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Los Angeles

Sharing In and Sharing Out:

The Equity Implications of

Informal Vehicle-Sharing

A dissertation submitted in partial satisfaction of the
requirements for the degree Doctor of Philosophy
in Urban Planning

by

Julene Vera Paul

2023

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ABSTRACT OF THE DISSERTATION

Sharing in and Sharing Out:

The Equity Implications of

Informal Vehicle-Sharing

by

Julene Vera Paul

Doctor of Philosophy in Urban Planning

University of California, Los Angeles, 2023

Professor Evelyn A. Blumenberg, Chair

U.S. residents travel in cars for the vast majority of their trips. Yet car travel imposes costs on the individual (in terms of out-of-pocket costs) and society (via air pollution, congestion, and collision rates). Urban planners, policymakers, and elected officials have enacted many policies to subsidize and promote shared-vehicle travel – including via public transit – to mitigate these costs. Yet despite the billions of public dollars poured into public transportation, most shared travel in the U.S. occurs in private cars. And by extending mobility to people with limited car access, informal automobile sharing – with household members, friends, coworkers, and strangers – also offers benefits to disadvantaged travelers. But due to data limitations and policy emphases on public forms of shared travel, few researchers have systematically examined the relationship between transportation disadvantage and informal sharing.

In this dissertation, I use mixed methods to answer different aspects of a single question: What utility does informal vehicle-sharing offer U.S. travelers? In the first essay, I use quantitative methods to explore the factors that determine whether a traveler chooses to share. In particular, I emphasize how disadvantage (in the form of medical conditions, poverty, and vehicle access)

influences informal automobile sharing. Using data from the 2017 National Household Travel Survey (NHTS), I model automobile sharing as an expression of rational choice and thus a proxy for the utility it offers travelers. I find that while transportation disadvantage is associated with certain sharing behaviors (including borrowing cars and receiving rides from people living in other households), trip purposes – particularly non-work-related ones – best predict the likelihood of sharing a private vehicle.

In the latter two essays, I analyze data from the Craigslist rideshare board to examine the opportunities and challenges people face in ridesharing with strangers. In the second essay, I use mixed methods to analyze web-scraped data. I examine the physical qualities of trips desired and offered on Craigslist and how they varied across California regions. I also measure the frequency and types of compensation that posters mentioned. In the third essay, I use qualitative methods to analyze information from surveys of and interviews with people who posted on the Craigslist rideshare board. I evaluate how often they successfully rideshared and how they balanced the risks and rewards of interacting with strangers.

Findings from the three essays highlight the potential of informal vehicle-sharing to address social and environmental challenges in the U.S. Millions of empty seats fill streets and highways every day, while many disadvantaged people struggle to meet their daily travel needs. Based on my findings, I recommend policies that provide automobile-based assistance – such as subsidized carshare programs – to low-income families. To facilitate ridesharing between strangers, I recommend that public agencies create digital applications to help people match with other travelers. I also recommend that agencies consider pricing road travel by distance, to make *non-sharing* – and particularly driving alone across long distances – costlier. Doing so will help increase opportunities to share for all travelers.

The dissertation of Julene Vera Paul is approved.

Brian D. Taylor

Michael K. Manville

Susan L. Handy

Evelyn A. Blumenberg, Committee Chair

University of California, Los Angeles

2023

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VITA

EDUCATION

- 2016 Rutgers, The State University of New Jersey
Master of City and Regional Planning
- 2013 Harvard College
A.B. in Social Studies, *cum laude*

REFEREED PUBLICATIONS

- 2022 Paul, Julene. Work from home behaviors among U.S. urban and rural residents. *Journal of Rural Studies*, Vol. 96. pp. 101-111 DOI: 10.1016/j.jrurstud.2022.10.017
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- 2023 Paul, Julene and Brian D. Taylor. Shifting transit use in COVID-19 pandemic and its implications for transit's recovery. UCLA Institute of Transportation Studies Policy Brief. DOI: 10.17610/T6RP62

GRANTS AND AWARDS

- 2023 Dwight David Eisenhower Transportation Fellowship, Federal Highway Administration
2023 UTC Student of the Year Award (Pacific Southwest Region), USDOT
2022 Dissertation Year Fellowship, UCLA Institute of Transportation Studies
2022 Planners of Color Interest Group Award, Association of Collegiate Schools of Planning
2022 Dissertation Year Fellowship, University of California Office of the President
2022 Doctoral Student of the Year, Pacific Southwest Region University Transportation Center
2022 Dwight David Eisenhower Transportation Fellowship, Federal Highway Administration
2021 Dr. George M. Smerk Scholarship, American Public Transportation Foundation
2021 Dwight David Eisenhower Transportation Fellowship, Federal Highway Administration
2020 Jack R. Gilstrap Scholarship, American Public Transportation Foundation
2020 Dwight David Eisenhower Transportation Fellowship, Federal Highway Administration
2019 BYD Scholarship, Women's Transportation Seminar - Los Angeles
2019 Graduate Research Mentorship Fellowship, University of California, Los Angeles
2019 Railway Association of Southern California Scholarship
2018 Eugene Cota-Robles Fellowship, University of California, Los Angeles
2016 Presidential Management Fellowship, U.S. Office of Personnel Management
2016 Mortensen/Voorhees Award for Highest Achievement in Transportation, Rutgers
2016 Ralph Bunche Outstanding Graduate Fellowship, Rutgers University
2012 David Rockefeller International Experience Grant, Harvard University

TEACHING EXPERIENCE

- 2022 Instructor of Record, University of California, Los Angeles
Introduction to Cities and Planning

URBAN PLANNING EXPERIENCE

- 2016 U.S. Department of Transportation, Federal Transit Administration Region IX
-18 Program Manager/Presidential Management Fellow
2017 U.S. Department of Interior, Fish and Wildlife Service
-18 Visiting Fellow, Pacific Remote Islands Marine National Monument
2015 Port Authority of New York and New Jersey
-16 Transportation Planner, Port Authority Trans-Hudson (PATH)

CHAPTER 1 – Introduction. *Why study sharing?*

Sharing is a fundamental human behavior. Social scientists from fields as diverse as economics and anthropology recognize that humans have long collaborated to share resources and that these practices have great social, cultural, and economic importance. But sharing is not a uniform activity. Patterns differ by the extent and nature of people’s social networks, the spatial contexts and cultures they inhabit, and even their personalities. Further, the nature of sharing differs by the relationship between the engaged parties. For example, sharing a meal with a family member likely arises from different motivations – and presents a different subjective experience – than sharing the highway with thousands of strangers.

Sharing plays a special role in cities and is thus relevant to the field of urban planning. Urban economists argue that opportunities to share partly explain the existence of cities (Duranton & Puga, 2020; Rosenthal & Strange, 2004), where high population densities increase the pool of potential sharing partners (Finck & Ranchordás, 2016). Sharing resources can also mitigate the downsides of living and working in cities. These downsides include, among others, road congestion, high land costs, and competition for limited natural resources (Brueckner, 2011). Relatedly, sharing can lower the costs of private ownership and increase access to a diversity of specialized goods and services (Buchanan, 1965). But despite the value it offers, sharing has its drawbacks. These include issues related to uncertainty, coordination, and the discomfort people feel in crossing personal boundaries.

Turning to transportation, public policies and planning may encourage or hinder vehicle-sharing. U.S. residents travel via public shared vehicles – including on transit – less often than in other countries. Indeed, U.S. rates of private vehicle travel are the third highest internationally, behind only Canada and New Zealand (Fountas et al., 2020). These rates reflect the fact that in the

U.S., automobile travel offers enormous accessibility advantages; given the same travel time budget, travelers can reach far more destinations via automobile than public transit (Owen & Murphy, 2018, 2019). But private automobile travel in general imposes high internal costs on the individual (in out-of-pocket expenses) and on society (via air pollution, congestion, and collision rates) (I. U. J. Becker et al., 2012). Solo driving, while convenient for most American travelers (Glaeser & Kahn, 2004), exacerbates these costs.

To address mobility challenges for disadvantaged travelers and the negative externalities of automobile travel, transportation planners have sought to reduce single-occupancy vehicle (SOV) use – via vehicle-sharing and otherwise (Cohen & Kietzmann, 2014). But researchers who emphasize shared modes like public transit tend to overlook shared private automobile travel generally and *informal* automobile sharing in particular. In defining informal automobile sharing, I include four categories: (1) car borrowing, (2) traveling with household members, (3) traveling with non-household members (including family, friends, and acquaintances), and (4) ridesharing with strangers. All these behaviors involve the shared use of a private vehicle but have unique characteristics that present different costs and benefits – in terms of time, money, and psychologically – to travelers.

Research on private vehicle-sharing is limited. For example, searching for the term “carpooling” in Google Scholar returns about 44,500 results, while a search for “public transit” generates 2.9 million results (Google, 2023). Yet in 2017, 2.5 percent of trips by U.S. residents took place on public transit, while 15.9 percent of trips took place in cars with travelers from different households (Federal Highway Administration, 2018a). Among those relatively few studies that analyze U.S. shared automobile use, most examine the work commute (Neoh et al., 2017). This emphasis on commuting in studies of informal vehicle-sharing is striking, as over 90

percent of inter-household carpool trips served non-commutes in 2017 (Federal Highway Administration, 2018a). And with the recent rise of working-from-home, the share of U.S. trips that serve non-work purposes has only grown (Caros et al., 2023; Javadinasr et al., 2022). Transportation professionals thus must increasingly look beyond the work commute to effectively plan for emerging transportation needs.

Shared automobile travel may help reduce transportation inequity and mitigate the challenges facing disadvantaged travelers (Lovejoy & Handy, 2011). Cars are expensive to own and operate, meaning that many low-income Americans cannot afford them (Smart & Klein, 2020). In the U.S., policymakers have addressed the mobility needs of low-income, auto-less people by subsidizing public transit (Sanchez, 2008). Yet in virtually all U.S. neighborhoods, public transit offers inferior levels of access compared to private automobiles (Owen & Murphy, 2018, 2019). Thus, a sizeable proportion of U.S. residents who do not own cars take many of their trips in automobiles anyway (Blumenberg & Thomas, 2014). The accessibility gaps between disadvantaged and non-disadvantaged travelers also reflect the fact that many U.S. policies inadvertently – or advertently – encourage solo driving (Shill, 2020).

Informal automobile sharing may also produce positive externalities that benefit society. In cases where high-occupancy vehicle (HOV) travel replaces SOV travel, for example, it may reduce congestion on roads and levels of air pollution (Shaheen et al., 2018). Further, by enabling greater access to automobile travel, increased vehicle-sharing rates could cause households to reduce the number of automobiles they own (Blumenberg et al., 2018). Over the long term, then, this could lower the environmental and economic impacts of devoting large swaths of land to parking (Chester et al., 2010).

The lack of attention to automobile sharing also reflects transportation research and policy emphases on urban travel. For the most part, formal systems of sharing – like public transit, carshare, and bikeshare programs – require a sufficient density of activity to justify them (Shaheen & Cohen, 2020). But most U.S. residents do not live in dense downtown areas; instead, they live in suburban, small-town, or rural neighborhoods (Mitchell, 2020). Rural travelers have especially limited access to formal shared mobility options (Pyrialakou, 2016). Continued research emphasis on formal sharing, then, may especially overlook the travel needs of residents living outside of urban centers.

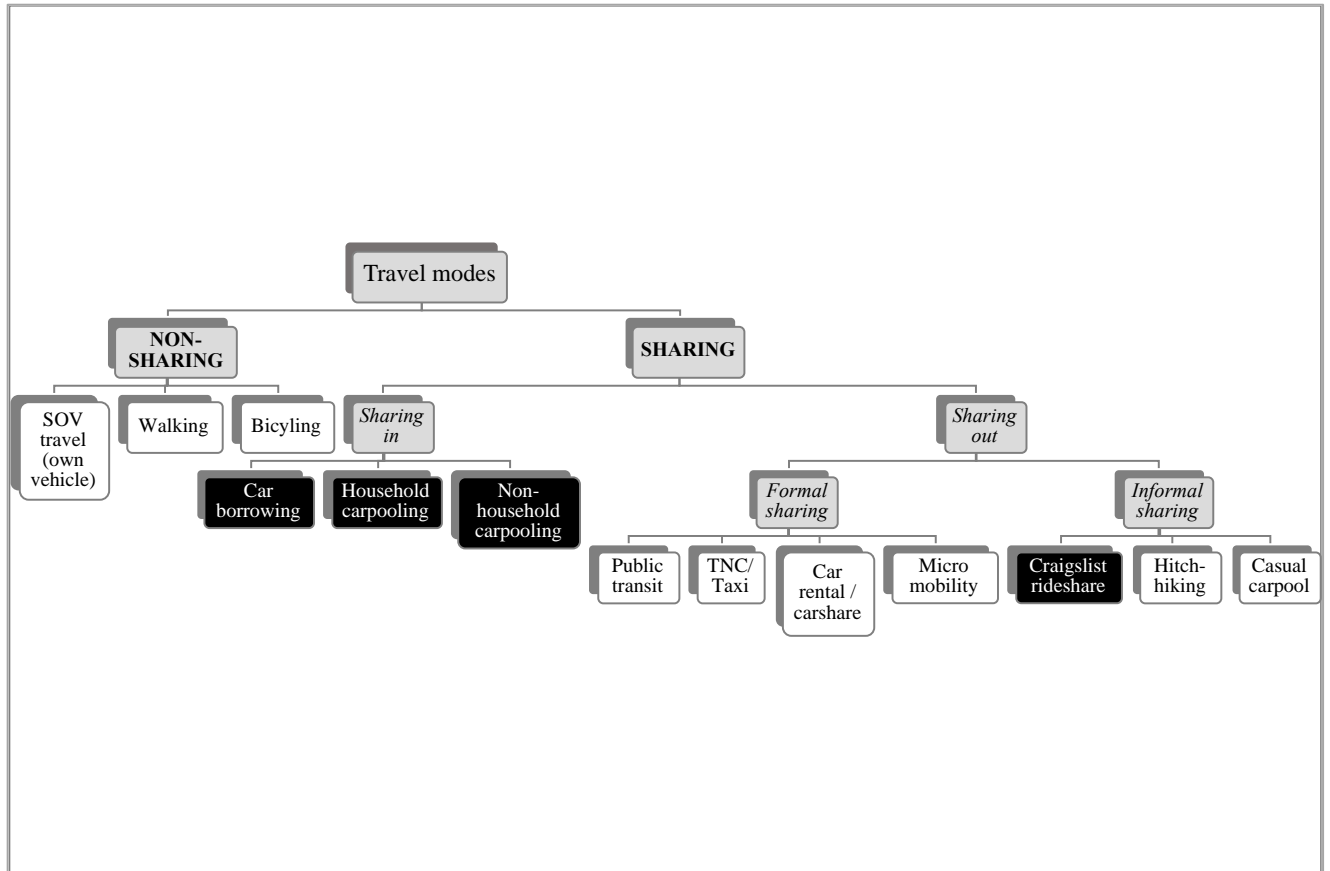
Many environmentally- and equity-minded planners continue to prioritize building new subways and bikeshare systems. Yet such efforts fail to address the current transportation needs of many Americans (and particularly disadvantaged ones). Meanwhile, millions of empty seats in private cars travel along highways every day, representing an untapped and valuable resource. In this dissertation, I address gaps in the research on informal vehicle-sharing. Using mixed methods, I draw on theories from travel behavior scholarship to examine what motivates people to share automobiles. I address different aspects of a simple question:

Does informal vehicle-sharing offer utility for different types of travelers and in different situations?

As I noted earlier, I emphasize informal modes of shared vehicle travel rather than formal ones. In the “formal” category I include public transit, ridehail, and carshare/rental services, all cases in which third parties coordinate sharing. In the “informal” category, I include private automobile borrowing and trips including at least one passenger, which are not arranged or managed by a third party (e.g., a private company or public agency). Examining different types of travel also helps address differences between **sharing in** – within one’s inner circle – and **sharing**

out – with members of a wider community, often with strangers (Belk, 2010). Figure 1 shows a graphic representation of the relationships between the different forms of shared travel I explore in the following three essays.

Figure 1 *Typology of vehicle-sharing, sharing in versus out, and formal versus informal modes*



This project fills a gap in the travel behavior literature on informal vehicle-sharing in the U.S. Informal automobile sharing likely offers different utility, and in different situations, from the more-often-studied formal types of sharing. Increased vehicle-sharing may help to close mobility gaps between travel haves and have-nots. It may also produce sustainability benefits by facilitating more efficient use of transportation infrastructure. Assessing the utility of informal sharing may thus assist efforts to address intractable accessibility challenges.

Dissertation structure

This dissertation comprises three essays, which may be read as standalone papers. They examine different aspects of transportation sharing in its informal manifestations. The essays build upon theories that I introduce in the Literature Review and results from the previous chapters. In the Conclusion, I further draw connections between findings from the three analyses.

In the Literature Review (Chapter 2), I introduce research on vehicle-sharing. I first describe social scientific perspectives on sharing and what motivates people to do it. I then review the literature on formal and informal types of shared transportation. After examining the relationship between informal vehicle-sharing and resource access, I identify gaps in the travel behavior and planning literatures. These include vehicle-sharing for non-commute trips, differences in inter versus intra-household sharing, and the costs and benefits of ridesharing with strangers.

In Essay 1 (Chapter 3), I draw on trip data from the 2017 National Household Travel Survey (NHTS), a national survey of travel behavior in the U.S. In this quantitative analysis, I use multinomial probit modeling to predict automobile sharing as an expression of rational choice. Combs et al. (2016) define *transportation disadvantage* as “a mismatch between the need for mobility and accessibility and the travel options available” (p. 68). My definition of transportation disadvantage builds on this definition and includes people who live in low-income households, have physical conditions that limit travel, and/or have low levels of automobile access; people with these characteristics tend to have few travel options relative to their mobility needs. In defining informal automobile sharing in Essay 1, I develop five categories distinct from private SOV travel, which account for different dimensions of inter-household and intra-household automobile sharing. I find that transportation disadvantage is associated with certain sharing subtypes, particularly borrowing cars and receiving rides from members of other households. However, trip

purpose – particularly when travelers make non-commute/work trips – better predicts the choice to share. The association of trip purpose with sharing is stronger among non-disadvantaged travelers. Some disadvantaged travelers may thus share because they *need* to, while other travelers share because they *want* to. Together, these findings suggest that sharing benefits disadvantaged travelers, but that the social and situational context also influences the decision to share.

In Essay 2 (Chapter 4), I analyze data from posts on the Craigslist rideshare board to explore its potential for meeting traveler needs. I examine how the informal nature of Craigslist – a website on which people semi-anonymously post requests and offers for shared trips – distinguishes it from formal sharing opportunities. I emphasize physical patterns in the types of trips people listed, differences across California regions, and the positive and negative aspects of ridesharing that posters identified. I find that rideshare posters tended to list intercity trips, although many income-seeking posters also offered services within cities. Posters mentioned both economic and social factors as motivations to rideshare. Some Craigslist users also acknowledged the socioemotional costs of sharing with strangers in their posts.

In Essay 3 (Chapter 5), I draw on data from surveys and interviews with Craigslist rideshare posters to analyze the process of arranging rides with strangers. First, I find that relatively few posters found rideshare partners via Craigslist. People who gave rides for pay and did not travel to shared destinations – acting like taxi drivers – tended to have higher rates of success in connecting with other travelers. Meanwhile, people who requested rides seldom reported making rideshare connections. Travelers also strategically used heuristics like gender and communication styles to overcome concerns about sharing space with strangers. Craigslist posters who responded to my queries also mentioned apprehension about violence or expectations of sexual favors. Yet while some travelers reported harassment, none reported experiencing violence or assault. Many

different factors influenced the propensity to rideshare. However, individual and idiosyncratic factors especially informed orientations toward sharing. These included histories of hitchhiking or regular ridesharing with strangers.

In the Conclusion (Chapter 6), I synthesize the findings from the three analyses. I then discuss additional policy considerations and identify opportunities for future research. I conclude by exploring how transportation researchers draw on their own mobility biographies and make normative judgments about travel. Transportation and planning scholars often research topics related to their personal travel experiences. This may contribute, however, to the dearth of research on automobile sharing, and an underappreciation of its potential to improve mobility for disadvantaged travelers.

CHAPTER 2 – Literature Review. *Sharing, mobility, and equity*

1. Introduction

Sharing is a complex behavior influenced by an array of social and economic factors. In this chapter, I review social scientific perspectives on sharing and how they might explain patterns of vehicle-sharing in the U.S. I divide this literature review into a summary of (1) perspectives on sharing from economics, sociology, and anthropology, (2) issues in shared mobility, and (3) the relationship between informal automobile sharing and transportation disadvantage. I conclude by identifying gaps in the automobile sharing literature.

2. Defining sharing

What is sharing? Scholars – not to mention policymakers and businesspeople – have failed to produce a single definition of sharing. Most social scientists agree that sharing has occurred for thousands of years and has a unique social component (Belk, 2010; Benkler, 2012; Price, 1975). Some scholars have argued that economic changes and increasing “competitive individualism” over the last few centuries have decreased the natural human tendency to share (Agyeman & McLaren, 2017). Yet, in contemporary society, people continue to regularly share food, housing, and information (Belk, 2010; J. Kennedy, 2016). And recently, digital platforms have helped to facilitate the exchange of underused goods, such as spare rooms and clothing, as part of what has been termed the “sharing” or “platform” economy (Benkler, 2012; Finck & Ranchordás, 2016). Some scholars have argued that these developing technologies will lower ownership rates and produce environmental benefits (Heinrichs, 2013). But despite the increased attention to sharing linked to technological change, sharing encompasses actions that predate the growth of digital platforms, as I detail below.

2.1 Types of sharing

Definitions of sharing often vary by discipline, including those proffered by anthropology (Widlök, 2013), geography (Cockayne, 2016), and marketing (Eckhardt & Bardhi, 2016) scholars. This partly reflects the fact that the term “sharing” has a positive connotation; attaching the “sharing” label, then, reflects normative judgments researchers and businesspeople make (Acquier et al., 2017; Finck & Ranchordás, 2016). In defining the term, scholars have distinguished between **caring-based** sharing – for example, offering childcare or cooking a meal for another person (Belk, 2017) – and sharing **access** – for example, to a room in a home (Yaraghi & Ravi, 2017). Before the recent rise of the so-called sharing economy, many social scientists examined the care-based prototype and identified sharing as common in the interior world of the home (and that occurred primarily among family members) rather than in market transactions (Belk, 2010). Modern studies often emphasize sharing outside of the home, accompanying the growth of “sharing” city initiatives that aim to facilitate collaborative consumption throughout entire districts and even regions (Finck & Ranchordás, 2016).

A related distinction contrasts *sharing in* with *sharing out* (Widlök, 2013), which differ in terms of the relationships between participating parties. People *share in* with people they know, particularly family but also friends and acquaintances. However, they *share out* primarily with strangers (Widlök, 2013). Personal ties also help dictate the effects of the two types of sharing (Belk, 2010). Belk (2010) argues that when sharing in, a person includes others “within the aggregate self”; sharing out, by contrast, explicitly crosses “boundaries separating self and other” (p. 725). Kennedy (2016) notes that sharing in comprises “a cultural process of community inclusion,” while sharing out “creates no social ties” (p. 462).

Empirical research indicates that U.S. residents exchange resources (outside of the market) in kin-based relationships more often than in relationships with friends or acquaintances (Hofferth & Iceland, 1998). Further, family sharing – either in money, goods, or time – usually moves down the generational line, particularly at an early age, although this reverses as parents and offspring age (Hofferth & Iceland, 1998). Addressing intra-family sharing, Price (1975) argues that it reflects early human tendencies toward a sexual division of labor. Sharing in can also occur outside of the household and nuclear family. People with whom one might share in include extended family members, friends, and neighbors (Belk, 2010). Belk (2017) suggests that a person may integrate non-kin into her pseudo-family through the sharing in process.

Sharing out, meanwhile, tends to characterize exchanges that happen outside of the family or household and occurs especially with strangers (J. Kennedy, 2016). In many cases of sharing out, people share the use of public resources (such as parks and education) (Belk, 2017; Buchanan, 1965). But despite its benefits, sharing out can be difficult, presenting even greater challenges in large communities (Beggs et al., 1996). One barrier is a lack of trust. When strangers share a common pool of resources, they cannot ensure that others will use the resources responsibly (Standing et al., 2019). In the related problem of “free riders,” some participants may refuse to contribute toward shared resources that they use (Buchanan, 1965). Another barrier is fear of the “leaky self,” or the discomfort that arises from a sense of contamination or impingement on privacy by strangers (Belk, 2010; Gregson & Crewe, 2003).

Third parties can mediate hindrances to sharing out. For example, governments facilitate the shared use of public roads (Buchanan, 1965). Organizations may reduce “moral hazard” and pool risk by screening participants (Horton & Zeckhauser, 2016). Price (1975) further notes that information processing limits of the human brain cap sharing, as people cannot personally know

all potential sharing partners. Writing in the 1970s, he predicted that developing technologies could expand sharing opportunities (Price, 1975).¹

While virtually all research suggests that people share in more often than they share out, these dynamics vary by the individual and the situation (Belk, 2010). Further, whether a person shares in or shares out depends not only on the individual but also on the norms and practices of the social world and community he inhabits (Belk, 2010). For example, some work suggests that compared to non-immigrants, recent immigrants to the U.S. are more likely to collaborate and exchange resources outside of their immediate families (P. S. Li, 2004). They thus maintain different – arguably wider – boundaries for sharing in than do non-immigrants. Meanwhile, Belk (2010) argues that contemporary Western societies tend to maintain stricter barriers to sharing in than do many non-Western ones. Anthropologists studying sharing, for example, often examine practices of food sharing. Belk (2010) reviews studies of the Hadza (of Tanzania) (Woodburn, 1998), the Inupiaq (of Alaska) (Bodenhorn, 2005), and residents of Mangaldihi, India (Lamb, 2000). He contrasts countries in the West with traditional Aboriginal cultures in Australia, which have stronger norms of sharing than private ownership (Belk, 2010).

2.2 Motivations to share

Some amount of sharing is prevalent in most societies. But why do people share? Echoing the distinction between sharing in and sharing out, I describe two clusters of motivations: those related to cost reduction and those based on non-financial benefits.

2.2.1 Sharing to reduce costs

Sharing can lower costs by enabling people to forego or reduce the financial burdens of owning a good (Acquier et al., 2017). When sharing access, a person can pay for the temporary

¹ As I detail in Essay 3, increased information availability (communicated through digital technologies) helps users to monitor the behavior of others and evaluate the risks they present (Benkler, 2012).

use of something, thus attaining the optimum marginal benefit without incurring the fixed costs of ownership (Acquier et al., 2017). Further, *owners* can benefit from sharing underused capacity (Finck & Ranchordás, 2016). For example, a person who rents out a spare bedroom receives income and thus reduces the cost of homeownership (Horton & Zeckhauser, 2016).

Buchanan's (1965) work on "club goods" – a concept related to sharing access – also provides insight into how and why people share. Buchanan defines club goods as falling between purely private and public goods, involving a type of "cooperative membership" that extends "ownership-consumption rights over differing numbers of persons" (Buchanan, 1965, p.1). He argues that the packaging of a club good depends on the cost of the fixed good, the nature of how one uses the good (including its congestion limits), and the price people will pay to use it (Buchanan, 1965). Club goods also provide users with access to a larger array of services than available via individual ownership. Because sharing access reduces user costs, club goods may prove especially attractive to low-income people (Buchanan, 1965). Certain versions of sharing access – notably, goods rental – not only reduce the cost of ownership but generate profits for the owner (Horton & Zeckhauser, 2016).

2.2.2 Sharing for socioemotional benefits

In addition to its economic benefits, sharing has non-financial value. For example, sharing can contribute to what Becker (1974) calls one's "social income," a combination of a person's monetary income and the value she assigns to her social environment. Cases of sharing with family and friends, in particular, may provide emotional value (Belk, 2010). But even sharing out with strangers may produce non-monetary benefits. For example, Akerlof and Kranton (2000) studied how generous or fair behavior may be important to a person's identity and thus provide her with value (Sobel, 2005). Similarly, Andreoni (1990) identified the "warm glow" associated with

charitable giving. And belonging to a food cooperative may generate positive feelings of community, even if members do not interact (Benkler, 2012).

Sociocultural norms also influence practices of sharing. For example, World War II-era efforts to encourage carpooling in the U.S. appealed to patriotic sentiments to conserve resources such as gas and rubber for the war effort (Ferguson, 1997). Recently, public outreach programs related to utilities and energy use have highlighted the positive environmental impacts of sharing (Gadenne et al., 2011; Martinsson et al., 2011; Schwartz et al., 2015). Findings from ethnographic research also suggest that certain sharing practices reflect the value of sharing itself (Widlök, 2013). For example, anthropologists have argued that food-sharing practices reflect sociocultural norms of group ownership (Belk, 2010; Woodburn, 1998).

2.3 Reciprocity

Scholars have also examined the role of reciprocity in practices of sharing. In cases of sharing, the recipient may compensate the sharer and/or owner of the shared good. Immediate reciprocity – usually in the form of payment at a fixed price – characterizes market exchanges (Sobel, 2005). Most cases of sharing out assume some reciprocal exchange, as in the case of shared financial responsibility for a vacation home (Sparks et al., 2008).²

Yet social scientists have reached less consensus on the relationship between reciprocity and practices of sharing in. Price (1975) defines sharing as allocating goods or services “without calculating returns” (p. 4) and thus argues that reciprocity is not a fundamental aspect of sharing. Anthropologists, particularly ethnographers, have also argued that some sharing practices are non-reciprocal. Belk (2010) agrees, writing that sharing lacks the expectation of neither immediate nor future compensation. Similarly, Acquier et al. (2017) argue that sharing does not involve

² In Essays 2 and 3 I explore whether this remains true in ridesharing with strangers (a unique form of *sharing out*).

reciprocity, and thus criticize market-based sharing as not “true” sharing. However, other researchers argue for a strong role for reciprocity, even when sharing in. Widlok (2013) cites the work of Ridley (1997) as representative of this perspective, in which practices like the hunter’s sharing of meat resemble the selling and buying of commodities in the stock market.

Of course, strictly distinguishing between reciprocal and non-reciprocal actions may oversimplify the complexities of how people exchange resources. For example, repeated instances of sharing may generate trust and social capital among participants (Sobel, 2005). People may ignore immediate gains, prioritizing social value in future interactions (Hofferth & Iceland, 1998). Sharing also helps people develop “weak ties.” These ties, which facilitate access to a large and diverse pool of resources, encourage reciprocal exchanges among acquaintances who may not know each other well (Granovetter, 1973). Researchers have identified links between positive employment outcomes and the number of weak ties people have; these weak ties are particularly valuable for low-skill workers (Zenou, 2015). Further, people can reciprocate by providing emotional support or granting high social standing to a person (Sahlins, 1972). Whether or not such an exchange is “reciprocal,” then, depends on one’s definition of reciprocity.

2.4 Sharing in space

Finally, because of its relationship with spatial factors, sharing has attracted the attention of urban planners and transportation researchers. Sharing can be pragmatic in cities, in which large markets exist for shareable goods. Indeed, Finck and Ranchordas (2016) contend that cities developed partly because they offer opportunities to share information and goods. Studies of urban agglomerations describe how sharing both causes and arises from dense concentrations of economic activity (Duranton & Puga, 2004). When firms locate close to each other, they reap productivity benefits – or returns to scale – as people share goods, including those with high fixed

costs (Rosenthal & Strange, 2004). Due to their sharing opportunities, cities also provide access to a greater variety of goods than non-urban places (Duranton & Puga, 2004).

As I noted above, sharing occurs not only because of physical opportunity (e.g., density and proximity to activity) but also because of social and personal factors. Patterns of sharing practices can arise from place-specific norms – including distinctions between urban and non-urban places. In one early study of cities, Wirth (1938) examined the social dynamics present in urban life. He hypothesized that when people left small towns and migrated to large industrial cities, they experienced a breakdown in intimate economic relationships and thus “community” (Wirth, 1938). Wirth’s hypotheses imply that urbanites might share less often than non-urbanites, as they face larger trust concerns and weaker social ties. Subsequent research, however, has challenged Wirth’s theories. Instead, empirical studies indicate that urban people still maintain strong social ties within their communities (C. S. Fischer, 1982).

However, it remains unclear whether practices of sharing in and sharing out differ by community type and size. Some studies have suggested that rural residents share in – by exchanging resources – more often than urban residents do (Hofferth & Iceland, 1998). Higher rates of sharing and resource exchange among rural people may arise from lower spatial access to shared public resources (and thus fewer opportunities to share out). Yet even controlling for these differences, rural people still appear to share differently – including by exchanging more often with family than with friends – than urban people do (Hofferth & Iceland, 1998). Social norms, then, may influence different rates and types of sharing and resource exchange between urban and rural residents, even after accounting for physical proximity to sharing opportunities (Hofferth & Iceland, 1998).³

³ See Chapter 5, and in particular Section 2.1, for a discussion of other factors (including information access and risk management) that influence sharing with strangers.

3. Transportation and sharing

Shifting now to transportation practices, sharing can occur in different aspects of travel. While some sharing occurs in virtually all travel modes – for example, in the use of roads and sidewalks – this review echoes the literature’s focus on *vehicle* sharing (National Academies of Sciences, Engineering, and Medicine, 2016). Per this definition, non-sharing includes driving alone, walking, and bicycling.⁴ But despite recent attention to new shared mobility technologies (like those that enable ridehail and scooter-share services), people have shared vehicles for centuries. After establishing the prominence of the automobile in the U.S., I describe types of shared vehicle modes and how transportation policy has promoted their use.

3.1 Influence of the private automobile

Despite growing interest in shared mobility, the private automobile continues to dominate the transportation landscape, particularly in the U.S. In 2017, over 93 percent of U.S. households had access to automobiles, and 80 percent of U.S. workers commuted alone via private automobile (Federal Highway Administration, 2018a; U.S. Bureau of the Census, 2017a). Non-urban travelers rely even more heavily on cars. While in 2017, almost 83 percent of U.S. trips took place in private automobiles nationwide, this figure jumps to 91 percent in non-urban locations (Federal Highway Administration, 2018a).

Due in part to the private automobile’s dominance in the U.S., travelers with limited auto access face grave mobility challenges. Most members of zero-vehicle households in the U.S. do not own automobiles due to their high costs (Blumenberg & Pierce, 2012; Mitra & Saphores, 2017). Because most U.S. cities developed around the automobile, carless individuals in these places face significant challenges in accessing economic and social resources (D. A. King et al.,

⁴ Sharing can also occur with bicycling, as I describe in Section 3.2.

2019). Members of “carless” households, however, are not a static population, as low-income families regularly transition into and out of automobile ownership (Klein & Smart, 2017). Even in automobile-owning households, many low-income travelers struggle with unreliable vehicles (Klein, 2020) and limited vehicle availability (Blumenberg et al., 2020).

A lack of automobile access not only arises from but also can further perpetuate economic disadvantage. It can constrain access to economic opportunities as well as to healthcare, schools, and social activities (Farber & Páez, 2011). Limited automobile access can also restrict residential location choice (Jeon et al., 2018). Researchers have also documented the psychological burdens associated with limited auto access (Klein, 2020). And concerningly, the economic disparities between those with and without vehicle access in the U.S. have grown over the last several decades. They reflect the virtual necessity of owning cars in most American neighborhoods today (D. A. King et al., 2019).

Beyond ownership itself, the inability to drive also limits automobility. Barriers to driving exist for young people, older adults, people with disabilities, and unlicensed individuals (Farrington & Farrington, 2005). Recognizing these challenges, the federal government dedicates funding and resources – such as reduced transit fares and demand response van services – to older adults and people with disabilities (Carleton & Porter, 2018). Yet these programs seldom provide the level of access that private automobiles offer (Lubin & Deka, 2012).

But despite the high cost of automobile ownership, many low-income people in the U.S. still rely on private vehicles for travel. In the U.S., while most zero-vehicle households are low-income, most low-income people own automobiles (Blumenberg & Pierce, 2012). Even among people living in zero-vehicle households, over 21 percent of their trips occurred via private automobile and 28 percent via public transit in 2017 (Federal Highway Administration, 2018a).

While public transit is an important resource for zero-vehicle households, automobile sharing and carpooling play critical roles in providing mobility to disadvantaged travelers.

3.2 Shared mobility

In addition to traveling via single-occupancy (SOV) travel, walking, and bicycling, travelers can share the use of a vehicle. Advocates and scholars often use the term “shared mobility” to refer to forms of sharing like public transit, carpooling, and micro-mobility (Shared-Use Mobility Center, 2015). Transportation sharing can be sequential – in which different people use the vehicle exclusively for a period – or concurrent – in which multiple people simultaneously travel in the vehicle. These sharing forms offer different benefits to the user and the environment; they also suit certain trips and users better than others (National Academies of Sciences, Engineering, and Medicine, 2016).

Public transit, a concurrent form of shared mobility, has existed since at least the 19th century (National Academies of Sciences, Engineering, and Medicine, 2016). Public transit modes include rail, buses, ferries, and demand response systems (also known as paratransit) (Shaheen & Cohen, 2019). In the U.S., the public sector provides subsidies to support the provision of service, construction of systems, and purchase of vehicles. But despite growth in subsidies, particularly since the mid-1990s (Taylor & Morris, 2015), per-capita public transit ridership remains low; in 2017, Americans took less than three percent of all trips via public transit (Federal Highway Administration, 2018a). National transit ridership has dropped even further since the start of the COVID-19 pandemic and has not yet recovered (Paul & Taylor, 2022). U.S. public transit users tend to have low levels of automobile access and median incomes (Taylor & Morris, 2015), suggesting that many riders take public transit because they cannot travel via automobile. This is

especially true of bus riders in the U.S., who are more likely to be low-income and non-white than the average American (Taylor & Morris, 2015).

In recent decades, researchers and policymakers have studied sequential shared mobility modes like bikeshare and carshare systems. With these services, the user temporarily borrows or rents the vehicle. Bikeshare and carshare systems can be public or private and dockless or have fixed stations (Shaheen & Cohen, 2020). While sequential shared mobility systems have existed since the 1990s, technology developments – including the ubiquity of smartphone access – have renewed interest in these services (National Academies of Sciences, Engineering, and Medicine, 2016). Unlike public transit riders, sequential shared mobility users tend to be younger, have higher levels of education and incomes, and are more likely to be white compared to the average U.S. traveler (Kaviti et al., 2019; E. Martin & Shaheen, 2011; Taylor & Morris, 2015).

Some researchers have characterized ridehail (e.g., Uber and Lyft) as a form of shared mobility. Ridehail companies connect users with drivers in private automobiles. Independent contractors own and operate these vehicles.⁵ However, researchers and policymakers have disagreed about whether to apply the “shared mobility” label to ridehail. Controversy about the use of “ridehail” versus “rideshare” to refer to Uber and Lyft – including the Associated Press stylebook’s insistence on retiring the latter (Warzel, 2015) – reflects this ambiguity. If one adopts the “sharing” terminology, ridehail companies offer opportunities for both sequential sharing (in that parties hail rides separately from one another) and concurrent sharing (including through the UberPool/UberX Share service, in which strangers travel simultaneously in a vehicle) (Morris et

⁵ The employment status of drivers has been subject to legal challenges (Harris, 2017; Weil, 2017).

al., 2020).⁶ In the former case, ridehail services resemble taxis, which provide passengers with shared sequential use of a private vehicle.

3.3 Shared mobility, public policy, and the built environment

Policymakers have expressed interest in newer shared mobility systems as supplements to public transit. Several U.S. agencies now operate and/or subsidize bikeshare, carshare, and e-scooter systems. Transit agencies in San Francisco and Los Angeles County have built their public bikeshare systems to facilitate connections to major transit stations and stops (Shaheen & Chan, 2016). Bay Area Rapid Transit (BART) – a heavy rail system serving the greater Bay Area in California – launched carshare programs to increase access to and from its stations (Shaheen et al., 2010). In addition to offering an on-demand rideshare service in some of its neighborhoods (Amato, 2021), the city of Los Angeles also subsidizes a public electric carshare program that specifically targets low-income users (Tinoco, 2018).

Some North American transit agencies have explored ridehail’s potential to enhance public mobility (Shurna & Schwieterman, 2020). Larger cities and agencies have subsidized ridehail to solve the “first-mile/last-mile” problem⁷ to help riders reach fixed transit stops and stations (Shaheen & Chan, 2016) and as a replacement for costly paratransit services (Jordan, 2018). Other agencies – particularly those located in smaller towns – have subsidized ridehail services to replace fixed routes (Lindt, 2021) and even their entire systems (Cecco, 2019). However, the use of ridehail as part of the public sector approach to transportation sharing has generated controversy (Shaheen & Chan, 2016). Critics note the private nature of companies, the contested employment

⁶ Evidence suggests that the large majority of Uber and Lyft trips are sequential (at least among different parties). Even when people request to partake in concurrent sharing with another rider, the application often fails to match them with other travelers (Young et al., 2020).

⁷ The “first-mile/last-mile” problem refers to the costs associated with reaching fixed transit stops from origins or destinations; access and egress to transit stops often comprise a large proportion of total travel time (Chandra et al., 2013).

status of ridehail drivers, and links between ridehail and increased vehicle miles traveled (VMT) (Cecco, 2019; Erhardt et al., 2019).

Meanwhile, population density, land use, and urban form all dictate the accessibility benefits provided by different travel modes, including shared mobility (Circella et al., 2018). Among public transit modes, rail systems efficiently serve dense downtown areas of monocentric cities, while buses are more cost-effective for less dense and peripheral parts of urban areas (Zhang, 2009). Meanwhile, bikeshare and carshare systems appear to function better in urban areas than in low-density parts of the U.S. (Shaheen & Cohen, 2020). Thus, the many Americans who live in far-flung suburbs and rural areas tend to have limited access to formal shared mobility systems.

4. Automobile sharing and disadvantage

Especially when contrasted with research on other shared mobility options, the scholarship on informal automobile sharing is small and uneven, although researchers agree on certain trends. As I noted earlier, in the following essays I explore four types of informal automobile sharing: (1) car borrowing, (2) traveling with household members, (3) traveling with non-household members, and (4) ridesharing with strangers. This definition of informal automobile sharing does not include trips when multiple travelers occupy a private vehicle driven by a hired worker (as with ridehail or taxis) nor carsharing, travel types I characterize as formal sharing (see Figure 1).

Many informal automobile sharing studies examine “carpooling.” This term requires some clarification. As with sharing and shared mobility, there is no universal definition of “carpooling” (Olsson et al., 2019). Most scholars and policymakers agree that carpooling requires that the trip include multiple people in a noncommercial private vehicle, thus excluding ridehail and taxis. But researchers disagree on the other factors that define a carpool trip. For example, some studies insist

that carpool trips include members from different households (Delhomme & Gheorghiu, 2016; Neoh et al., 2017) while others do not (Blumenberg & Smart, 2010; Ferguson, 1997; Lee et al., 2016). Some researchers define carpools as only serving the commute-to-work (Benita, 2020; Neoh et al., 2017; Olsson et al., 2019) while others include non-commute trips (J. Li et al., 2007; Shaheen et al., 2017). I note when researchers use any such restrictions in defining carpooling.

Below I review studies of the influence of different factors – primarily those associated with transportation disadvantage – on the likelihood of automobile sharing in its different forms. I begin by reviewing trends in vehicle-sharing over time. I then explore connections between transportation disadvantage and different types of informal automobile sharing.

4.1 Vehicle-sharing in the U.S. over time

In the U.S., HOV travel for the commute declined over the 20th century (after peaking during World War II amid fuel shortages). Ferguson (1997) notes that in the U.S., rates of carpooling to work – both internal and external to the household – declined especially sharply from the 1970s to the 1990s. He found that economic factors (such as the falling cost of owning/operating a vehicle) and sociodemographic factors (such as increased workforce participation by women) contributed to these declines. More recent data show further decreases in carpooling to work in the U.S. Rates fell from 13.4 percent in 1995 to 12.4 percent in 2009 (Blumenberg & Thomas, 2014).

The emergence of new technologies to match users and the rise of the platform economy,⁸ however, have renewed interest in carpooling, ridesharing, and automobile borrowing. Several app-based technologies pair users traveling to similar places and exploit underused capacity (i.e.,

⁸ The term “platform economy” refers to services like Airbnb, TaskRabbit, Uber, and Lyft, where platforms connect consumers with workers or goods owners. Most exchanges take place for money and users have access to reputational information about other users (Finck & Ranchordás, 2016; Schor & Attwood-Charles, 2017).

empty seats in private cars). Other new resources include peer-to-peer (P2P) carshare programs through which an automobile owner lends her private vehicle to others for a fee. Some of the studies I discuss below – including Hartl et al. (2020), Vanoutrive et al. (2012), Bachmann et al. (2018), and Prieto et al. (2017) – examine these applications.

4.2 Carpooling to work and disadvantage

As I noted above, low-income people in the U.S. are more likely to live in zero-vehicle households than people with higher incomes. Yet even among vehicle-owning households, rates of carpooling appear to reflect financial constraints. Using data from 2009, Blumenberg and Thomas (2014) examined rates of carpooling to work among U.S. residents who did and did not own vehicles and by income. Unsurprisingly, people without vehicle access carpoled to work more often (19.7%) than people with vehicle access (12.2%).⁹ But among those living in households with vehicle access, poor people carpoled to work far more often (26.0%) than non-poor people (11.2%). In both cases, they defined “carpool” as including both internal- and external-to-household HOV travel for the commute (Blumenberg & Thomas, 2014).

Gender, race, and ethnicity may affect the likelihood that a person carpoles to work, reflecting other sources of disadvantage. U.S. women (and especially mothers) make the majority of HOV trips involving children and thus face time poverty (Fan, 2017; Taylor et al., 2015). Childcare responsibilities – and the need to provide rides to children – can constrain the travel options of female commuters. For example, researchers surveyed Tucson commuters in the 1990s about policies to encourage them to switch from driving alone to carpooling or transit (Rosenbloom & Burns, 1993). Women were three times as likely as men to cite the arrangement

⁹ This discrepancy was much larger for commuting via public transit; 66.5 percent of people living in zero-vehicle households took public transit to work, versus only 3.3 percent of people living in vehicle-owning households (Blumenberg & Thomas, 2014).

of childcare as the single most important consideration in switching to vehicle-sharing for the commute (Rosenbloom & Burns, 1993). Meanwhile, race and ethnicity may also predict rates of carpooling to work. For example, recent immigrants (Blumenberg & Smart, 2010; Cline et al., 2009) and people who live in racially or ethnically homogenous neighborhoods (Charles & Kline, 2006) are more likely to carpool to work in the U.S., even after accounting for income and automobile access. These findings suggest roles for social networks and capital in increasing rates of vehicle-sharing for the commute (Charles & Kline, 2006; Cline et al., 2009).

4.3 Getting rides, ridesharing, and disadvantage

Studies have also addressed getting rides from other travelers, ridesharing, and their relationships to transportation disadvantage. Some researchers have focused on ridesharing's potential value for elderly travelers, as many of them cease driving due to health issues (Adler & Rottunda, 2006; J. Choi et al., 2019; Davey, 2007; Glasgow & Blakely, 2000). But while some older adults rely on other travelers for car rides, many of them express discomfort with asking people for rides (Burkhardt, 1999). Because many older adults do not drive, they cannot reciprocate by later returning the favor (M. Choi et al., 2019; Davey, 2007).

Children are another demographic group who, due to their inability to drive, frequently rely on other people (mostly parents) for rides. Much of the literature on child travel examines school trips and finds that most U.S. children travel to school as passengers in vehicles (McDonald & Aalborg, 2009). In turn, this may cause issues for parents (see Section 4.2 above). Childcare duties, in the context of transportation, can restrict employment opportunities for single mothers (Blumenberg & Manville, 2004; Chapple, 2001).

Researchers also find that ridesharing may especially benefit rural people. Because many rural areas have limited formal shared mobility options, rural residents without cars must rely on

informal channels to maintain mobility. To explore these issues, Combs et al. (2016) conducted interviews and focus groups with rural residents. Many of their interviewees with limited automobile access relied on informal assistance rather than formal paratransit services. Interviewees reported asking for rides from friends and family, using transportation provided by employers or community groups (such as churches), and compensating acquaintances for rides (Combs et al., 2016). Surveys of rural Irish people also found that people living in carless households strongly preferred getting car rides or borrowing automobiles over taking public transit (Gray et al., 2006). Some studies suggest that getting rides may be especially important for racial and ethnic minorities in rural areas, such as Mexican immigrants in California's San Joaquin Valley (Lovejoy & Handy, 2011) and Black people in small towns in North Carolina (N. S. Park et al., 2010).

4.4 Borrowing automobiles and disadvantage

Finally, a small body of literature addresses the practice of automobile borrowing among acquaintances.¹⁰ Studying informal automobile borrowing for the commute, Blumenberg and Thomas (2014) found that in 2009, almost 13.9 percent of Americans living in zero-vehicle households drove solo to work, meaning that they used another household's vehicle to do so.

Qualitative studies also confirm that people with limited automobile access regularly borrow the vehicles of family, friends, and acquaintances. In interviews with low-income families in Austin, Texas, Clifton (2004) found that many auto-less respondents borrowed automobiles from acquaintances. However, concerns about accidents and insurance dissuaded people from lending and borrowing automobiles (Clifton, 2004). In focus groups with recent Mexican

¹⁰ A much larger body of literature explores formal automobile borrowing, including carsharing. As I note above, carsharing is a formal type of vehicle-sharing coordinated by a third party. I thus do not review studies of carsharing and disadvantage here.

immigrants in California, Lovejoy and Handy (2011) also found that people with limited automobile access borrowed vehicles from people they knew. However, many travelers expressed hesitation about doing so; they similarly cited financial responsibilities associated with vehicle maintenance. Interviewees also preferred to borrow cars from close contacts (such as family members) instead of acquaintances (Lovejoy & Handy, 2011).

5. Summary and gaps in the automobile sharing literature

The above review suggests three findings concerning informal automobile sharing in the U.S. First, informal vehicle-sharing rates – particularly for the commute – have declined consistently over the past 70 years. However, they remain higher than rates of public transit use. Second, travelers experiencing transportation disadvantage – including people living in auto-less and/or low-income households – frequently rely on automobile-based assistance from other travelers. Third, people who receive informal transportation assistance from friends and family express concerns about how to compensate them. Aside from these findings, researchers do not agree on exactly how trip purpose, household relationships, and the nature of informality affect automobile sharing and the utility it offers travelers. To establish the project’s contribution to the literature, I describe four gaps in the research on vehicle-sharing.

5.1 HOV travel and the commute

One of the largest gaps in the vehicle-sharing literature is the use of HOV travel for *non*-commutes, an omission that reflects the U.S. transportation policy context over the last several decades. Researchers concerned with transportation demand management (TDM) programs began evaluating carpool programs in the 1970s. At that time, the federal government funded carpool demonstration projects to help communities comply with air quality mandates (Ferguson, 1997). Local and state programs also encouraged carpooling to reduce automobile travel during peak

hours. Many California communities adopted employment-based trip reduction (EBTR) policies to mitigate congestion and improve air quality in the 1980s and 1990s. These programs promoted HOV travel to replace SOV commute trips (Koppelman et al., 1993), following guidance from air quality districts (Dill, 1998). They also established a role for large employers in assisting with incentives, such as dedicated parking spaces and vanpools (Buliung et al., 2010; Dill, 1998). The federal government and the State of California prohibited mandatory EBTR programs in 1995 (Dill, 1998). Yet carpool and rideshare researchers continue to emphasize the journey-to-work, partly because of the temporal and spatial concentration of commute travel and thus its potential to reduce congestion.

In addition to responding to the policy environment, researchers also emphasize the commute for vehicle-sharing due to data availability. Ferguson (1997) notes that U.S. researchers did not measure carpooling as a unique behavior until the second iteration of the Nationwide Personal Transportation Survey (the forerunner to the NHTS) in 1977. Unlike with data on modes like public transit, researchers must survey individuals to quantify rates of carpooling (Ferguson, 1997). The U.S. Census and American Community Surveys (ACS) *do* ask travelers about their travel behavior. However, these surveys only measure travel mode for the journey-to-work. Thus, studies using Census and ACS data – including those by Benita (2020) and Charles and Kline (2006) – cannot address HOV travel for non-commute trips.

But over 80 percent of trips in the U.S. do not serve the work commute (Federal Highway Administration, 2018a). Further, even before the COVID-19 pandemic, over a third of all Americans did not work at all (Bureau of Labor Statistics, 2021). Focusing on the commute-to-work fails to account for the travel needs of non-workers, who are more likely to be seniors, very young, female, and/or to have disabilities (Bureau of Labor Statistics, 2022). The NHTS data,

which include information about non-commute trips, allow me to evaluate the role of sharing for non-commute purposes.

5.2 Automobile sharing within versus between households

Few studies directly address differences in automobile sharing among members of the same versus different households, and many of them that *do* analyze decades-old data. As I note above, some researchers define carpooling as including travelers from different households, while other researchers do not. Sharing within versus across households may serve travelers differently. In the context of transportation disadvantage and resource sharing, external-to-household carpooling appears to enhance access for people living in households facing hardship (Blumenberg & Smart, 2010). Internal-to-household carpooling may not enhance access as strongly, as travelers must still draw on household resources.

A handful of regional studies have compared internal- and external-to-household carpooling for the commute. Examining Melbourne commuters in 1978, Richardson and Young (1981) observed that external-to-household carpool commutes were significantly longer than internal ones; this may reflect the fixed costs of coordinating between households, which require longer commute distances to make shared travel worthwhile. Blumenberg and Smart (2014) studied the relationship between immigrant status, neighborhood composition, and rates of carpooling to work within and between households in Los Angeles County. Analyzing data from the 2000 Census and a local travel survey, they found that recent immigrants were more likely than native-born adults to form both types of carpools, even upon controlling for income. However, immigration status had a stronger association with the likelihood of forming an internal-to-household carpool than an external-to-household one (Blumenberg & Smart, 2010).

Using data from 2009, Blumenberg and Thomas (2014) also examined mode share for the commute, comparing external-to-household and internal-to-household carpooling rates in the U.S. They found significant differences between the two types of carpooling by income and household composition. For example, among single parents in poverty, far more (10.9%) commuted via internal carpooling than via external carpooling (6.6%). Meanwhile, a slightly greater proportion of all adults in metropolitan areas commuted via external carpooling (6.5%) versus internal carpooling (5.9%) (Blumenberg & Thomas, 2014).

Finally, as I note above, Ferguson (1997) examined historical declines in carpooling and the factors that contributed to changes in both internal-to-household and external-to-household carpooling rates for the commute in the U.S. He found that rising rates of automobile ownership caused declines for both types of carpooling from 1970 to 1990. Yet he also identified differences in the contribution of other factors. For example, economic factors like falling real gasoline prices, declining poverty rates, and rising family incomes contributed disproportionately to the decline in external-to-household carpools. Meanwhile, demographic factors such as smaller household sizes and growing female labor force participation contributed disproportionately to falling internal-to-household carpooling rates (Ferguson, 1997). Yet these dynamics may not have continued from 1990 to the 2020s; the last 30 years have seen smaller changes in rates of poverty, automobile ownership, and female labor force participation.

5.3 The costs and benefits of informal ridesharing with strangers

The travel behavior literature has not fully identified the costs and benefits of informality in ridesharing, especially with strangers. Transportation modes have distinct advantages and disadvantages, which help dictate the utility they offer in different spatial contexts and for different trip purposes. Travelers also vary in how they balance these costs and benefits. Researchers have

studied money and time costs in the context of formal sharing, including in public transit, ridehail, micro-mobility, and employer-based carpooling programs (see Sections 3.2 and 3.3). However, fewer studies address the costs and benefits of informality – and the transaction costs it may generate – in vehicle-sharing. Supply and demand for informal ridesharing, in particular, could indicate when and where it competes best with formal services.

One type of informal ridesharing that has received some attention from researchers is casual carpooling. Casual carpoolers (or “sluggers”) give or receive rides along high-occupancy vehicle (HOV) or high-occupancy toll (HOT) lanes. Its primary U.S. examples occur on roads traveling into central Washington D.C., San Francisco, and Houston (Burriss & Winn, 2006). Agencies generally do not coordinate – but may tacitly support – casual carpooling. Researchers have examined the time savings it provides for travelers, who gain access to exclusive HOV lanes (and in the case of Bay Area bridges, to reduced tolls). They have also evaluated how casual carpooling may help reduce congestion (Shaheen et al., 2016). This type of informal ridesharing, however, almost exclusively serves commuters and only operates during peak travel periods on weekday mornings and evenings (Zmud & Rojo, 2013).

And while researchers tend to emphasize the economic and time factors associated with mode choice, informal ridesharing could present unique *socioemotional* costs and benefits. Researchers acknowledge that travel can provide additional utility beyond access to other activities. A handful of studies have assessed whether traveling with others is a subjectively positive or negative experience. Using national data, Morris and Guerra (2015) found a small association between traveling as a passenger and a positive mood. They surmise that this reflects the benefits of interacting with other travelers. Studies have also examined the socioemotional impacts – both positive and negative – of carpooling with coworkers (J. Li et al., 2007) and riding

public transit with strangers (Fink, 2012). Identifying the socioemotional costs and benefits of informal sharing may further illuminate the types of travelers and situations well-suited for sharing.

5.4 Technology, risk, and ridesharing with strangers

Travelers may face danger, discomfort, or uncertainty when interacting with strangers (Vanoutrive et al., 2012). Previous research has analyzed perceptions of risk among hitchhikers (Gao et al., 2020; Greenley & Rice, 1974) and casual carpoolers (Burriss & Winn, 2006; Zmud & Rojo, 2013).¹¹ Yet in the last decade or so, many new companies in the platform economy have enabled strangers to exchange goods and services, and facilitating trust has been critical to their success (Finck & Ranchordás, 2016). To address the risks of interacting with strangers, ridehail companies like Uber and Lyft conduct background checks and allow riders and drivers to assess each other's reputations via ratings (Finck & Ranchordás, 2016). But research has not yet addressed whether ridesharers, accustomed to new technologies, perceive risk differently in an informal environment for finding rides like the Craigslist rideshare board. Evaluating how people manage the uncertainty of ridesharing may answer questions about risk and barriers to sharing more generally.

6. Conclusion

This review has established the factors that influence sharing, the approaches transportation researchers have used to study sharing, and gaps in the literature. In the following chapter (Essay 1), I use quantitative methods to analyze relationships between transportation disadvantage, vehicle-sharing, and other demographic and situational factors. By using data from the NHTS, I can address the lack of research on non-commute travel, differences in sharing between and within

¹¹ See Chapters 4 and 5 for extended reviews of the literature on casual carpooling, BlaBlaCar, hitchhiking, and their relationships to perceptions of risk.

households, and implications for increasing mobility among disadvantaged travelers. In the succeeding chapters (Essays 2 and 3), I analyze data from Craigslist rideshare posts, interviews, and surveys with posters. In these essays, I address gaps in the literature on informal ridesharing outside of standardized practices like casual carpooling. I compare the financial and socioemotional costs and benefits that people perceive of sharing with strangers. In Essay 3, I also contribute to the limited research on how people make decisions to share with strangers and the growing role of technology in their doing so.

CHAPTER 3 – Essay 1. *Beyond the company carpool*: The equity implications of informal sharing within and between households

1. Introduction

For decades, transportation planners and policymakers have promoted the benefits of vehicle-sharing, highlighting its ability to increase mobility for disadvantaged travelers. Automobiles are expensive to own and operate, and researchers have documented the heavy financial burdens that these costs impose on low-income people in the U.S. (Smart & Klein, 2020). Transportation professionals have also emphasized vehicle-sharing’s ability to replace single-occupancy vehicle (SOV) travel (Shaheen et al., 2018). Vehicle-sharing may thus reduce some of the negative externalities – such as carbon emissions, air pollution, and congestion – of private auto travel (Downs, 2005).

Yet researchers continue to emphasize formal versions of transportation sharing, including public transit, carshare, and ridehail. Research attention to formal sharing often overlooks the high rates at which people share in with family, friends, and acquaintances when traveling by car. It may also ignore the advantages informal vehicle-sharing affords individual travelers. Further, when researchers and policymakers *do* analyze private vehicle-sharing, they tend to emphasize “carpooling” for the commute, ignoring that most trips serve non-work travel (Federal Highway Administration, 2018a). These approaches to transportation sharing fail to capture the reality of shared travel in the U.S.

In this essay, I address these gaps in the literature by analyzing the relationships between disadvantage, trip purpose, and informal vehicle-sharing. I begin by measuring differences in the distribution of traveler disadvantage and trip purposes across shared automobile trips using data from the 2017 National Household Travel Survey (NHTS). I then use multinomial probit modeling

to predict the choice to share. In defining informal automobile sharing, I propose five categories distinct from private SOV travel and distinguish between inter- and intra-household sharing.

In studying sharing behaviors, I also emphasize differences between disadvantaged and non-disadvantaged travelers. Combs et al. (2016) define transportation disadvantage as “a mismatch between the need for mobility and accessibility and the travel options available” (p.68). Informed by this description, my definition of transportation disadvantage includes people who live in low-income households, have medical conditions that constrain travel, or have limited automobile access.¹² I hypothesize that disadvantage encourages people to share by enabling them to save money and reduce travel times. The sharing literature also suggests that sharing is specific to social situations (Price, 1975). I thus examine relationships between trip purposes – including socially-oriented ones – and automobile sharing, controlling for disadvantage factors. Finally, I control for other factors – including sex, race/ethnicity, and the built environment – that have documented relationships with mode choice.

I hypothesize that transportation disadvantage has a positive association with automobile sharing, as constrained travelers share to conserve resources. Further, transportation disadvantage may have an especially strong relationship with cases of external-to-household receiving (i.e., getting a ride or borrowing a car). I also hypothesize that taking a non-work trip increases the likelihood of automobile sharing; this occurs because non-work trips have temporal flexibility and because people are more likely to do non-work activities together than to work at the same location. However, I also theorize that trip purpose better predicts sharing among non-disadvantaged

¹² Some people who live in zero-vehicle households choose not to own automobiles, and thus may not experience disadvantage in socioeconomic status, for example. Yet as I discussed in Chapter 2 (see Section 3), most Americans without automobiles lack them because they cannot afford ownership rather than because they do not want to own them (A. E. Brown, 2017; Mitra & Saphores, 2017). Further, the motivations to share of “choice” non-owners likely resemble those of people who cannot afford to own automobiles.

travelers than among disadvantaged travelers, as the former may share because they *want* to, rather than because they face constraints.

2. Literature review

In Chapter 2, I reviewed studies about the relationship between vehicle-sharing and transportation disadvantage in the U.S. Research indicates that household vehicle access (Cline et al., 2009), income (Blumenberg & Thomas, 2014), and health status (N. S. Park et al., 2010) have positive associations with informal vehicle-sharing. In the following sections, I address other attributes – including demographic, built environment, and attitudinal factors – that may encourage sharing. These factors inform the variables I include in the mode choice models that comprise the bulk of this analysis. Previous research also suggests relevant factors for which I cannot account, given the data available. The studies I review primarily address carpooling for the commute, for reasons I stated in Chapter 2.

2.1 Carpooling and demographic factors

Researchers have reached different conclusions about the relationships between carpooling and traveler demographics. In older studies, Teal (1987), Ferguson (1997), and Buliung et al. (2010) found that demographics have little association with carpooling (as defined both as internal- and external-to-household commute trips), apart from their correlations with automobile ownership. But in a meta-analysis of more recent studies of carpooling in several countries,¹³ Neoh et al. (2017) found a handful of demographic characteristics – including being female – associated with commuter carpooling. Vanoutrive et al. (2012) similarly found that Belgian women carpooled to work more often than men did in 2001. However, analyzing data from 2009, Blumenberg and Thomas (2014) found that poor single (mostly female) parents carpooled to work less often than

¹³ Studies in the meta-analysis capture data from Belgium, Canada, Portugal, New Zealand, Switzerland, the U.K., and the U.S.

other poor people in the U.S. This finding likely reflects the time constraints associated with household duties and childcare, which complicate efforts to coordinate travel with other people (Blumenberg & Thomas, 2014; Rosenbloom & Burns, 1993).

Neighborhood economic and demographic diversity and traveler race, ethnicity, and nativity also appear to influence carpooling rates (although less dramatically than they influence public transit use). Blumenberg and Smart (2014) examined the role of nativity in carpooling for the commute among Southern California residents in 2000. They concluded that immigrants living in immigrant-rich neighborhoods carpoled at higher rates than native-born residents. However, they found the reverse for immigrants who lived in neighborhoods with fewer non-native residents. This, they argue, suggests a role for social networks in carpooling (Blumenberg & Smart, 2014). U.S. immigrants also formed more external-to-household carpools than the native-born did (Blumenberg & Smart, 2010). Similarly, Charles and Kline (2006) examined national travel behavior in 1990 and found that more homogenous neighborhoods – with higher concentrations of race/ethnicity – saw greater rates of carpooling for the commute.

2.2 Carpooling and the built environment

Many studies have identified *some* relationships between the built environment and the modes by which people travel, including via public transit (Aston et al., 2021). Researchers have also tested for associations between carpooling and the built environment, but their findings differ by country. For example, Vanoutrive et al. (2012) found that Belgian people employed at workplaces with low accessibility – defined by proximity of the workplace to rail stations, presence of congestion, and the number of residences accessible via car – carpooled to work more often than did those working in more accessible employment locations. Benita (2020) reached a different conclusion for U.S. workers. Using 2017 data, he identified a strong positive relationship between

carpooling to work and population density at the county level (Benita, 2020). However, other regional and employer-based studies in the U.S. have found no association between residential and employment density and commuter carpooling rates (Y. Park et al., 2018; Wang & Chen, 2012).

Other studies have examined the association between trip characteristics and carpooling. Several studies from the 1980s found a correlation between trip distance/time and carpooling among commuters (Cervero & Griesenbeck, 1988; Richardson & Young, 1981; Teal, 1987). However, studying university students and workers in Ohio, Park et al. (2018) found a non-linear relationship between commute times to work/school and carpooling. People who lived within 10 minutes of campus were more likely to carpool than people who lived 20 to 30 minutes away from campus. This association disappeared as commute times grew beyond 30 minutes (Y. Park et al., 2018). In the greater Toronto area, Buliung et al. (2010) concluded that a pool of coworkers living near one's residence increased the likelihood of carpooling. However, suburban/urban residence and proximity to carpool lots – government-managed spaces where commuters may park their cars– had no significant relationship with mode choice. In a study of the same area, Buliung et al. (2009) found that shorter distances between worker homes helped determine rates of commuter carpooling. They also concluded that compared to urban residents, suburban and exurban residents had higher likelihoods of matching successfully via a digital carpooling app (Buliung et al., 2009). These varying findings could reflect regional variations in urban spatial structure, policies that influence travel costs, and changing trends over time. Additionally, some studies examine patterns across entire metropolitan areas, while others focus on carpooling only among workers from the same firm.

2.3 Carpooling and attitudes

Researchers have also conducted surveys to examine the influence of attitudinal versus situational factors on carpooling rates. In a meta-analysis, Neoh et al. (2017) found that situational job-specific factors – for example, employer size and standardized work schedules – better predicted carpooling than worker motivations and attitudes toward carpooling – for example, the desire to save money or reduce congestion. Yet in a follow-up meta-analysis, Olsson et al. (2019) found that the influence of individual attitudes on the likelihood of carpooling has grown in recent years (alongside falling carpooling rates). The relative influence of attitudinal versus situational factors may also vary by the type of mode “switch.” Wang and Chen (2012) used longitudinal data to examine changes in carpooling rates among Seattle commuters from 1989 to 1996. They identified an association between traveler attitudes – such as a lower perceived difficulty of carpooling and greater support for HOV lanes – and the likelihood of switching from driving alone to carpooling. Meanwhile, structural factors – including changes in the population density of one’s workplace and residence, as well as household vehicle access – better predicted a switch from carpooling to driving alone. They surmised that attitudes and beliefs may play unique roles in the decision to carpool among people who own automobiles (Wang & Chen, 2012).

Environmental values may also influence the propensity to carpool. Park et al. (2018) examined carpool intention and behavior among students and university employees in Ohio and found that respondents concerned with the environment were more likely to state intentions to carpool *and* to do so. Bachmann et al. (2018) surveyed Swiss people about their willingness to use a smartphone application matching them with strangers. Unlike with the Ohio students and employees, they found that personal norms – particularly attention to environmental issues – predicted the *intention* to carpool, but not actually doing so. Studying German and Austrian adults,

Hartl et al. (2020) found that environmentalist values predicted willingness to provide carpool services on a peer-to-peer application (through which travelers connect with strangers).

Given data limitations, I cannot control for attitudes toward vehicle-sharing in this study. However, socioeconomic factors may function as proxies for traveler orientation (Mokhtarian et al., 2015). For example, researchers may assume that women have greater personal security concerns and use gender to proxy for their attitudes toward certain travel modes. Findings on demographic factors may thus provide insight into the influence of attitudinal factors.

2.4 Gaps in the literature and hypotheses

This analysis addresses several gaps in the literature on shared travel, transportation disadvantage, and the role of situational factors in the decision to share. First, travel behavior researchers who examine equity tend to emphasize the use of public transit. I thus extend this work to informal sharing, including by testing the hypothesis that disadvantaged travelers disproportionately share automobiles. Second, most studies of carpooling – one relevant type of informal vehicle-sharing – examine sharing between households and for the commute. In this study, I can compare different types of internal-to and external-to-household sharing and how they relate to mobility constraints. I thus test the hypothesis that disadvantaged travelers rely on external-to-household sharing more often than non-disadvantaged ones. In studying non-work travel, I also hypothesize that people share disproportionately for social purposes, but that this relationship is stronger for non-disadvantaged travelers. This extends the body of research that tests the relative influence of long-term economic factors (such as resource access) and temporary needs (such as trip purpose).

3. Data and methods

In the following sections, I describe my data, dependent and independent variables, and statistical modeling approach. I conclude this section by highlighting the strengths and limitations of this analysis. I use Stata 17 to compile all summary statistics, generate models, and compute other measures like goodness-of-fit.

3.1 Trip data from the 2017 National Household Travel Survey (NHTS)

I analyze data from the 2017 National Household Travel Survey (NHTS). The U.S. Federal Highway Administration conducts the NHTS every few years, most recently in 2001, 2009, and 2017. Surveyors contact respondents and instruct them to keep travel diaries recording where, when, how, and why they travel in a single day. In 2017, the NHTS recorded responses from 129,969 households, capturing data for 264,234 persons and 923,572 noncommercial trips. The weighted version allows users to produce population-level estimates. The version of the NHTS available to the public consists of four files: household, person, vehicle, and trip level data (Federal Highway Administration, 2018b). I primarily use data from the trip file, but also attach variables from the household and person files.

I restrict the sample to trips made by people aged 16 and older because I conceive of mode choice as a revealed preference; because people make utility-maximizing choices, observing their actions reveals their preferences (Ben-Akiva et al., 1985; Samuelson, 1948). Modeling the behavior of very young people – for example, a ten-year-old child driven by her mother – may inappropriately represent choice (and thus preferences), as parents or caregivers often make travel decisions for minors (Faulkner et al., 2010). For brevity’s sake, I occasionally refer to these trips as taken by “adults,” although the sample also includes 16 and 17-year-olds.

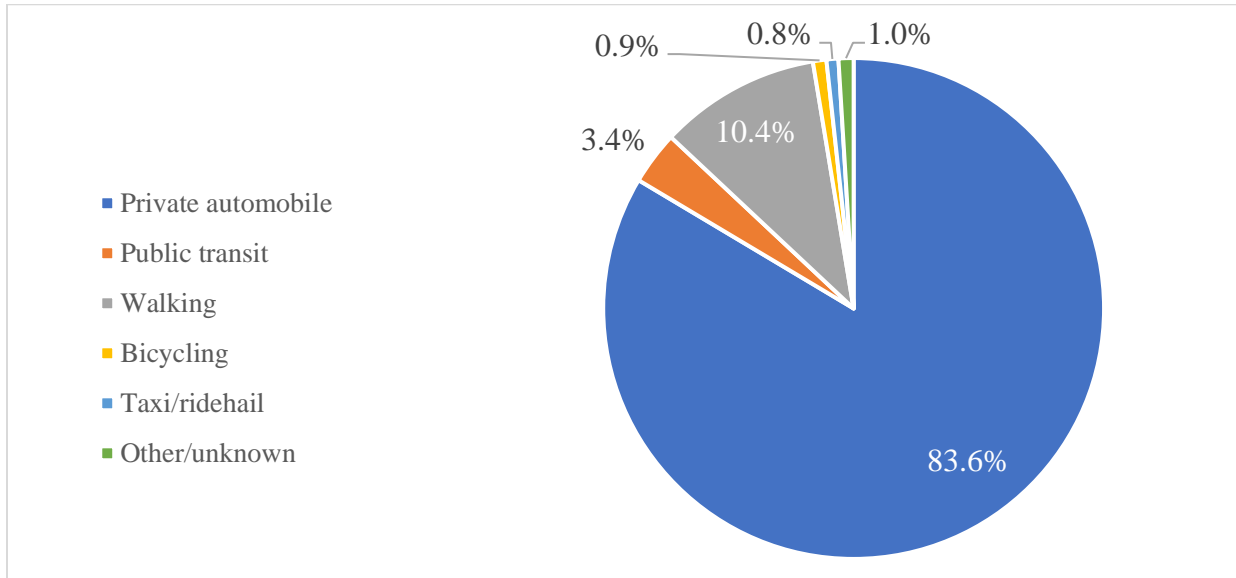
In this study, the trip serves as the unit of analysis. This unit of analysis occasionally leads to some awkward phrasing. For example, in summarizing sharing rates, I cannot state that “women

shared more of their trips than men did,” as some women took a large number of trips and thus are overrepresented in the sample. Instead, I write that “a greater percentage of trips made by women were shared.” And should an independent variable have a positive association with sharing (relative to non-sharing), I may write that “the traveler being unemployed increases the likelihood that a trip was shared.” However, this does not necessarily mean that being unemployed increases the likelihood that a person shared; again, the traveler is not the unit of analysis. While these sentences can seem clumsy, the reader may appreciate the effort to accurately report the results.

3.2 Defining automobile sharing

In this analysis, I predict the type of private automobile sharing used for a trip. People travel via non-private and non-automobile modes, such as by taking public transit, walking, bicycling, taxi/ridehail, ferry, or airplane. However, national travel patterns explain my focus on automobile travel (at least in the U.S.). Figure 2 displays the modal share of trips made by persons aged 16 and older in 2017. It indicates that in 2017, almost 84 percent of U.S. noncommercial trips took place in private automobiles, followed by a notable proportion via walking (10.4%) and small proportions (collectively about 6%) via other modes.

Figure 2 Modal distribution of all trips made by travelers aged 16 and up, 2017



Note. Other includes ferry/airplane. Data source is Federal Highway Administration (2018).

I do not analyze shared trips made without private vehicles (for example, via public transit or carsharing). While these modes comprise an important aspect of travel, they fall outside of this research focus on automobile sharing and have received extensive research coverage elsewhere.¹⁴ Restricting the analysis to private automobile trips leads to a sample of 737,812 trips (representing a national total of over 822 million trips). I further divide these private auto trips into six categories (see Table 1).

Table 1 Private automobile trip categories and their characteristics

| Category | Characteristics | | | | |
|----------|--------------------|----------------------------|------------------------------|-----------------------------|--------------------|
| | Multiple occupants | Vehicle owned by household | Non-household member on trip | More than one adult on trip | Traveler is driver |
| | | | | | |

¹⁴ See Table 16 in the Appendix for a comparison of the measures of traveler disadvantage in trips made via private automobile versus other modes (e.g., walking and public transit). T-tests indicate that compared to automobile trips, non-automobile trips have a stronger association with all forms of traveler disadvantage.

(1) **Drives alone:**

Automobile trip taken in household vehicle with only one traveler (the driver). X X

(2) **Household child:**

Automobile trip taken in household vehicle with only one adult (traveler); all passengers were under the age of 16.¹⁵ X X X

(3) **Internal carpool:**

Automobile trip taken in household vehicle with more than one adult (from the same household). X X X O

(4) **External driver:**

Automobile trip including more than one person from different households; traveler drove. X X X O X

(5) **External passenger:**

Automobile trip including more than one person from different households; traveler was a passenger. X O X O

(6) **Borrowed car:**

Automobile trip in vehicle not owned by household and only with household members; may have no passengers.¹⁶ O O O O

Note. X indicates characteristic is present; O indicates characteristic may be present; blank indicates characteristic is not present.

The six categories include five sharing categories and a non-sharing one (*Drives alone*). The categories capture different aspects of sharing; for example, in trips that fall into categories 2 through 5, people engaged in concurrent sharing (i.e., HOV travel). Category 6 (*Borrowed car*),

¹⁵ Note that in categories 3 through 6, a child may also be present.

¹⁶ For example, a person who borrowed a private vehicle from another household and drove her child and partner took a “Borrowed car” trip.

however, includes some SOV trips that are cases of sequential sharing. Categories 4 through 6 require that people shared *across* households; only in categories 5 and 6, however, does the traveler *receive* transportation resources from a non-household member. Meanwhile, in category 4, the traveler provided resources to another household (by driving a non-household member). These distinctions may be relevant to theories of resource exchange, including variations in sharing with close versus distant contacts (see Chapter 2, Section 2.1). Finally, *Household child* trips (category 2) have an ambiguous relationship with sharing, as child passengers may not voluntarily “share.” Figure 3 graphically demonstrates the relationships among the six categories.

Figure 3 *Private automobile sharing and non-sharing types*

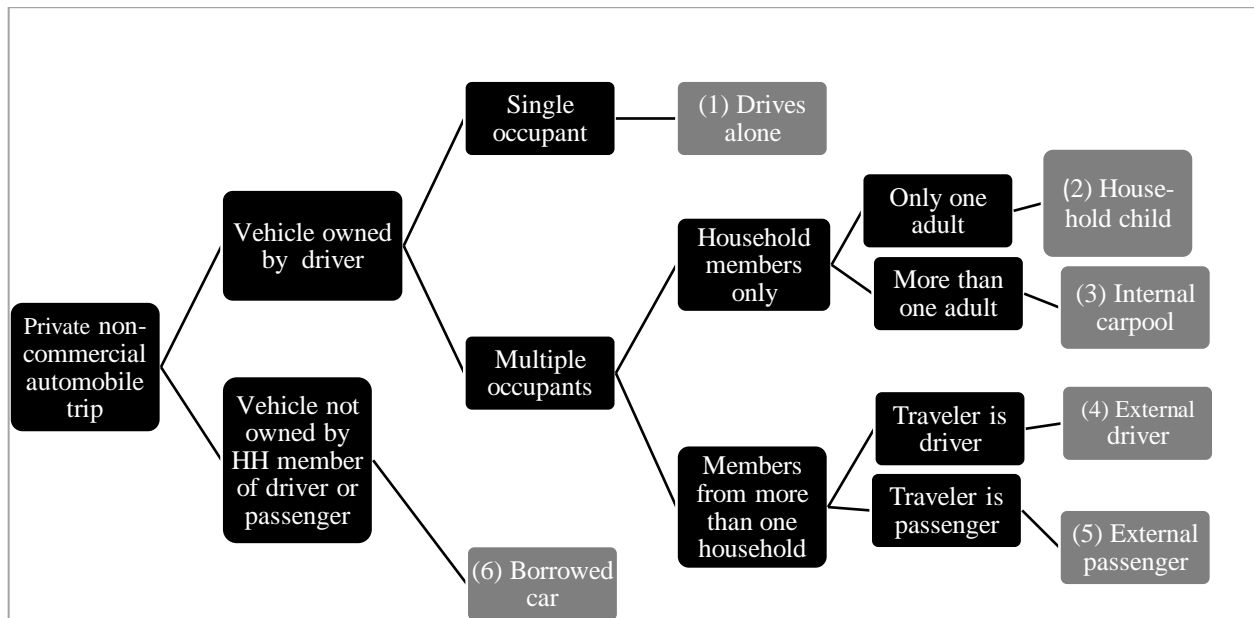
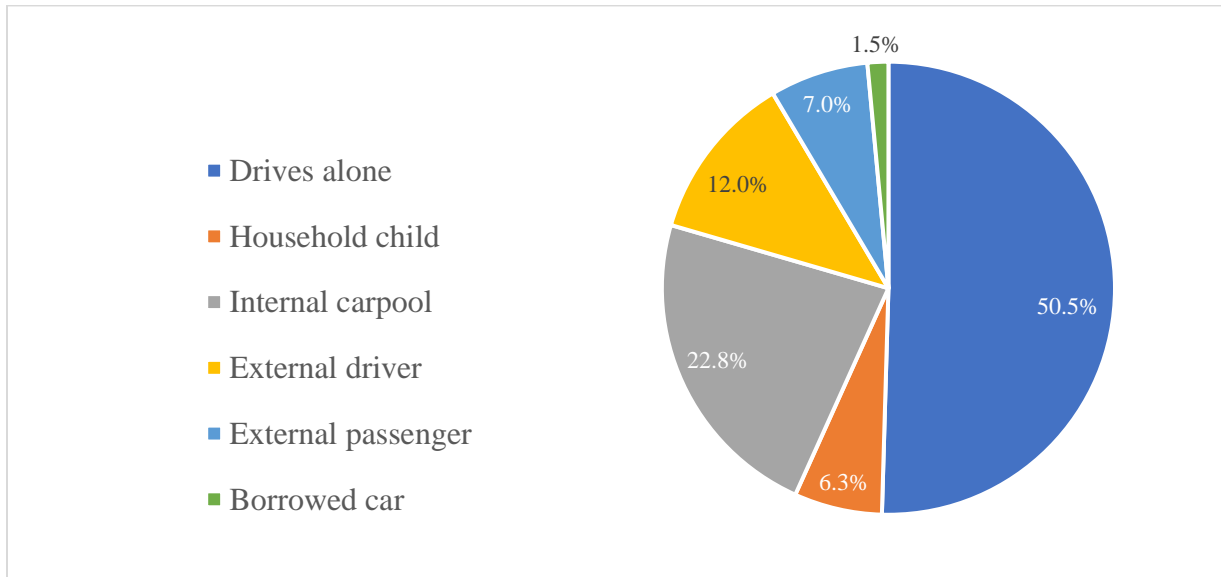


Figure 4 displays the proportion of all private automobile trips made via the six categories. In 2017, almost half (49.5%) of private automobile trips involved some sharing. Further, over 29 percent of all private automobile trips occurred via intra-household sharing (*Household child* or *Internal carpool*), in which travelers and the vehicle belonged to the same household. The

remaining trips (20.5%) occurred via inter-household sharing (*External driver, External passenger, or Borrowed car*).¹⁷

Figure 4 *Distribution of private automobile trips by travelers aged 16 and up, 2017*



Note. Data source is Federal Highway Administration (2018).

3.3 Independent variables

I use several independent variables to test the hypotheses that I described above. These variables fall into four general categories: personal/household socioeconomic factors, the built environment context, transportation disadvantage, and trip purpose. Table 2 summarizes the characteristics of the first three categories among trips taken by persons aged 16 and over. As I

¹⁷ A larger proportion of external carpool trips took place as driver (12%) than as passenger (7%). A substantial portion of the passengers in external carpool trips may have been children. Because the NHTS lacks demographic data on travelers from other households, I cannot identify whether external passengers were aged 16 and over. I thus include hypothetical trips serving young passengers in the *External driver* category (rather than in a category equivalent to *Household child*). This would include, for example, a parent driving a carpool that includes a child living in another household. However, in the trip, the traveler of interest still provided travel resources to another household, so I do not see this as inconsistent with the sharing type category.

noted earlier, the statistics and models in this essay reflect figures for daily trips rather than travelers.¹⁸

Table 2 *Personal, household, built environment, and transportation disadvantage characteristics among trips made by travelers aged 16 and up, 2017*

| Traveler category | Proportion/mean/median (of trips) |
|---|-----------------------------------|
| Personal characteristics | |
| Age | 46 (median) |
| Female | 52.1% |
| <i>Race/Ethnicity</i> | |
| Non-Hispanic White | 64.8% |
| Non-Hispanic Black | 11.3% |
| Non-Hispanic Asian | 4.7% |
| Hispanic | 15.5% |
| Other race/ethnicity | 3.7% |
| <i>Nativity/immigration</i> | |
| Foreign-born | 14.0% |
| Years in the U.S. (among foreign-born) | 20.5 years (median) |
| <i>Education</i> | |
| Less than high school | 6.9% |
| High school | 19.2% |
| Some college | 29.3% |
| Bachelors | 24.3% |
| Graduate degree | 20.2% |
| NA/skip | 0.1% |
| <i>Primary activity of traveler (previous week)</i> | |
| Working | 57.7% |
| Unemployed | 3.5% |
| Homemaker | 7.3% |
| School | 6.6% |
| Retired | 16.5% |
| Other | 8.4% |
| Owens home | 66.4% |
| Household size | 2.90 (mean) |
| <i>Household structure</i> | |
| Single adult with no children | 14.9% |

¹⁸ For example, in 2017, 6.5 percent of adult trips were made by a person living in the New York City metropolitan area; however, 6.6 percent of surveyed travelers aged 16 and older lived in the New York City metropolitan area.

| | |
|--|---|
| Multiple adults with no children | 51.4% |
| Single adult and child(ren) under 16 | 3.4% |
| Multiple adults and child(ren) under 16 | 30.3% |
| Built environment | |
| Residential population density | 2,000 to 3,999 per square mile (median) |
| Lives in the New York City metropolitan area | 6.5% |
| Metropolitan Statistical Area (MSA) population | 1M to 3M (median) |
| Measures of transportation disadvantage | |
| <i>Automobile access</i> | |
| Zero-vehicle household | 5.4% |
| Vehicle-deficient household | 18.7% |
| Vehicles per driver | 1.07 (mean) |
| <i>Physical limitations</i> | |
| Has a travel-limiting medical condition | 5.0% |
| <i>Financial constraints</i> | |
| Household income | \$50,000 to \$75,000 (median) |
| Lives below the poverty line | 9.1% |
| Lives below 200% of the poverty line | 24.8% |

Note. Data source is Federal Highway Administration (2018). Weighted data reflect noncommercial travel of all U.S. residents in 2017.

I proxy for transportation disadvantage drawing on responses to different NHTS survey questions. For physical limitations, I use a binary variable capturing whether the respondent reported a travel-limiting medical condition. For household vehicle access, I cannot control for zero-vehicle household status, as it perfectly predicts the failure of several sharing category outcomes; if a person lives in a zero-vehicle household, she cannot travel via categories 1 through 4. I thus use a binary variable capturing whether the trip-maker lived in a household with fewer than one vehicle per driver – or is “vehicle-deficient.”¹⁹ This category *also* includes people living in zero-vehicle households. Blumenberg and Pierce (2012) suggest that because people living in households with a less-than-one vehicle-to-driver ratio cannot use a vehicle whenever they want, they have lower amounts of mobility and flexibility in travel. Finally, in terms of financial

¹⁹ I adopt this term from Scheiner and Holz-Rau (2012).

resources, I use a binary variable for persons living below and above the poverty line, rather than capturing income at several different ranges.²⁰ I do so because research finds that travel behavior tends to be distinct at the bottom end of the income spectrum (Blumenberg & Pierce, 2012; Blumenberg & Thomas, 2014).

Model 1 solely addresses the association between sharing and disadvantage, but in Models 2 and 3 I also examine relationships between trip purpose and private automobile sharing. To address trip purpose, I use six categories using information from two codes provided by the NHTS (see Table 3). These collapsed categories distinguish among purposes directly related to work and/or commuting (commuting/work-related), household duties (shopping/maintenance), social activities that may serve others (e.g., school, daycare, and church), non-optional personal maintenance (healthcare), social activities (social/recreation), and providing transportation for another person (transporting someone). These categories do not always have clean divisions; for example, a trip coded as “meals” could have been a maintenance rather than social activity (insofar as it involved feeding an elderly parent). Meanwhile, a trip to transport someone could have offered the opportunity to socialize with a friend or neighbor. Regardless, I rely on the primary NHTS classifications to categorize trips.

Table 3 *Trip purpose categories for private automobile trips taken by travelers aged 16 and over, 2017*

| Trip category | Description (from codes WHYTRP90 and WHYTRP1S) | Proportion of private automobile trips |
|-----------------------|--|--|
| Commute/work-related | To/from work, work-related business | 23% |
| Shopping/maintenance | Shopping, other family/personal | 32% |
| School/daycare/church | School, church, daycare/religious activity | 6.0% |
| Healthcare | Medical/dental | 2.7% |
| Social/recreation | Visit friends/family, social/recreational, meals | 25% |
| Transporting someone | Transport someone | 7.7% |

²⁰ I adjusted the categorical income data by household size. See Table 17 in the Appendix for household income cutoffs for poverty by household size in 2017.

| | | |
|-------|---------------------------|------|
| Other | Other, refused/don't know | 3.5% |
| Total | | 100% |

Note. Data source is Federal Highway Administration (2018).

Table 3 indicates that a minority (23%) of trips made by people aged 16 and over served the commute or work, despite the emphasis researchers and policymakers have placed on this trip type. Per this typology, the two most popular trip purposes were shopping/maintenance (32%) and social/recreation (25%), similar to the distribution of trips by all modes (Federal Highway Administration, 2018a).

I hypothesize that other factors – for example, lower population densities, being female, and recent immigration to the U.S. – have distinct associations with automobile sharing. For example, I hypothesize that compared to a traveler being male or native-born, being female or an immigrant increases the likelihood that a trip was shared, all else equal. Further, living in higher population density neighborhoods or larger cities increases the likelihood of a shared trip, given that locations tend to be closer together and the costs of operating and parking a vehicle higher. Yet I hypothesize that even *after* controlling for these factors, transportation disadvantage and non-work trip purposes continue to predict the likelihood of sharing an automobile instead of driving alone. I thus include the full model – which includes other variables with documented relationships in the mode choice literature – after the disadvantage and trip purpose models.

3.4 Statistical methods and limitations

In testing these hypotheses, I estimate a series of multinomial probit models to predict mode choice and use the variables listed in Table 2. In many travel behavior studies, researchers have used discrete choice models to determine how individuals make rational, utility-maximizing choices among travel modes (Ben-Akiva et al., 1985; Morris & Guerra, 2015). In particular, they have used multinomial logistic and probit models to compare the factors that influence the choice

of one mode over another (Ben-Akiva et al., 1985). From these models, I compute average marginal effects to determine the relationship between the independent variables and the *actual* probability – rather than the *relative* probability – of sharing for an automobile trip.

I considered using a multinomial logistic regression model, as this is a less computationally intensive method of modeling discrete choice. However, multinomial logistic regression models assume Independence of Irrelevant Alternatives (IRR), that the choice of one alternative over another occurs independently of the presence of other choices (Ray, 1973). IRR is an assumption occasionally violated in studies of mode choice (Bhat, 1995) and Hausman tests of the IIA assumption suggest that this could be true with the NHTS data. I thus model auto-sharing mode choice via multinomial probit regression. Each subsequent model takes the form

$$\rho_{ij} = \rho(Y_{\iota} = j) = \Phi(x'_{\iota}\beta) + \varepsilon_{\iota}$$

where ρ_{ij} is the probability that for trip ι , an individual selected mode/sharing subtype j (e.g., *Internal carpool*), $(x'_{\iota}\beta)$ is a vector of explanatory variables, Φ denotes the cumulative distribution function (cdf) of the standard normal distribution, and ε_{ι} is an error term.

This approach to studying informal sharing has many strengths. The NHTS is a well-documented dataset with high external validity, given its large sample size and rigorous sampling methodology. Travel diary data also capture revealed behavior rather than general traveler impressions. When surveyed about their regular activities, people often over-report performing socially desirable behaviors (Van de Mortel, 2008). In surveys of recent actions (as with the NHTS), respondents provide more accurate information about their actions (Möller et al., 2013).

I also examine shared travel using multiple definitions of sharing. I do so because automobile sharing motives and utility may differ by the nature of automobile sharing. As I noted earlier, carpooling researchers have tended to focus on external-to-household automobile sharing.

Yet these purposes comprise a minority of shared vehicle trips. Alternative definitions of automobile sharing may illuminate how different types of resource-sharing serve disadvantaged travelers. Further, the use of multinomial probit modeling allows me to control for several factors simultaneously. I can then examine whether one aspect of disadvantage that appears to influence sharing is better explained by another demographic factor (e.g., race or sex).

This analytical approach also has limitations. First, these data only address actual behavior – and not necessarily preferences or unmet needs. Most studies of travel behavior have this issue, but concerns may arise about latent travel demand (Clifton & Moura, 2017); for example, this analysis does not include people who did not travel on the survey day. Another issue relates to causality. As with other statistical models, t-tests and multinomial probit models can conclusively establish associative, but not causal, relationships. I may find that attending church has an association with car borrowing. Yet this modeling approach cannot determine whether (1) the desire to attend church caused a person to borrow a car or (2) the ability to borrow a car caused a person to attend church. Social scientists have used other methods – for example, longitudinal data, random experiments, and natural experiments – to overcome this issue (de Souza Briggs et al., 2010; Klein & Smart, 2017); these are not reasonable alternatives for a national analysis of travel behavior. Further, while instrumental variables allow researchers to better establish causal relationships in observational data (Angrist et al., 1996), I have not identified any appropriate variables available in the NHTS.

Finally, omitted variable bias may complicate assessing the social aspects of sharing explored in this analysis. In the case of shared travel, some people may simply be more social than others, and thus more inclined to share resources. Further, attitudes likely influence orientations toward sharing. As I stated earlier, socioeconomic factors may provide clues about some of them

(Mokhtarian et al., 2015). The NHTS contains little information about the attitudes of respondents. In Essays 2 and 3, however, I use qualitative data to address the roles of attitudes in sharing.

4. Results

I present the results in two sections. First, I provide descriptive evidence of relationships between disadvantage factors, trip purpose, and auto-sharing. Second, I present statistical models controlling for these factors simultaneously.

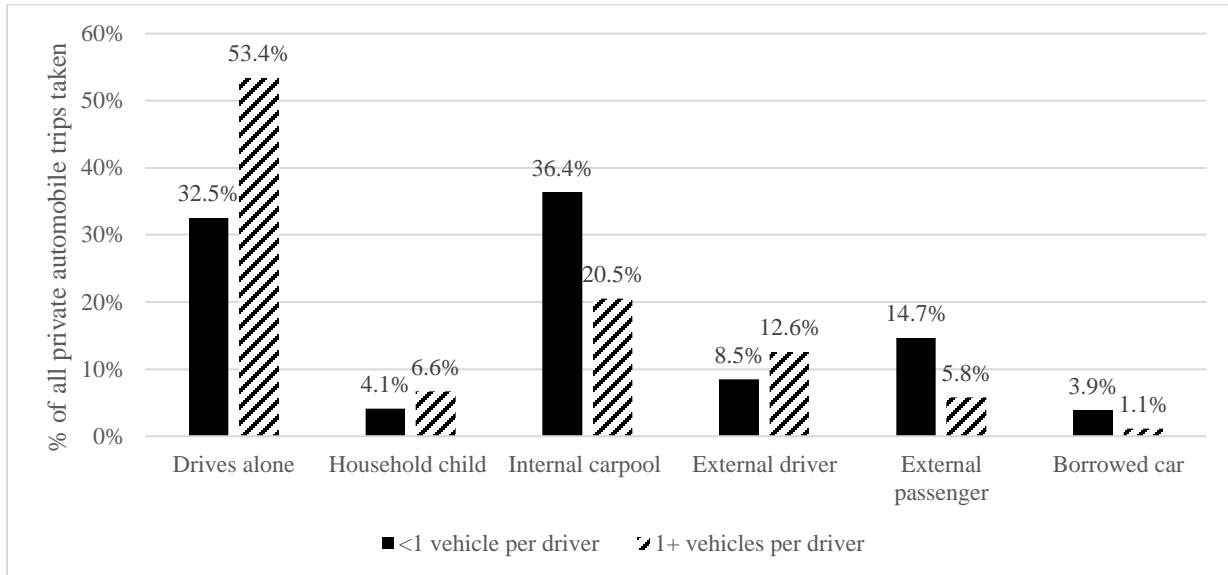
4.1 Summary of relationships between sharing subtypes, transportation disadvantage, and trip purpose

Here, I present descriptive statistics about non-sharing and sharing subtypes of private automobile trips. I begin with three major aspects of transportation disadvantage and then summarize trip purpose by sharing subtype.

4.1.1 Transportation disadvantage

Consistent with previous research findings, disadvantaged travelers shared more frequently than other travelers. Figure 5 shows the distribution of private automobile trips taken by travelers living in zero-vehicle/vehicle-deficient households and non-vehicle-deficient households; in the former case, a driver may lack access to a vehicle whenever they want it (as he shares the automobile with another household member).

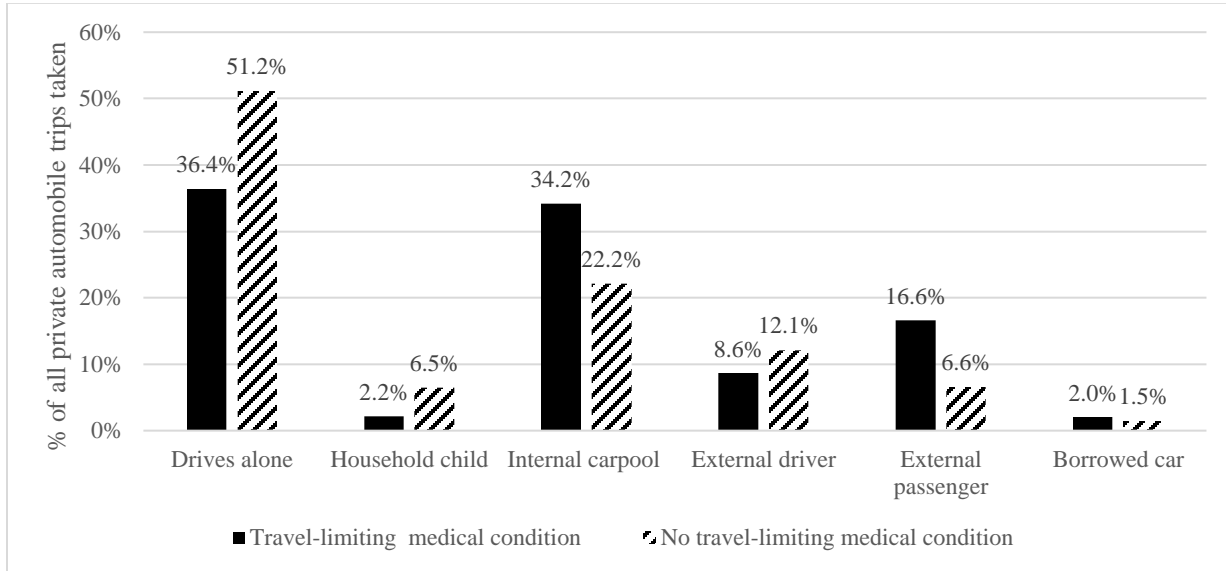
Figure 5 Distribution of private automobile trips by vehicle access of traveler, 2017



Note. Data source is Federal Highway Administration (2018).

Some of the patterns are intuitive. For example, compared to those taken by people living in vehicle-deficient households, a greater proportion of trips taken by travelers with full vehicle access were via *Drives alone* (53.4% versus 32.5%), *Household child* (6.6% versus 4.1%), and *External driver* (12.6% versus 8.5%). Meanwhile, the reverse was true for the other three categories. Compared to those of fully equipped travelers, a greater proportion of trips taken by members of vehicle-deficient households occurred via *Internal carpool* (36.4% versus 20.5%), *External passenger* (14.7% versus 5.8%), and *Borrowed car* (3.9% versus 1.1%). The differences in trip share by vehicle access are particularly stark in the latter two trip categories. In both of those sharing subtypes, a traveler received transportation resources from a non-household member.

Figure 6 *Distribution of private automobile trips by travel-limiting medical condition status of traveler, 2017*

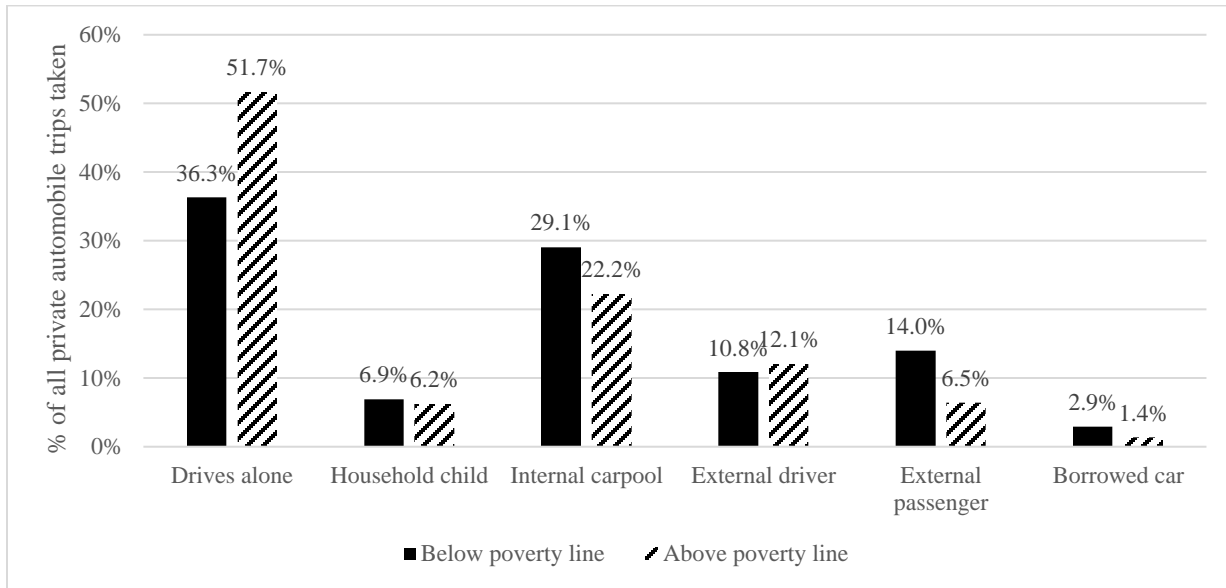


Note. Data source is Federal Highway Administration (2018).

Some medical conditions limit mobility: when people cannot easily drive, walk, or take public transit, they may have to rely on shared car rides. Figure 6 shows the distribution of private automobile trips, separated by whether a traveler had a travel-limiting medical condition. Compared to trips taken by travelers with medical conditions, a greater proportion of trips taken by travelers without travel-limiting medical conditions occurred via *Drives alone* (51.2% versus 36.4%), *Household child* (6.5% versus 2.2%), and *External driver* (12.1% versus 8.6%), which mirrors the patterns observed with vehicle access. Meanwhile, compared to trips taken by travelers without travel-limiting conditions, those taken by travelers with medical conditions were more likely to be *Internal carpool* (34.4% versus 22.2%), *External passenger* (16.6% versus 6.6%), and *Borrowed car* (2.0% versus 1.5%). *Household child* trips differ most dramatically by the traveler’s

medical status. In many of these trips, parents drove children and thus may have been younger and healthier than the average traveler.

Figure 7 *Distribution of private automobile trips by poverty level of traveler, 2017*



Note. Data source is Federal Highway Administration (2018).

Finally, financial constraints – particularly living below the poverty line – contribute to mobility constraints. Low incomes limit the financial resources available to spend on travel; these costs include transit fares and auto-related expenses like fuel, tolls, maintenance, and insurance. Figure 7 indicates that compared to those of poor travelers, most private automobile trips by the non-poor – indeed a majority – occurred via *Driving alone* (51.7% versus 36.3%) and slightly more via *External driver* (12.1% versus 10.8%). A similar proportion of private automobile trips taken by poor travelers (6.9%) occurred via *Household child* versus those made by non-poor travelers (6.2%). Finally, a greater proportion of automobile trips taken by poor travelers occurred via *Internal carpool* (29.1% versus 22.2%), *External passenger* (14.0% versus 6.5%), and

Borrowed car (2.9% versus 1.4%). As with vehicle access, the latter two cases are especially stark – and cases in which the traveler received external-to-household resources.

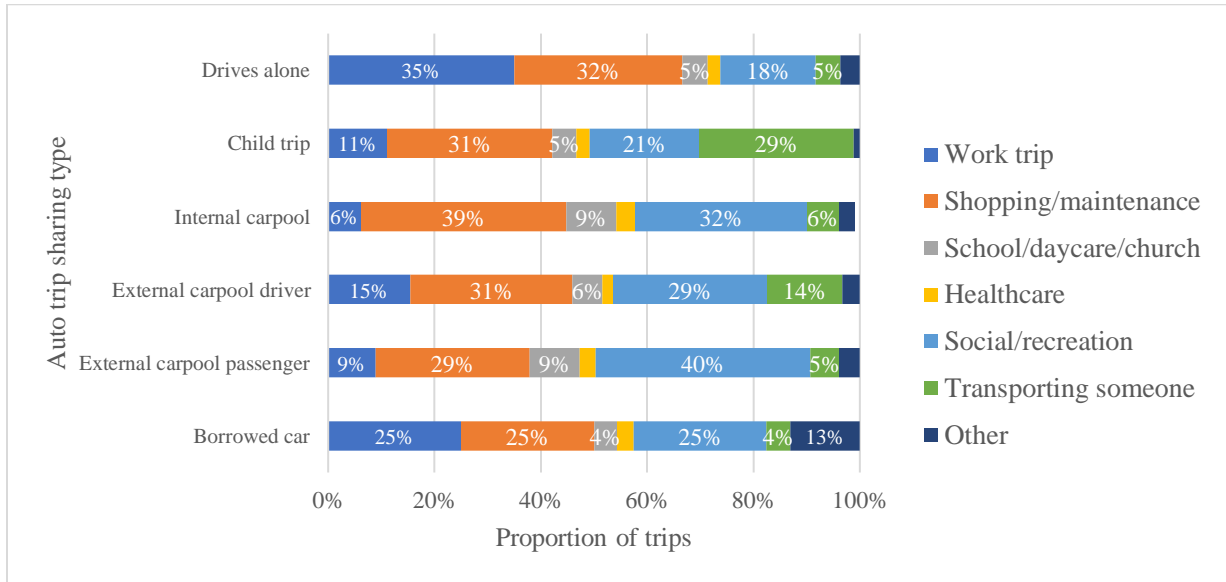
Some of these figures may seem counterintuitive – for example, why did more trips by people with medical conditions take place via *Internal carpool*, compared to those taken by people without medical conditions? This reflects what I measure: the denominator is all private automobile trips taken by disadvantage status (and does not account for public transit trips, for example).²¹ In the Appendix, Figure 26, Figure 27, and Figure 28 show similar information where the denominator is the total number of private automobile trips taken by each subtype. Figure 27 thus shows that while 5.1 percent of all private automobile trips are taken by a person with a medical condition, 7.2 percent of *Internal carpool* trips are. Table 18 in the Appendix also includes a summary of t-tests testing for differences in rates of sharing by disadvantage status.

4.1.2 Trip Purpose

Finally, because vehicle-sharing may offer higher or lower utility depending on the object of the trip, I hypothesize that the distribution of trip purposes differs by sharing sub-type. Figure 8 includes summary statistics for these distributions. While differences appear less stark than those among disadvantage factors, some sharing subtypes disproportionately served certain trip purposes.

²¹ As I stated earlier, compared to non-disadvantaged travelers, disadvantaged travelers were more likely to take non-automobile trips (see Table 16 in the Appendix).

Figure 8 Trip purpose by automobile sharing type, 2017



Data source: Federal Highway Administration (2018).

For example, 35 percent of *Drives alone* trips served commute/work-related purposes, a figure much higher than the six percent for *Internal carpool* trips (statistically significant at $p < .001$). Other noteworthy exceptions include the disproportionately high rates of *Household child* (29%) and *External driver* (14%) trips in which the traveler transported someone. Perhaps most relevant to studying the social components of sharing, however, is the high proportion (40%) of *External passenger* trips that served a Social/recreation purpose, followed by *Internal carpool* and *External driver* trips (32% and 29%, respectively). These sharing subtypes all require that multiple adults occupy a vehicle. Model 2 explores whether compared to disadvantage, this social element has a distinct association with sharing, after controlling for other factors.

4.2 Multinomial probit models

I now present the results of three multinomial probit models testing the relationships between disadvantage, trip purpose, and other demographic and built environment factors. Doing so allows me to identify the relative strengths of their associations with types of sharing. In each

case, I model the likelihood that a trip took place via the subtypes of automobile sharing, rather than the reference category of *Drives alone* (a form of non-sharing).

4.2.1 Transportation disadvantage

To model disadvantage, I again used household vehicle deficiency, medical condition, and poverty status. Variance Inflation Factor (VIF) values – with a maximum value of 1.04 – indicate that multicollinearity does not present an issue.

Table 4 *Likelihood of informal automobile sharing relative to driving alone based on transportation disadvantage (Multinomial probit model 1)*

| Model 1 | Household child | Internal carpool | External driver | External passenger | Borrowed car |
|--|----------------------|----------------------|----------------------|----------------------|----------------------|
| Has travel-limiting medical condition (<i>Reference: No medical condition</i>) | -0.498*** (0.021) | 0.417*** (0.010) | 0.008 (0.012) | 0.599*** (0.011) | 0.146*** (0.021) |
| Below poverty line (<i>Reference: Above poverty line</i>) | 0.322*** (0.015) | 0.079*** (0.011) | 0.173*** (0.012) | 0.445*** (0.013) | 0.326*** (0.019) |
| <1 vehicle-per-driver (<i>Reference: Fully-equipped</i>) | 0.249*** (0.013) | 0.903*** (0.008) | 0.217*** (0.010) | 0.955*** (0.009) | 1.040*** (0.013) |
| Constant | -1.697*** (0.004) | -0.837*** (0.003) | -1.140*** (0.003) | -1.702*** (0.003) | -2.451*** (0.006) |
| Observations | 737,812 | | | | |
| Chi-square (degrees of freedom: 15) | 30,496 | | | | |
| Log-likelihood | -934,790 | | | | |

Note. Standard errors in parentheses. *, **, *** indicates significance at the 90%, 95%, and 99% level, respectively.

Concerning variables representing transportation disadvantage, the model parameters in Table 4 suggest similar relationships to those in the summary statistics in Figure 5, Figure 6, and Figure 7. Relative to a *Drives alone* trip, for example, a travel-limiting medical condition decreases

the likelihood of traveling via a *Household child* trip, all else equal; the reverse is true for *Internal carpool*, *External passenger*, and *Borrowed car* (and has no statistical association with *External driver*) trips. Meanwhile, a traveler living below the poverty line increases the likelihood of sharing (of any type) rather than non-sharing (*Drives alone*). This relationship was particularly true of *External passenger* trips, increasing the likelihood by 56 percent after controlling for both vehicle access and medical condition. Finally, vehicle access is the strongest positive predictor of most types of sharing (*Internal carpool*, *External driver*, *External passenger*, or *Borrowed car*) over non-sharing (*Drives alone*), all else equal. For the latter two categories – cases of receiving resources from outside of the household – living in a vehicle-deficient household increases the likelihood that the traveler shared by 160 percent and 183 percent, respectively.

While Model 1 shows the influence of disadvantage via three separate variables, I also explored using a single composite variable to represent disadvantage. This binary variable – capturing whether the traveler had any of the three qualities (medical condition, limited vehicle access, or poverty status) – is coarser than the individual ones and does not distinguish among different sources of disadvantage. Yet the models using this binary variable produce the expected results. Having *any* transportation disadvantage again increases the likelihood of traveling via automobile sharing compared to driving alone; these effects range from an increase of 16 percent (for *Household child* trips) to 114 percent (for *External passenger* trips), relative to a *Drives alone* trip. See Table 19 in the Appendix for full results. I also use this composite variable to examine the relationship between disadvantage and trip purpose in Section 4.2.2 below.

4.2.2 Trip purpose and mode choice

Model 2 includes control variables for both trip purpose and transportation disadvantage. I model trip purpose as a categorical variable, with commute/work-related as the reference group.

Table 5 presents the model's parameters.

Table 5 *Likelihood of informal automobile sharing relative to driving alone based on transportation disadvantage and trip purpose (Multinomial probit model 2)*

| | Household child | Internal carpool | External driver | External passenger | Borrowed car |
|--|----------------------|----------------------|----------------------|----------------------|----------------------|
| Has travel-limiting medical condition (Reference: No medical condition) | -0.612*** (0.022) | 0.235*** (0.010) | -0.080*** (0.012) | 0.480*** (0.012) | 0.120*** (0.021) |
| Below poverty line (Reference: Above poverty line) | 0.292*** (0.015) | 0.071*** (0.011) | 0.158*** (0.012) | 0.462*** (0.013) | 0.341*** (0.020) |
| <1 vehicle-per-driver (Reference: Fully-equipped) | 0.199*** (0.013) | 0.928*** (0.008) | 0.203*** (0.010) | 0.988*** (0.009) | 1.065*** (0.013) |
| <u>Trip purpose</u> (Reference: Commute/work-related trips) | | | | | |
| Shopping/maintenance | 0.677*** (0.011) | 1.348*** (0.008) | 0.528*** (0.008) | 0.847*** (0.011) | 0.217*** (0.014) |
| School/church/daycare | 0.844*** (0.018) | 1.771*** (0.012) | 0.708*** (0.013) | 1.358*** (0.016) | 0.465*** (0.025) |
| Healthcare | 0.725*** (0.022) | 1.556*** (0.014) | 0.544*** (0.016) | 1.066*** (0.019) | 0.267*** (0.033) |
| Social/recreation | 0.914*** (0.011) | 1.854*** (0.008) | 0.972*** (0.008) | 1.592*** (0.011) | 0.697*** (0.014) |
| Transporting someone | 2.062*** (0.013) | 1.499*** (0.012) | 1.535*** (0.011) | 1.283*** (0.016) | 0.553*** (0.025) |
| Other | 0.319*** (0.026) | 1.324*** (0.015) | 0.707*** (0.015) | 1.301*** (0.018) | 1.138*** (0.021) |
| Constant | -2.450*** (0.009) | -2.146*** (0.007) | -1.757*** (0.006) | -2.702*** (0.010) | -2.841*** (0.011) |
| Observations | 737,812 | | | | |
| Chi-square (degrees of freedom: 45) | 122,810 | | | | |
| Log-likelihood | -882,380 | | | | |

Note. Standard errors in parentheses. *, **, *** indicates significance at the 90%, 95%, and 99% level, respectively.

After controlling for disadvantage, the parameters for trip purpose continue to resemble the relationships suggested by Figure 8. Relative to a commute/work-related trip, all other purposes increase the likelihood of sharing (of any type) than non-sharing (i.e., *Drives alone*), all else equal. These positive associations are strong between non-work trips and *Internal carpool*; for example, a trip serving a social/recreation purpose rather than a commute/work-related one increases the likelihood of traveling via *Internal carpool* rather than *Drives alone* by over 539 percent, after controlling for disadvantage. This finding makes sense; relatively few household members work in the same workplace. Predictably, in comparison to commute/work-related trips, transporting someone has a strong positive association with *Household child* trips; in many such cases, a traveler chauffeured a child who could not drive herself. Trip purpose tends to have smaller associations with the category of *Borrowed car* relative to *Drives alone* trips, after accounting for disadvantage.²²

Examining differences in resource exchange within versus between households yields more interesting insights. As I noted above, disadvantage increases the likelihood that a trip involved receiving assistance from another household. Yet the association between trip purpose and the likelihood of traveling via *External passenger* (a form of household-receiving) remains robust, particularly in serving social/recreation needs rather than commute/work-related purposes (all relative to non-sharing).

To determine whether disadvantage mitigates the relationship between sharing and trip purpose, in a separate model I interacted trip purpose with a composite binary variable for general disadvantage status (see Section 4.2.1). The results confirm that disadvantage tends to weaken the relationship between trip purpose and sharing, increasing the likelihood of sharing for most trip

²² These associations hold before and after accounting for traveler disadvantage. See Table 20 in the Appendix for the results of a model that controls only for trip purpose.

types and trip purposes. This mitigating effect is especially strong for *Internal carpool* and *External passenger* trips (while more ambiguous for *Household child* and *External driver* trips), relative to *Drives alone* trips. Table 21 in the Appendix includes the full model results; measures of marginal effects are available upon request.

4.2.3 Incorporating all variables

Finally, I model the same automobile sharing outcomes while including other factors that have documented relationships with mode choice. These include traveler characteristics like sex, race/ethnicity, age, education level, immigrant status and years in the U.S., and primary activity in the previous week, as well as built environment factors such as residential population density, metropolitan statistical area (MSA) size, and residence in the New York City metropolitan area.²³

Table 6 displays these model results.

Table 6 *Likelihood of informal automobile sharing relative to driving alone, full model (Multinomial probit model 3)*

| | Household child | Internal carpool | External driver | External passenger | Borrowed car |
|--|---------------------|---------------------|---------------------|---------------------|---------------------|
| Has travel-limiting medical condition (Reference: No medical condition) | -0.041 (0.025) | 0.210*** (0.010) | -0.029** (0.013) | 0.458*** (0.012) | 0.151*** (0.022) |
| Below poverty line (Reference: Above poverty line) | 0.235*** (0.018) | -0.002 (0.012) | 0.059*** (0.013) | 0.209*** (0.014) | 0.222*** (0.021) |
| <1 vehicle-per-driver (Reference: Fully-equipped) | 0.104*** (0.014) | 0.903*** (0.008) | 0.161*** (0.010) | 0.899*** (0.010) | 1.036*** (0.014) |
| <u>Trip purpose</u> (Reference: Commute/work-related trips) | | | | | |
| Shopping/maintenance | 0.858*** (0.012) | 1.287*** (0.009) | 0.590*** (0.008) | 0.784*** (0.012) | 0.255*** (0.016) |
| School/church/daycare | 1.015*** | 1.686*** | 0.791*** | 1.205*** | 0.484*** |

²³ While many built environment and regional factors have an association with travel behavior, New York City metropolitan area residents travel uniquely. For example, while in 2017 under six percent of U.S. residents lived in the New York City metropolitan area, over 34 percent of national public transit trips occurred on New York City Transit (Federal Transit Administration, 2017; U.S. Bureau of the Census, 2017b).

| | | | | | |
|---|-----------|-----------|-----------|-----------|-----------|
| | (0.020) | (0.013) | (0.014) | (0.017) | (0.027) |
| Healthcare | 0.996*** | 1.482*** | 0.627*** | 0.991*** | 0.315*** |
| | (0.025) | (0.015) | (0.017) | (0.020) | (0.034) |
| Social/recreation | 1.037*** | 1.799*** | 1.033*** | 1.539*** | 0.734*** |
| | (0.012) | (0.009) | (0.008) | (0.012) | (0.016) |
| Transporting someone | 2.088*** | 1.422*** | 1.552*** | 1.166*** | 0.544*** |
| | (0.014) | (0.012) | (0.011) | (0.017) | (0.026) |
| Other | 0.435*** | 1.293*** | 0.744*** | 1.293*** | 1.150*** |
| | (0.028) | (0.015) | (0.016) | (0.019) | (0.021) |
| Built environment | | | | | |
| <u>Residential population density of traveler,</u> persons per square mile (Reference: Low, <2,000) | | | | | |
| Medium (2,000 to 3,999) | -0.039*** | -0.100*** | -0.036*** | -0.011 | -0.048*** |
| | (0.010) | (0.007) | (0.007) | (0.009) | (0.014) |
| High (4,000 to 9,999) | -0.057*** | -0.091*** | -0.004 | 0.011 | -0.101*** |
| | (0.010) | (0.007) | (0.007) | (0.009) | (0.014) |
| Highest (10,000+) | -0.148*** | -0.097*** | 0.020 | 0.096*** | 0.025 |
| | (0.018) | (0.012) | (0.012) | (0.015) | (0.023) |
| NYC metropolitan area residence (Reference: Lives outside of NYC metropolitan area) | -0.098*** | -0.010 | 0.025* | 0.036** | -0.110*** |
| | (0.022) | (0.013) | (0.015) | (0.018) | (0.030) |
| <u>Metropolitan Statistical Area size</u> (Reference: Not in MSA) | | | | | |
| Less than 250k | -0.004 | -0.031*** | 0.007 | 0.012 | 0.024 |
| | (0.015) | (0.009) | (0.010) | (0.013) | (0.020) |
| 250k to 500k | -0.035** | -0.039*** | 0.008 | 0.013 | -0.058*** |
| | (0.014) | (0.009) | (0.009) | (0.011) | (0.018) |
| 500k to 1M | -0.017 | -0.054*** | -0.040*** | -0.049*** | -0.066*** |
| | (0.014) | (0.009) | (0.010) | (0.012) | (0.019) |
| 1M to 3M | 0.019 | -0.023*** | -0.049*** | -0.044*** | -0.019 |
| | (0.013) | (0.008) | (0.009) | (0.011) | (0.017) |
| 3M plus | 0.054*** | 0.025*** | 0.024** | 0.057*** | 0.056*** |
| | (0.014) | (0.008) | (0.009) | (0.011) | (0.018) |
| Personal characteristics | | | | | |
| Female (Reference: Male) | 0.278*** | -0.042*** | -0.002 | 0.398*** | -0.143*** |
| | (0.008) | (0.005) | (0.005) | (0.007) | (0.011) |
| Age | -0.035*** | -0.007*** | -0.006*** | -0.008*** | -0.005*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Owns home (Reference: Does not own home) | 0.193*** | 0.181*** | -0.093*** | -0.071*** | 0.068*** |
| | (0.010) | (0.007) | (0.007) | (0.009) | (0.014) |

| | | | | | |
|--|-----------|-----------|-----------|-----------|-----------|
| <u>Race/ethnicity</u> (Reference: Non-Hispanic White) | | | | | |
| Non-Hispanic Black | 0.030* | -0.253*** | 0.068*** | 0.008 | 0.077*** |
| | (0.016) | (0.011) | (0.011) | (0.013) | (0.019) |
| Non-Hispanic Asian | 0.015 | 0.228*** | 0.165*** | 0.211*** | 0.250*** |
| | (0.020) | (0.015) | (0.016) | (0.020) | (0.029) |
| Hispanic | 0.125*** | 0.148*** | 0.144*** | 0.078*** | 0.126*** |
| | (0.014) | (0.010) | (0.010) | (0.013) | (0.020) |
| Other | 0.038* | 0.037*** | 0.099*** | 0.080*** | 0.109*** |
| | (0.020) | (0.013) | (0.014) | (0.017) | (0.027) |
| <u>Years in the U.S.</u> (Reference: Native-born) | | | | | |
| Five or less | 0.137*** | 0.570*** | 0.077** | 0.245*** | -0.018 |
| | (0.036) | (0.026) | (0.031) | (0.034) | (0.058) |
| Six to ten | 0.298*** | 0.292*** | -0.043 | 0.051 | -0.044 |
| | (0.034) | (0.028) | (0.032) | (0.037) | (0.059) |
| Eleven to fifteen | 0.219*** | 0.183*** | -0.079*** | -0.004 | -0.046 |
| | (0.032) | (0.027) | (0.030) | (0.036) | (0.057) |
| 16 to 20 | 0.322*** | 0.120*** | -0.066** | -0.159*** | -0.091* |
| | (0.029) | (0.024) | (0.027) | (0.035) | (0.052) |
| More than 20 | 0.113*** | 0.061*** | -0.082*** | -0.076*** | 0.017 |
| | (0.018) | (0.012) | (0.013) | (0.016) | (0.024) |
| <u>Education</u> (Reference: Less than high school) | | | | | |
| High school | -0.068*** | -0.276*** | -0.058*** | -0.458*** | -0.276*** |
| | (0.024) | (0.013) | (0.016) | (0.016) | (0.026) |
| Some college | 0.082*** | -0.474*** | -0.040** | -0.663*** | -0.326*** |
| | (0.023) | (0.013) | (0.016) | (0.015) | (0.025) |
| Bachelors | 0.206*** | -0.543*** | -0.087*** | -0.678*** | -0.384*** |
| | (0.023) | (0.013) | (0.016) | (0.016) | (0.026) |
| Graduate | 0.337*** | -0.515*** | -0.090*** | -0.683*** | -0.377*** |
| | (0.023) | (0.013) | (0.016) | (0.016) | (0.026) |
| NA/skip | 0.025 | 0.068 | -0.207 | 0.127 | -0.459* |
| | (0.220) | (0.096) | (0.131) | (0.111) | (0.254) |
| <u>Primary activity in previous week</u> (Reference: Employed) | | | | | |
| Unemployed | -0.141*** | 0.064*** | -0.109*** | 0.156*** | 0.056* |
| | (0.024) | (0.016) | (0.018) | (0.020) | (0.032) |
| Homemaker | 0.903*** | 0.377*** | 0.103*** | 0.250*** | 0.168*** |
| | (0.012) | (0.010) | (0.012) | (0.013) | (0.025) |
| School | -0.818*** | -0.206*** | -0.370*** | -0.091*** | -0.200*** |
| | (0.023) | (0.015) | (0.018) | (0.019) | (0.031) |
| Retired | -0.569*** | 0.264*** | -0.026*** | 0.221*** | -0.047*** |

| | | | | | |
|--------------------------------------|-----------|-----------|-----------|-----------|-----------|
| | (0.018) | (0.007) | (0.008) | (0.010) | (0.017) |
| Other | 0.051*** | 0.231*** | 0.109*** | 0.417*** | 0.342*** |
| | (0.015) | (0.010) | (0.011) | (0.012) | (0.018) |
| Constant | -1.431*** | -1.488*** | -1.354*** | -1.901*** | -2.265*** |
| | (0.029) | (0.018) | (0.020) | (0.023) | (0.035) |
| Observations | 737,168 | | | | |
| Chi-square (degrees of freedom: 200) | 164,732 | | | | |
| Log-likelihood | -849,980 | | | | |

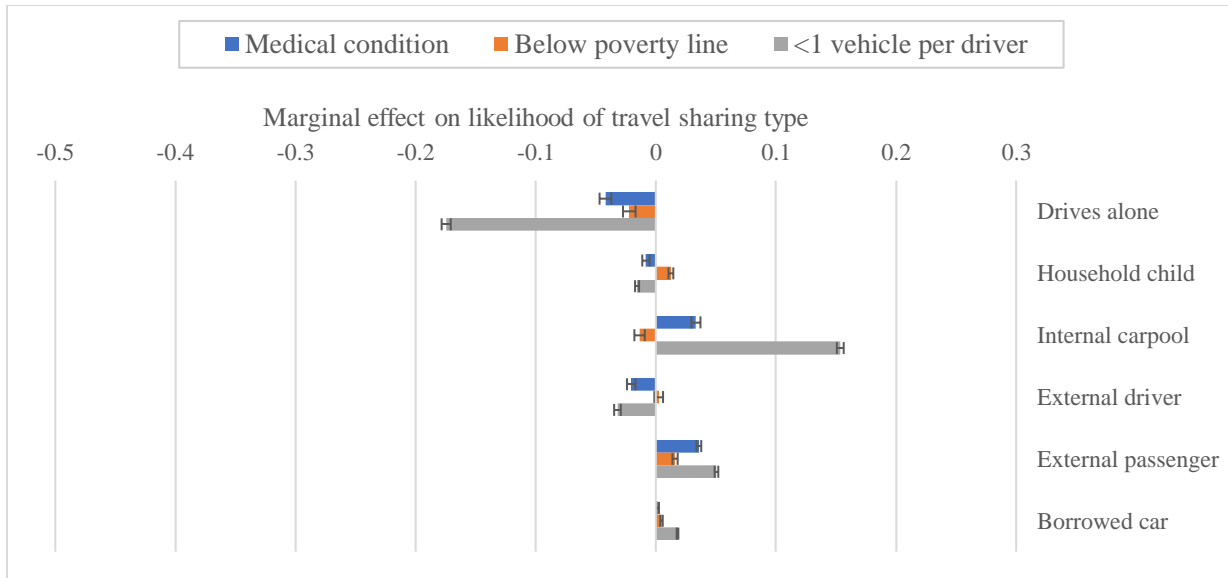
Note. Standard errors in parentheses. *, **, *** indicates significance at the 90%, 95%, and 99% level, respectively.

The results of Model 3 indicate additional associations between sharing and traveler characteristics. Several demographic factors – including immigrant status, sex, and employment status – have statistically significant relationships with the likelihood of vehicle-sharing. Yet few of the relationships between sharing outcomes and trip purpose or disadvantage (as seen in Models 1 and 2) lost significance, and none changed direction. Few of the built environment factors – including density and MSA size – are statistically significant and tend to have modest effects. A higher log-likelihood value indicates that Model 3 provides a stronger fit than Model 2 (which is expected, given the inclusion of several additional variables). Multicollinearity does not present an issue, with a mean VIF of 1.82.

Interpreting the results of the three multinomial probit models is challenging, however. These parameters indicate the associations between the independent variables and the relative probability of an outcome, rather than its *actual* probability. Figure 9, Figure 10, and Figure 11 thus display the marginal effects of the independent variables for the six non-sharing and sharing outcomes. The marginal effects capture how a one-unit increase in the variable changes the average

probability of observing that outcome (and in this case, all variables except for age are binary or categorical).²⁴

Figure 9 *Marginal effects of transportation disadvantage on average probability of travel sharing type*



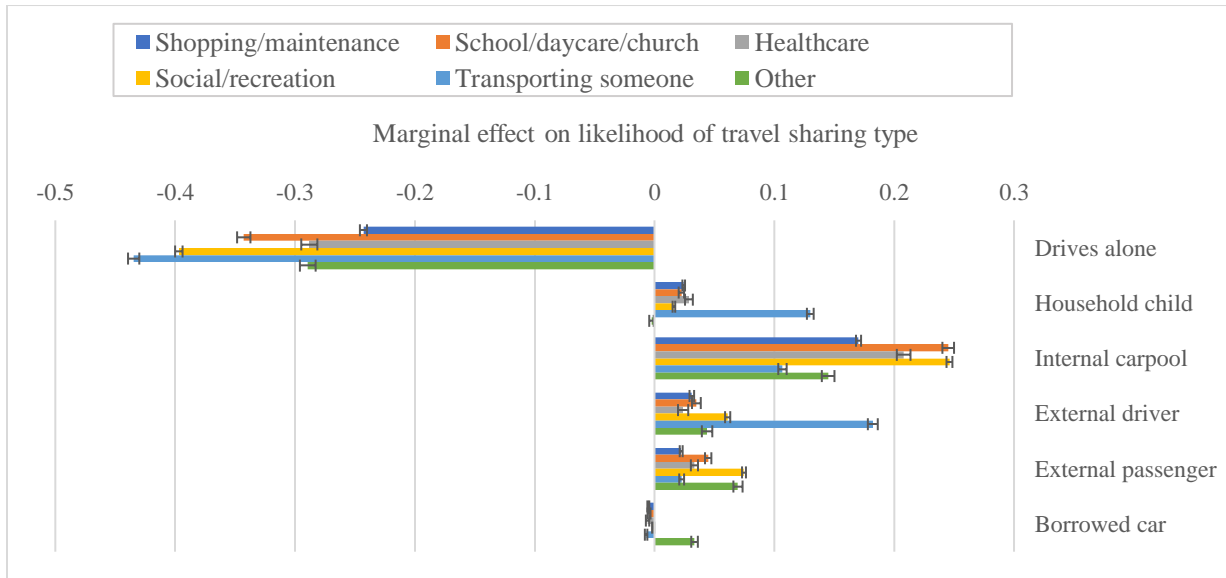
Note. Reference category is not having a medical condition, living above the poverty line, and living in a household with ≥ 1 vehicle per driver. Error bars indicate 95% Confidence intervals.

Figure 9 indicates that in Model 3, all transportation disadvantage factors have negative associations with traveling via *Drives alone*. Meanwhile, all disadvantage factors are positively associated with *External passenger* and *Borrowed car*, although for the latter they have relatively small associations. These small magnitudes partly reflect the fact that few private automobile trips (1.5%) occurred via *Borrowed car*. Having fewer than one vehicle per driver in the household and a travel-limiting medical condition decrease the likelihood of traveling via *Household child* or *External driver* (cases in which the traveler also drove). Limited vehicle access and having a

²⁴ The scales for the figures below have the same range of values for the y-axis to demonstrate the relative strength of the effects by independent variable.

medical condition both increase the likelihood of traveling via *Internal carpool*; among disadvantage factors, poverty status tends to have the smallest association with sharing outcomes, after controlling for other factors.

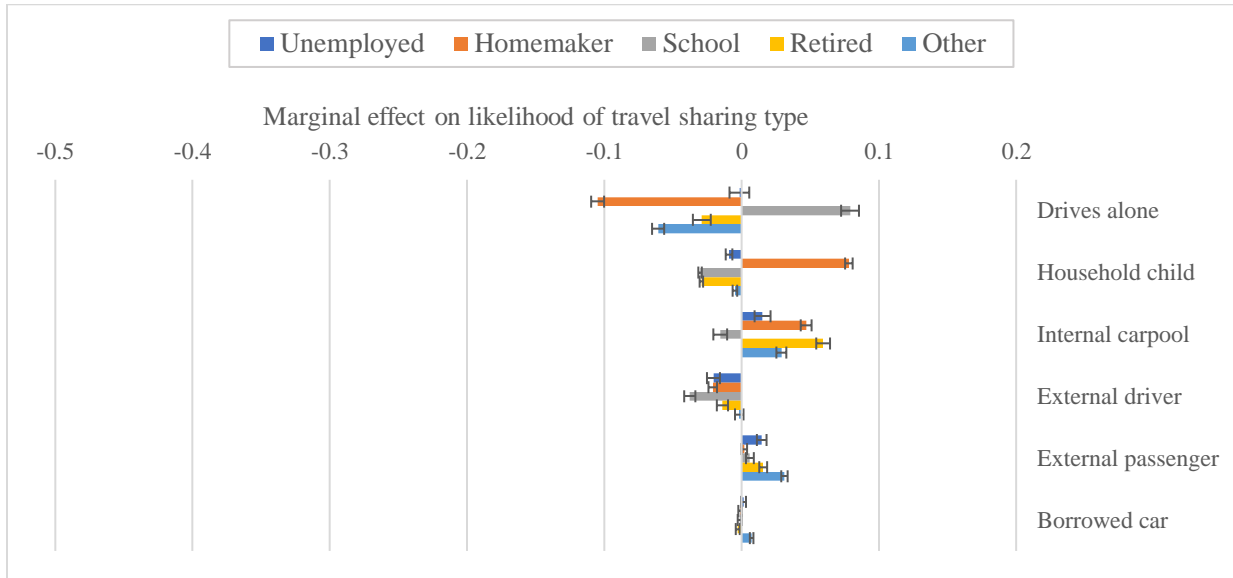
Figure 10 Marginal effects of trip purpose on average probability of travel sharing type



Note. Reference category is commute/work-related trip. Error bars indicate 95% Confidence intervals.

In Figure 10, the marginal effects show the influence of trip purpose relative to the reference category of commute/work-related trips. These effects are large, particularly for *Drives alone*; all non-work trips have strong negative associations with that outcome. Compared to work trips, non-work trips have strong positive associations with traveling via *Internal carpool*. And all else equal, transporting someone has a strong positive association with traveling via *External carpool* or *Household child*, while other trip purposes tend to have more modest effects on these outcomes. Trip purpose has the smallest marginal effects on the likelihood of traveling via *Borrowed car*, all else equal.

Figure 11 *Marginal effects of principal activity on average probability of travel sharing type*



Note. Reference category is being employed. Error bars indicate 95% Confidence intervals

Figure 11 shows the marginal effects of the traveler’s principal activity in the previous week, with the reference group being employed. One noteworthy category is homemaker, in which the traveler retains primary household responsibilities – and of which 94 percent were female in the NHTS sample. Unsurprisingly, a traveler being a homemaker rather than a worker increases the likelihood of a *Household child* trip; it also strongly decreases the likelihood that she *Drove alone*. Being a retiree, meanwhile, increases the likelihood that a traveler took any particular trip via *Internal carpool* but decreases the likelihood of a *Household child* trip (likely reflecting the fact that older, retired people are unlikely to live with or care for children). But compared to these cases of non-sharing or intra-household sharing, a person’s principal activity has a small influence on the likelihood of external-to-household receiving, all else equal. I also generated estimates of the marginal effects for all other variables in Model 3, but most are relatively small (under .05)

and/or not significant.²⁵ See Figure 29, Figure 30, Figure 31, Figure 32, and Figure 33 in the Appendix for these results.

5. Discussion and implications for scholarship

These results lead me to several conclusions about the value of sharing. First, informal automobile sharing – mostly cases of *sharing in* – serves many Americans; per Figure 2 and Figure 4, over 40 percent of all trips taken by U.S. adults occurred via informal automobile sharing. Further, transportation disadvantage – particularly in the form of limited vehicle access – increases the likelihood of private vehicle-sharing compared to non-sharing. This is especially true in cases where sharing occurred *across* households and in which the traveler received resources. Inter-household sharing may allow travelers to compensate for their lack of resources. This is consistent with the literature on poverty, transportation costs, and the mobility strategies of constrained people (Lovejoy & Handy, 2011) as well as the general social science literature on what motivates people to share (see Chapter 2, Section 2.2.1). These findings agree with conclusions from both quantitative studies (Blumenberg & Thomas, 2014) and qualitative studies (Blumenberg & Agrawal, 2014; Lovejoy & Handy, 2011). The model results also quantify just how much different forms of disadvantage increase the propensity to informally share cars in the U.S.

The relationships among other demographic factors, the built environment, and sharing are consistent with the findings from previous studies. For example, all else equal, women – even excluding their tendencies to be full-time caregivers – tended to bear greater responsibility for *Household child* trips, echoing the conclusions of Taylor et al. (2015) studying household- and child-serving trips. Further, Model 3 suggests that recent immigrants were more likely to travel with others – both within and between households – than native-born U.S. travelers, echoing the

²⁵ The one slight exception to this is traveler education (see Figure 31).

conclusions of Blumenberg and Smart (2010). Meanwhile, built environment factors have limited associations with rates of carpooling, all else equal. This agrees with previous studies, which also identify small or insignificant relationships between the built environment and carpooling for the commute (Buliung et al., 2009; Ferguson, 1997; Teal, 1987). This analysis extends this finding to non-commute trips.

The results of this analysis also indicate positive associations between automobile sharing and non-work travel. Few studies have compared the influence of traveler demographics versus situational – i.e., trip purpose – factors on vehicle-sharing. Results from Models 2 and 3 indicate that trip purpose best predicts the likelihood to share (particularly via intra-household sharing) over driving alone. The choice to travel with household members may reflect temporary travel needs, rather than the necessity of conserving sources. For example, relative to trips for commuting, a social/recreation trip strongly increases the likelihood that the trip occurred via *Internal carpool*. Two roommates attending a party may be able to drive alone but prefer to travel to the party together; they drive together for the opportunity to socialize. Of course, the reverse could be true. Perhaps one roommate wants to drink alcohol at the party and so he asks his roommate for a ride; feeling grateful for the assistance, he extends the party invite.

The results also suggest that *Household child* trips fundamentally differ from other private vehicle trips (both shared and non-shared). Non-disadvantaged travelers disproportionately made *Household child* trips. Unlike most other trip types, further, in *Household child* trips travelers were often transporting someone. Researchers interested in equity should continue to study *Household child* trips and the burdens they impose on travelers, particularly women. Extending conclusions about *Household child* trips to other findings on private vehicle-sharing, however, may be problematic, given their ambiguous relationship to sharing.

To build upon these findings, future research could directly evaluate the value people place on different types of private vehicle-sharing versus public sharing. Due to spatial differences in access to formal shared mobility services like public transit, this study examines trips made via *private* forms of sharing. This study, then, does not evaluate how commercial or public shared mobility modes influence shared travel. It also does not fully capture the degree to which travelers “choose” one type of sharing over another. Individual surveys of sharing motivations would help address this issue. Further, surveys could also address the direction of causality between different factors (for example, between trip purpose and mode choice). Finally, this analysis has not distinguished between external-to-household trips with acquaintances (for example, coworkers or family) versus strangers (for example, casual carpooling). These relationships further help distinguish between *sharing in* and *sharing out*. Additional data would enable an exploration of this distinction at a national scale.

6. Policy implications

These findings have policy implications for two types of strategies, including those that seek to (1) increase mobility among disadvantaged travelers, and (2) increase vehicle-sharing among the entire population.

6.1 Policies to increase mobility among disadvantaged travelers

To increase mobility for travelers facing financial and physical constraints, public efforts have often emphasized subsidized shared mobility services like public transit (Sanchez, 2008). But public transit appears to only meaningfully increase access – for example, to employment – in a handful of U.S. neighborhoods and regions (Owen & Murphy, 2019; Smart & Klein, 2020). And only 3.4 percent of trips made by U.S. adults in 2017 took place on public transit (Federal Highway Administration, 2018a). Despite decades of policy changes and increased investment in public

transportation, U.S. per-capita transit ridership had fallen while per-capita automobile travel increased or remained stagnant even before the COVID-19 pandemic (O’Toole, 2018). Since the start of the pandemic, transit ridership remains significantly depressed (Federal Transit Administration, 2021)

Meanwhile, disadvantaged travelers shared automobiles (including by getting rides and borrowing automobiles) far more than they rode transit and more than non-disadvantaged travelers did. Given this, policymakers should consider providing automobile-based support outside of the traditional shared mobility paradigm. For example, agencies could provide disadvantaged travelers with vouchers to compensate neighbors or friends who give them rides. Some Temporary Aid to Needy Families (TANF) recipients may use cash payments for transportation, but this is not a special allowance (45 CFR Part 260, 2023). Further, in some states like Maine, newly employed TANF recipients may receive reimbursement for automobile travel in the 18 months after leaving TANF via the Transitional Transportation Program. This only applies to commute travel, however (Pine Tree Legal Assistance, 2014), so agencies might consider expanding reimbursement to include non-commute trips. Further, that disadvantaged travelers so frequently rely on private vehicles – while not a new finding – reinforces the need to provide affordable automobile access to needy travelers.

Other policies could increase travel options for disadvantaged travelers, particularly options that more closely mimic private automobile access than public transit does. Policymakers should consider subsidizing carsharing in low-income communities, as do existing programs in Los Angeles (Spacek, 2017) and the San Joaquin Valley (Rodier et al., 2021). Vouchers for ridehail or taxi services might similarly provide travelers with temporary access to the benefits of private automobile travel (A. Brown et al., 2022). Some forms of micro-mobility, including electric

bicycles and scooters, might also effectively serve disadvantaged travelers (Abduljabbar et al., 2021).

6.2 Strategies to increase sharing among all travelers

Findings on trip purpose can inform programs to increase transportation sharing among all travelers in the U.S. Public programs have provided incentives to increase rates of carpooling for the commute (Shaheen et al., 2018). This is understandable, as public regulations can more easily influence the policies of large employers (Shaheen et al., 2018). Yet informal vehicle-sharing appears to have an especially strong relationship with non-work travel. New programs could thus offer incentives to promote vehicle-sharing for non-work trips. How these programs operate would differ based on the types of trip purposes they support. For example, shuttles from commercial locations to residences could provide auto-like assistance to shoppers. Such efforts, however, may face logistical challenges, including the difficulties of serving decentralized destinations and during non-peak travel times.

Further, the associations between sharing and automobile access echo findings from other studies of automobile ownership and travel behavior. Policies that make automobile use costlier could thus increase vehicle-sharing. Efforts might include policies that reduce parking availability (Antonson et al., 2017) or increase vehicle registration costs or taxes (Chia & Phang, 2017). Policies from other countries – such as Singapore, where travelers must bid on limited certificates of entitlement (COEs) to own and operate cars (Diao, 2019) – could inform U.S. efforts to increase shared travel. Policymakers should also consider congestion pricing, a strategy long endorsed by transportation economists, to better match supply and demand for road travel (Downs, 2005). Of course, the political challenges to making vehicle ownership and operation more costly remain formidable, particularly in the U.S. (Mattioli et al., 2020). Planners must also account for other

issues in road-pricing, including their impacts on disadvantaged people (D. King et al., 2007; Manville & Goldman, 2018).

7. Conclusion

The analysis in this chapter has examined the factors predicting different types of sharing at the trip level and explored differences between inter- and intra-household sharing. In the next essay, I turn to posts on the Craigslist rideshare board to understand how people use informal markets for sharing to meet their travel needs.

CHAPTER 4 – Essay 2. *Hitchhiking on the digital highway*: The costs and benefits of informal ridesharing

1. Introduction

In this essay, I consider informal practices of sharing out, in which people share vehicles with members outside of their social networks. As I discussed in Chapters 2 and 3, U.S. residents frequently travel by *sharing in* with people they know (from within and outside of their households). Yet travelers also *share out* with strangers.²⁶ Among other forms, sharing out in transportation includes (1) riding public transit, (2) using taxi/ridehail and carshare services, and (3) casual carpooling and ridesharing. In the first two categories, external parties – including public transit agencies and private companies – mediate sharing. However, travelers in the third category must coordinate exchanges themselves.

Scholars of travel behavior and equity may draw great value from studying informality in ridesharing. First, studying informal sharing can illuminate unmet travel needs and inform strategies to improve *formal* practices of sharing. Second, it may provide insight into the role transportation inequity plays in sharing with strangers. As findings from Chapter 3 indicate, people who experience transportation disadvantage – including travel-limiting medical conditions, poverty, and limited automobile access – are more likely to rely on cars and rides from other households (Federal Highway Administration, 2018a). Beyond transportation, informality benefits people with limited resources by lowering the costs of other goods and services (Gerxhani, 2004). Identifying the positive aspects and the drawbacks of informality in transportation, then, may enable planners to assess mobility gaps and better serve disadvantaged travelers.

²⁶ See Figure 1 for an illustration of the relationships between different types of transportation sharing.

Because data on informal ridesharing are not widely available, in this essay I draw on advertisements placed on the Craigslist rideshare board. After assembling data via web scraping, I examine posts using text mining and directed content analysis. I explore patterns in how travelers present themselves and their travel needs within an informal digital environment. Among other factors, I emphasize differences by region, between people who *offer* and *request* shared rides, and between people who engage in primarily commercial versus noncommercial transactions. I find that while rideshare posts primarily listed intercity trips, regional patterns varied. Further, while posters mentioned both economic and social factors as motivations to informally rideshare, cost-savings were the strongest motivations for most posters. Finally, some posters anticipated negative aspects of sharing with strangers.

For policymakers, the findings suggest that informal ridesharing may serve current demand for shared travel, particularly for going between cities. In most of the U.S. replacing informal networks with formal networks is not a workable solution for intercity travel. Thus, agencies might act best as facilitators of sharing by enabling travelers to access information about each other; this could include, for example, creating a smartphone application to match travelers based on trip or demographic characteristics. To close gaps between informal and shared formal services, agencies might also consider semi-formal shared services – such as regular shuttles – to large casinos in California’s San Joaquin Valley. Further, residents of Fresno – a medium-sized city located in a largely agricultural county – appear to have demand for travel *within* the region, suggesting a need for increased shared mobility options there. I expanded on these and other policy solutions in Section 8 below.

2. Choosing to rideshare with strangers

As I noted in Chapter 3, mode choice models assume that people make rational decisions about travel mode based on utility, or the value a person derives from a good or service based on the preferences they have (Ben-Akiva et al., 1985). In these models, scholars presume that a traveler weighs the monetary and time costs of alternatives; he then chooses the option that maximizes the benefits he receives (Moses & Williamson Jr, 1963). Differences between formal and informal markets for goods indicate that ridesharing with strangers may offer higher levels of utility for travelers in certain situations. Informally coordinating a ride with a stranger incurs large transaction costs. Travelers must also weigh not only the economic and time costs of sharing but also the socioemotional consequences of sharing with strangers. To explore how different factors influence the propensity to share with strangers, I begin by discussing the differences between informal and formal markets for sharing. Next, I describe potential economic and socioemotional costs and benefits of informal sharing. I then discuss the relationship between uncertainty and informality and its relevance for sharing transportation. I conclude by identifying gaps in the literature.

2.1 Informal versus formal markets for vehicle-sharing

Differences between informal and formal markets for services suggest that the Craigslist rideshare board offers unique costs and benefits to travelers. Mukhija and Loukaitou-Sideris (2014) note that most scholarship on informal markets addresses their operation in places with limited infrastructure and public services. Most studies of informal markets thus address cases in the Global South (Casson et al., 2010; Gerxhani, 2004; Webb et al., 2013). Scholars also increasingly recognize the presence of informal markets in Global North cities like Los Angeles; like other U.S. cities, Los Angeles is home to many immigrants, some of whom bring informal practices from other countries (Mukhija & Loukaitou-Sideris, 2014).

For consumers, informal markets have advantages and disadvantages over formal markets. Informal markets are flexible (Maloney, 1999) and may provide goods and services at low costs to the consumer (Gottlieb, 2002). But informality also presents challenges, arising from a lack of regulation and coordination by central actors. The downsides of informal markets include health and safety issues, worker exploitation, and discrimination against consumers (including price discrimination) (Chen, 2008; Roesel & Grace, 2014; Valenzuela Jr et al., 2005).

Informal sharing options for transportation range from established commercial operations to casual interactions between strangers. On the more institutionalized end, niche markets have emerged for informally shared travel similar to public transit. For example, *raites* and *camionetas* are van services that primarily serve intercity Spanish-speaking travelers in California (Valenzuela Jr et al., 2005). During the New York City Transit strike in the 1980s, Haitian immigrants began operating dollar vans in New York City; these vans continue to serve major arterials in Brooklyn that have limited public transit service (Goldwyn, 2020).

While *raites* and dollar vans operate as profit-making enterprises, noncommercial informal sharing options have also emerged in some U.S. cities. Houston, Washington D.C., and the San Francisco Bay Area host casual carpooling (Burris & Winn, 2006; Shaheen et al., 2016). In casual carpooling, passengers wait at locations adjacent to HOV (high-occupancy vehicle) or HOT (high-occupancy toll) lanes during peak travel hours, and drivers pick them up. Both drivers and passengers receive the benefits of reduced travel times and/or savings on tolls or transit fares; however, public agencies generally do not coordinate these sharing practices (Zmud & Rojo, 2013). In hitchhiking, an informal type of ridesharing, travelers receive rides from passing motorists. To hitchhike, a rider stands on the side of the road or at a fueling station and solicits

travel assistance. Compared to casual carpooling, hitchhiking's norms around social interaction and compensation vary more widely (O'Regan, 2016).²⁷

Informal and formal markets for transportation also vary by location (Cervero & Golub, 2007). For example, in a dense city like San Francisco, travelers have many formal vehicle-sharing options. These include a robust public transit system (Federal Transit Administration, 2021), extensive coverage by ridehail providers (Erhardt et al., 2019), and multiple carshare systems (San Francisco Municipal Transportation Agency, 2017). Smaller cities, towns, and rural areas struggle to sustain similar services. Rural areas, in particular, lack large and dense formal markets for shared travel. About 20 percent of rural areas have no public transit service at all (Mattson & Mistry, 2021). Further, almost 90 percent of rural places that *do* have transit struggle with very high per-passenger costs and infrequent service (Mattson & Mistry, 2021). Beyond public transit, U.S. rural residents have limited access to other formal services like ridehail and taxis (Conway et al., 2018). Informal shared transportation may thus offer special value to rural and exurban travelers.

2.2 Time costs and benefits of informal sharing

All types of vehicle-sharing – from the most to the least formal versions – present monetary costs and benefits. These costs vary by trip location, traveler, and sharing type. Formal versions of sharing, particularly public transit, can have low out-of-pocket costs for travelers. Due to government subsidies, riding public transit in the U.S. costs travelers less on a per-mile basis than driving alone in a car (Litman, 2022). In informal carpooling, meanwhile, travelers – coworkers for example – can save money by splitting the costs of single-occupancy vehicle (SOV) travel (Washbrook et al., 2006). Travelers may alternate who drives, contribute to fuel expenses, use HOT/HOV lanes, and/or gain access to employer-provided parking. Evidence suggests that rates

²⁷ I provide an extended review of the literature on casual carpooling and hitchhiking in the following chapter.

of carpooling rise when fuel costs also rise (Bento et al., 2013). The monetary benefits of carpooling may be especially attractive to people with low incomes or who lack cars (Blumenberg & Pierce, 2012; Blumenberg & Thomas, 2014).

The financial costs of ridesharing, however, vary by the traveler and trip. Unlike in formal markets, ridesharers may lack consensus on appropriate compensation. Informal ridesharing, then, could lead to inequitable exchanges, depending on the leverage travelers have in negotiations. In many cases of ridesharing, an offering party will make the planned trip without the passenger. Meanwhile, the requesting party may not have other travel options; she may need to defer the trip if she and the driver cannot reach an agreement. The driver may thus have more bargaining power than the passenger when negotiating a trip fare (Molm, 2003). These dynamics can influence the economic costs and benefits of informal vehicle-sharing.

Informal ridesharing also has costs and benefits in terms of time, in both coordinating and making the trip. People must spend time and energy arranging trips before travel. In the case of rideshare boards, users must write the post and filter responses. Further, in-vehicle travel times may be longer than when driving alone, as drivers serve multiple destinations and diverge from the most direct path between each traveler's origin and destination (Y. Park et al., 2018). Ridesharing also offers less schedule flexibility. Yet for passengers, especially, informal sharing may be a faster and more flexible travel option than formal transportation services like transit (Shaheen et al., 2016), a mode that is slower, on a per-mile basis, than traveling via automobile (Litman, 2008). Unlike public transit or dollar vans, informal ridesharing only requires ad hoc coordination with a handful of travelers. Further, it does not require that travelers conform to previously planned routes (J. Li et al., 2007).

2.3 Socioemotional costs and benefits of ridesharing in and out

Sharing generally – and informal ridesharing in particular – also generates *socioemotional* costs and benefits. Social psychologists have long established that as social creatures, humans value social interactions (Diener et al., 2018; Diener & Seligman, 2002). Yet social interactions with strangers also have costs. Indeed, several scholars view travel not only as a form of “derived demand” for meeting other needs but instead as an activity with its own experiential benefits and costs; see De Vos et al. (2013) for a review of this research.

Travel behavior researchers have studied the socioemotional aspects of carpooling. For example, Morris and Guerra (2015) conclude that on average, people find traveling as a private automobile passenger more enjoyable than as a driver, partly because passengers can interact with other travelers. Positive socioemotional benefits may thus motivate vehicle-sharing with acquaintances. Several researchers have found that enjoying spending time with others increases the propensity to carpool to work. For example, Park et al. (2015) found that university students and commuters frequently mentioned having company as a reason to carpool (although they mentioned it less frequently than cost-savings). In a study by Li et al. (2007), Texas commuters cited the enjoyment of traveling with others as a motivation for carpooling to work (J. Li et al., 2007). The ability to relax and avoid driving in congestion may emotionally benefit non-drivers (Beirão & Sarsfield Cabral, 2007) and rideshare or vanpool participants (Novaco & Collier, 1994). Reciprocal exchanges themselves may build goodwill and even social capital between regular carpoolers over time (Molm et al., 2007). Finally, impulses toward prosocial behavior – or the desire to help others – may cause people to assist others (Penner. et al., 2005), including by providing transportation. Yet carpooling also has socioemotional costs. These include, for example, spending time with unpleasant people, lacking the ability to control the vehicle

environment (such as choice of music), and generally foregoing “alone time” (J. Li et al., 2007). These socioemotional factors do not appear to discourage carpooling as much as structural issues such as time flexibility and varied schedules among travelers (J. Li et al., 2007).

Yet traveling via sharing out may have socioemotional costs and benefits distinct from those of sharing in (such as carpooling with a coworker). Compared to traveling as a driver or passenger in a private vehicle, travel via public transit is associated with lower moods (Chatterjee et al., 2020; Morris & Guerra, 2015). Meanwhile, Fink (2012) studied regular bus riders and their experiences sharing out. Some were positive; for example, regular bus riders engaged in short and enjoyable conversations or developed relationships over time. However, bus riders also reported unwelcome interactions with strangers, experiencing sexual harassment, offensive smells, insults, and threats. A significant proportion of these unwelcome interactions came from unhoused people or those with mental health issues (Fink, 2012).

2.4 Informality and the costs of uncertainty

In general, formality has an inverse relationship with risk. This means that as sharing becomes less formal, it involves greater uncertainty (Perry, 2007). Ridesharing with strangers involves a level of uncertainty absent in, for example, driving oneself. One source of uncertainty is traveler reliability: a traveler may arrange a trip with another person, who then fails to show. Another source of uncertainty is operator safety. In most informal sharing arrangements, the passenger cannot predict whether her driver will disobey traffic rules or engage in substance abuse, and typically has little recourse afterward if they do. Vehicle reliability is another issue, as traveling in a poorly maintained vehicle may be stressful, uncomfortable, or unsafe. Finally, personal safety issues (and fear of physical violence, in particular) presents another source of risk. Several studies have addressed driver and passenger concerns about personal safety in vehicle-

sharing, including in public transit (Appleyard & Ferrell, 2017), ridehail (Mousavi et al., 2022), and casual carpooling (Deakin et al., 2010). I return to the issue of safety and physical risk in Essay 3.

Formal services have less uncertainty because external parties manage risks for travelers. Platform economy companies, in particular, help consumers overcome safety and psychological concerns (Setiffi & Lazzer, 2018). To this end, many companies allow people to evaluate the reputation of other users and access personal information like names, gender, and nationality (Finck & Ranchordás, 2016). Ridehail companies like Uber and Lyft vet their drivers; they conduct criminal background checks, ensure that they have valid licenses, and check their driving records for moving violations (Lyft, 2022a; Uber, 2022b). Ridehail applications also track deviations from the assigned route, and drivers and passengers do not exchange cash. In states like California, both companies require that drivers use four-door vehicles that are less than 15 years old (Lyft, 2022b; Uber, 2022a). Further, ridehail riders and drivers may view previous user ratings before accepting a ride and leave feedback after (Lyft, 2023; Uber, 2023).

With informal sharing where no third party mediates exchanges with strangers, the parties must act with limited information. Some travelers may attempt to acquire personal information to assess risk (Vanoutrive et al., 2012). Further, people trust strangers of the same race/ethnicity and social background more than people from other backgrounds (Glaeser et al., 2000). A second strategy, then, is to discriminate against people from population groups different from the traveler. For example, women may prefer to ride with other women, or young people with other young people (Créno & Cahour, 2014). Evidence suggests that some passengers discriminate against ridesharing drivers based on race or nationality (Farajallah et al., 2019).

Ridehail providers have formal mechanisms to facilitate sharing; hitchhiking is at the other end of the informality spectrum.²⁸ Though an informal type of vehicle-sharing, Craigslist rideshare falls somewhere between these poles. Craigslist is less formal than digital vehicle-sharing platforms (like ridehail) that verify user identities and allow people to evaluate each other. On Craigslist, the poster must provide an email address to request or offer a ride (and nothing more). This system makes it difficult for users to verify the information that people provide. High-profile crimes may also dissuade some people from sharing private space with strangers; indeed, the media has dubbed dozens of criminals “the Craigslist killer” (Dewey, 2016). But Craigslist allows users access to some information (however unreliable) about a poster – for example, where they plan to travel and perhaps a photograph. This makes Craigslist rideshare trips somewhat less uncertain than hitchhiking. This information may partly reduce concerns about physical danger and uncertainty. Table 7 summarizes the costs and benefits of informal ridesharing relative to formal sharing and non-sharing along several different dimensions.

Table 7 *Costs and benefits of informal ridesharing relative to non-sharing and formal shared travel*

| | Costs | Benefits |
|-------------|---|--|
| Monetary | Passengers may pay more than public transit to reach the same destination; drivers could engage in price discrimination | Drivers may split the costs of operating the vehicle (e.g., fuel costs) or even make a profit; passengers may find it less expensive than ridehail |
| Travel time | Drivers experience longer travel times versus driving alone | Passengers experience shorter travel times than on public transit |
| Transaction | Travelers must coordinate trips, negotiate compensation, and establish rules/norms for trip | Travelers may communicate and negotiate compensation before travel (rather than on the side-of-the-road, as in hitchhiking) |

²⁸ See National Academies of Sciences, Engineering, and Medicine (2016) for an extended discussion of the differences between these different types of vehicle-sharing and Figure 12 below.

| | | |
|----------------|--|---|
| Socioemotional | Travelers may encounter unpleasant people | Travelers may enjoy talking or socializing |
| Uncertainty | Travelers cannot assess the reliability of driver/passenger or vehicles; other travelers may be dangerous or have nefarious intentions | Passengers have greater flexibility than with public transit; travelers have information about trip origins and destinations of other travelers |

2.5 Gaps in the literature and hypotheses

Little research has addressed how informal sharing – and ridesharing in particular – competes with other travel modes in the U.S. As I noted in Chapters 1 and 2, researchers tend to emphasize public transit in studies of shared travel. Yet public transit (and other formal shared services) offers limited mobility in most of the U.S. The role of public transit is especially limited for intercity ground transportation. U.S. travel via intercity buses and rail has declined over the last several decades, following the deregulation of services in the 1980s (Augustin et al., 2014). In recent years, public shared services like Amtrak and buses served less than four percent of intercity trips under 400 miles that were made via ground transportation (Schwieterman et al., 2017).

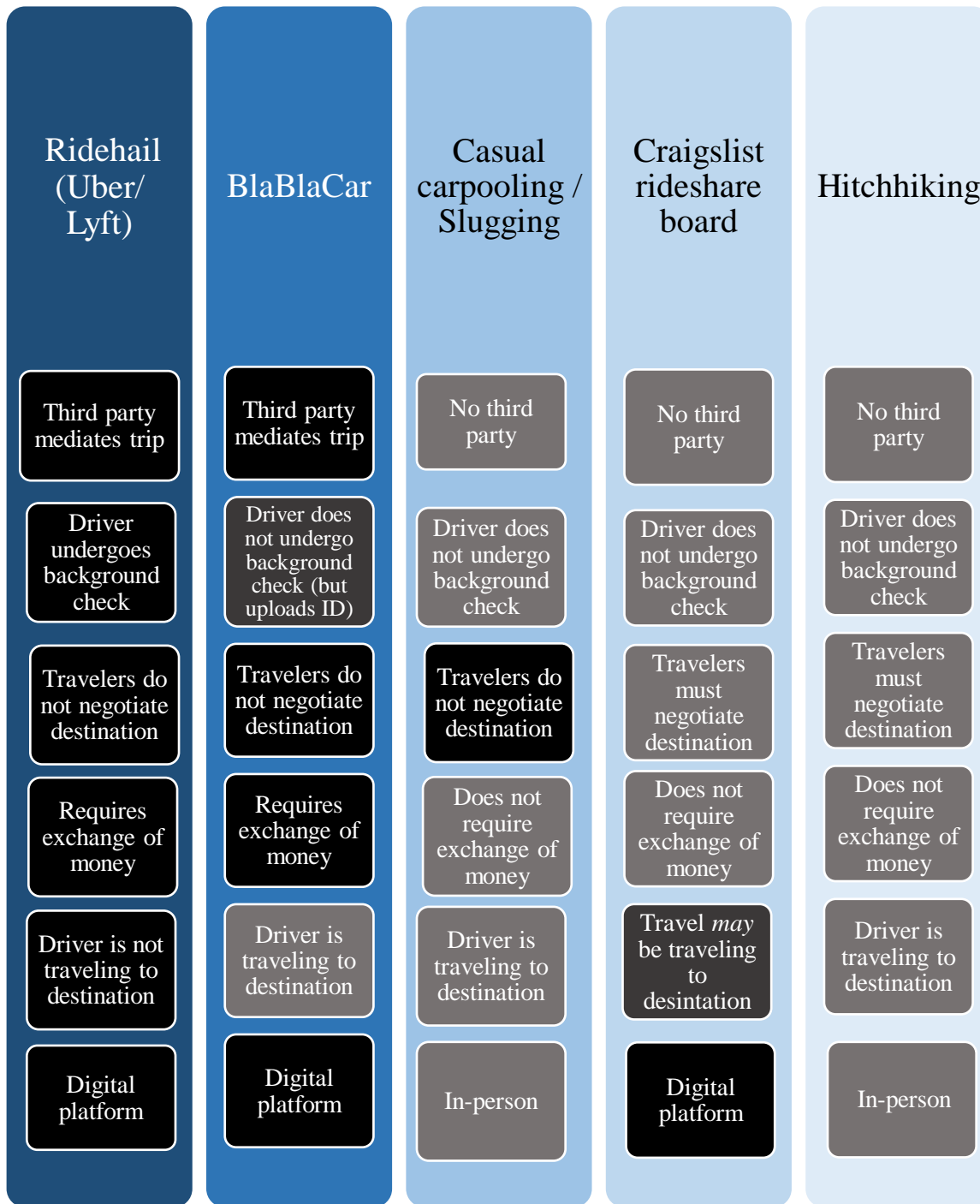
The few studies of economic versus socioemotional motivations for sharing tend to explore shorter distance travel with non-strangers (including the studies above by Beirão and Sarsfield Cabral (2007), Li et al. (2007), Novaco and Collier (1994), and Park et al. (2018)). These studies examine the experiences of people carpooling to work; their findings may not apply to long-distance and non-commute trips, nor to sharing with strangers. Informal ridesharing also typically lacks opportunities for repeated interaction (or at least built-in mechanisms to encourage repeated shared trips). People thus cannot easily reciprocate in non-financial ways, such as by trading off driving duties.

In studying informal ridesharing with strangers, one relevant form of transportation is BlaBlaCar. The service operates throughout Western Europe and connects travelers making trips between cities via a smartphone application (Gheorghiu & Delhomme, 2018; Shaheen et al., 2017).

Like Craigslist, BlaBlaCar also falls somewhere on the formal-to-informal sharing spectrum. BlaBlaCar does not promise drivers that they will make any profit from the trip but instead that they share travel costs. To use the service, a passenger searches for potential drivers and uses the platform to pay a driver within a price range set by BlaBlaCar (based on route distance) (Setiffi & Lazzer, 2018; Shaheen et al., 2017). While BlaBlaCar emphasizes the environmental and social benefits of ridesharing with strangers, researchers find that economic considerations cause most travelers to use the platform (Setiffi & Lazzer, 2018). In examining the market for rideshare trips, Farajallah et al. (2019) find that more experienced BlaBlaCar drivers tend to set lower prices (within the pre-determined range) and more effectively court passengers. They also found that all else equal, drivers with Arabic-sounding names attracted fewer passengers than drivers with French-sounding names. BlaBlaCar users thus appear to discriminate against Arabic drivers when choosing rides (Farajallah et al., 2019).

Yet data from BlaBlaCar cannot address critical questions about informality in shared transportation. With BlaBlaCar, users write reviews and evaluate each other's reputations online (Setiffi & Lazzer, 2018). Travelers can use this information to assess risk (Farajallah et al., 2019). Craigslist users cannot access similar verified information. Further, BlaBlaCar – while not promising any kind of profit – requires that passengers compensate their drivers via its digital platform (Setiffi & Lazzer, 2018). This system differs from Craigslist rideshare, in which travelers choose whether to exchange money. Finally, BlaBlaCar only serves certain countries in Western Europe (Gheorghiu & Delhomme, 2018; Shaheen et al., 2017), which host built environments distinct from the U.S. Figure 12 shows types of transportation sharing (and their characteristics) on a spectrum from most to least formal (left to right).

Figure 12 *Formality spectrum of vehicle-sharing*



This analysis has implications for research on non-urban travel and regional inequity in the U.S. These costs and benefits of shared travel vary by location and traveler automobile access. California provides an excellent case study for comparing informal ridesharing needs in urban and

non-urban places. It hosts two enormous metropolitan areas: Los Angeles and the San Francisco Bay Area. Yet it also has smaller cities and rural areas, whose residents have distinct travel needs. One of California's large regions, the San Joaquin Valley, occupies the central and southern portions of the Central Valley. Barajas and Wang (2023) identified rural areas in California where residents had accessibility challenges. Most of the areas were located in the San Joaquin Valley, particularly in Fresno and Tulare counties (Barajas & Wang, 2023). Further, they noted that rural households with limited automobile access faced significant mobility barriers and had much lower incomes than their non-rural equivalents (Barajas & Wang, 2023). Like Lovejoy and Handy (2011), Barajas and Wang (2023) found that Central Valley residents with limited vehicle access relied on family, friends, and other acquaintances for regular rides. Even in its non-rural areas, the region also has limited public transit service compared to other parts of California (Karner & London, 2014). Agencies in the Los Angeles and San Francisco Bay Area megaregions offer far more transit service and boast higher per capita transit ridership compared to the San Joaquin Valley (Taylor et al., 2020). Comparing informal rideshare posts across the three places may reveal regional differences in supply and demand for shared-vehicle travel.

In addition to accessibility issues, transportation equity scholars have focused on the San Joaquin Valley due to environmental justice concerns. The region has an agriculturally based economy. It thus attracts people who work in farming and processing, earn low wages, and are immigrants (and many with precarious legal status) (P. Martin et al., 2016). Further, San Joaquin Valley residents face poor air quality, polluted water, and exposure to pesticides (Connolly et al., 2020). These factors suggest that the region deserves special attention from scholars of transportation inequity.

Finally, this analysis contributes to the growing body of work on technology-facilitated exchanges. Digital platforms now enable people to share resources with strangers (and mostly for profit). These emerging models raise questions about whether exchanges are simply formalized economic transactions or comprise new practices of sharing (Setiffi & Lazzer, 2018). The informality inherent in some services can create challenges absent in highly formal environments (Schor, 2016). Patterns among Craigslist rideshare posts people may thus illuminate how people anticipate these challenges.

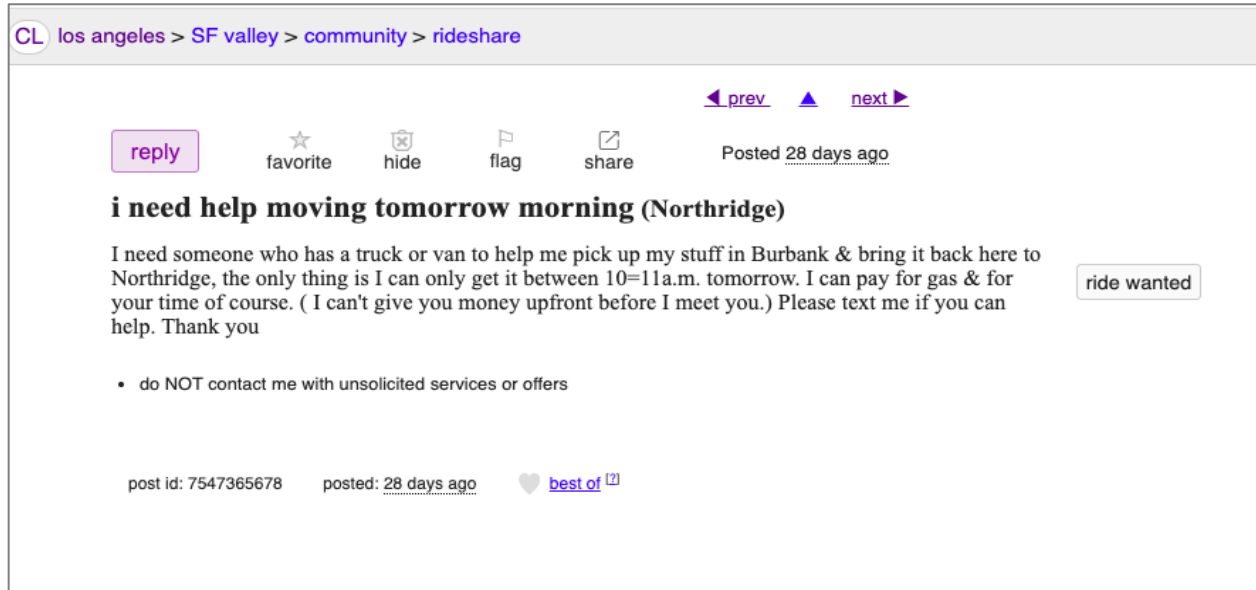
3. Data and methods

In this section I describe my data, the use of web scraping to collect it, and my coding approach. I also describe the use of text mining to identify term frequencies among the different post types. I then discuss the strengths and weaknesses of these approaches.

3.1 Data collection and processing

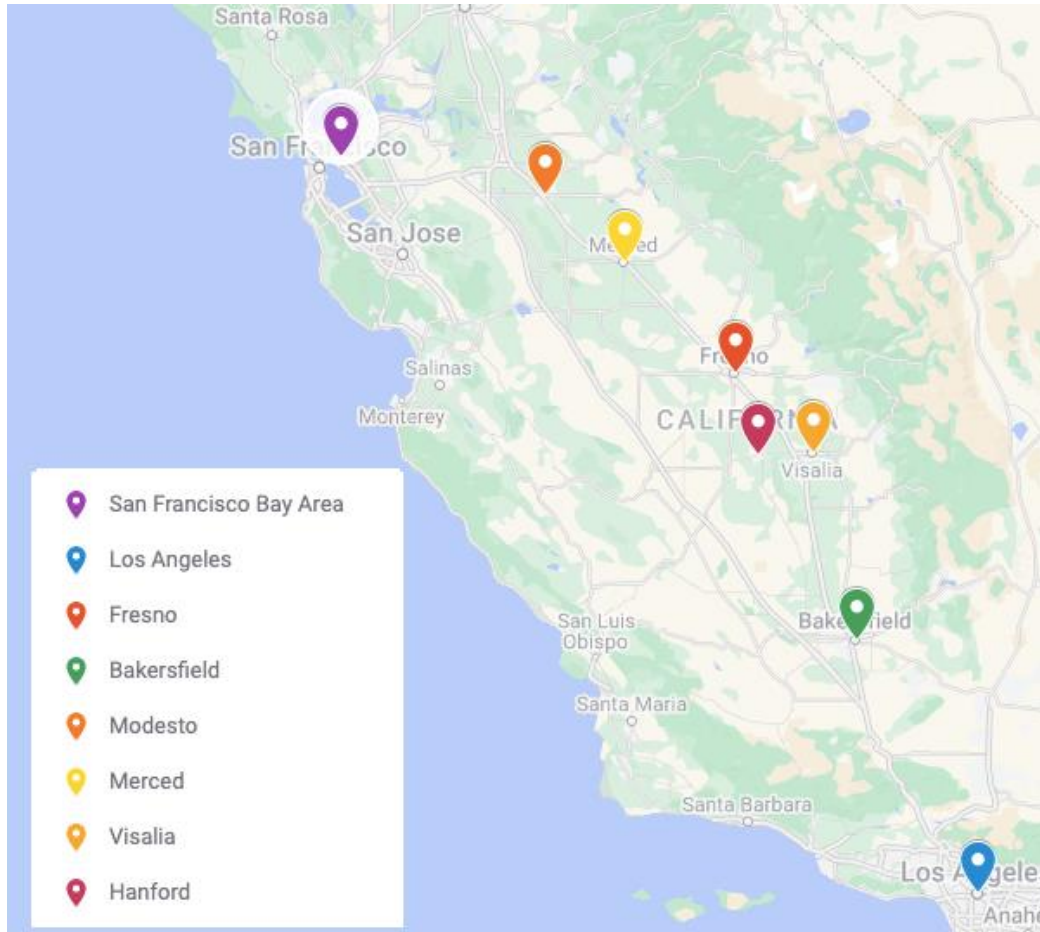
I draw the data for this analysis from the Craigslist community rideshare board. Craigslist is a classified advertisement website that allows almost anyone with internet access to sell or request goods or services (Leon, 2022). Developed in 1995, Craigslist received approximately 200 million page views in September 2022 (Semrush, 2022). Craigslist organizes its pages by geography. To post on the rideshare board, users must provide an email address, title, and description, and indicate whether the trip is “offered” or “wanted.” They may also attach images to their posts. Figure 13 shows an example post from the Los Angeles board.

Figure 13 *Example Craigslist post*



I used the Python package Beautiful Soup to scrape the pages for the three regions: San Francisco Bay Area, Los Angeles, and the southern San Joaquin Valley (the pages for Fresno, Bakersfield, Hanford, Merced, Modesto, and Visalia/Tulare). Figure 14 displays these locations.

Figure 14 Locations of eight California study regions



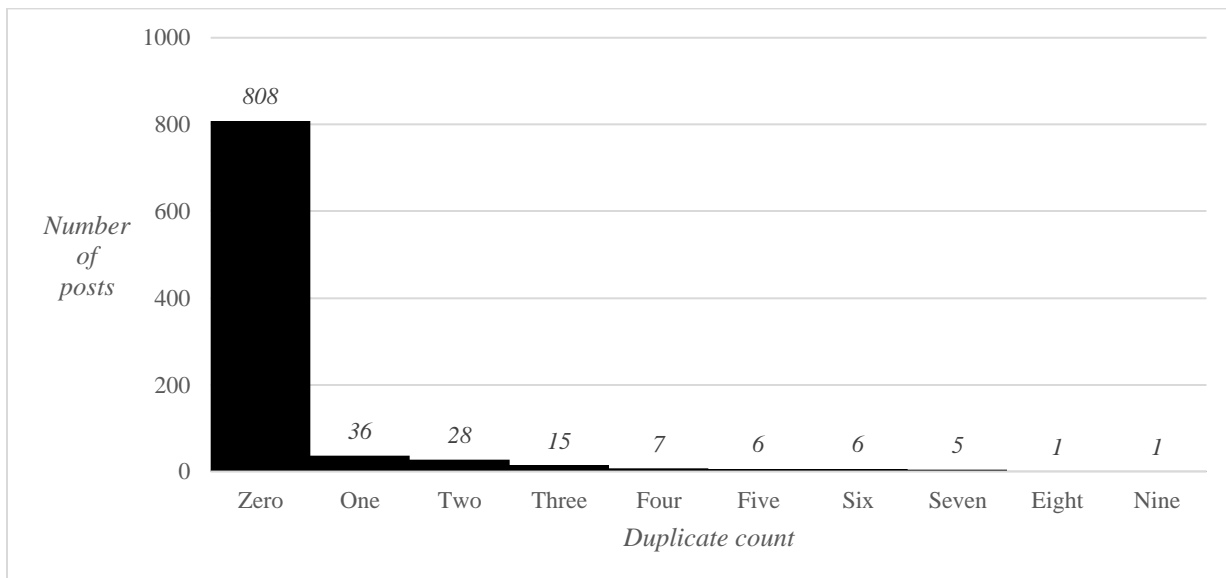
For each posting, I scraped the fields for the unique numeric identifier (“Posting ID”), neighborhood, title, description of the request, and date/time. Table 8 provides an example of the output from the Beautiful Soup script for the post in Figure 13.

Table 8 Data output of sample post

| Posting ID | Neighborhood | Title | Description | Date |
|------------|--------------|--------------------|---|----------------------|
| 7547365678 | Northridge | i need help moving | I need someone who has a truck or van to help me pick up my stuff in Burbank & bring it back here to Northridge, the only thing is I can only get it between 10=11 a.m. tomorrow. I can pay for gas & for your time of course. (I can't give you money upfront before I meet you.) Please text me if you can help. Thank you | 10/16/22 16.14.02 |

I scraped posts by running the query at 11 a.m. Pacific Daylight Time (PDT) each day from September 1 to September 30, 2023. After compiling data for the eight pages, I removed duplicates based on post ID (as posters can “repost” the same advertisement to move it to the top of the page). Figure 15 shows the number of post duplicates. Only a small minority of posts were reposted, but some occurred several times. For example, one was reposted nine times, for a total of 10 appearances at the top of the results page. Removing duplicates reduced the sample from 1,198 to 923 unique posts.

Figure 15 *Post duplicate counts*



I then manually excluded non-trip posts. Forty-one posts fell into this category. Among these, 17 were transportation-related in some way (such as selling an automobile, bus, or parking space), 12 implied offers for sexual activity, six were for non-travel sales (including two dogs), and six fit into none of these categories. Eliminating non-trip posts reduced the sample to 874 posts.

Table 9 *Count of posts by region*

| Region | Post count | Proportion of sample |
|------------------------|------------|----------------------|
| San Francisco Bay Area | 369 | 42% |
| Los Angeles | 326 | 37% |
| San Joaquin Valley | 179 | 20% |
| <i>Fresno</i> | 104 | 12% |
| <i>Bakersfield</i> | 40 | 4.6% |
| <i>Modesto</i> | 16 | 1.8% |
| <i>Visalia/Tulare</i> | 10 | 1.1% |
| <i>Merced</i> | 5 | 0.6% |
| <i>Hanford</i> | 4 | 0.5% |
| All trips | 874 | 100% |

Table 9 shows the counts and distribution of the posts by region. The sample sizes partly reflect differences in regional population sizes (but are not proportional to them). For example, in 2021 the population of Los Angeles County numbered about 9.8 million people, while the population of Kings County (home to Hanford) numbered 153,000 (U.S. Bureau of the Census, 2021a). Due to their small samples, I combined posts from the Hanford, Merced, Modesto, and Visalia/Tulare boards in the category of “San Joaquin small towns.” When quoting posts, I present them as they appeared and without correcting misspellings or grammatical errors.

3.2 Coding approach

To code these data, I used directed content analysis, an approach that combines aspects of deductive and inductive approaches. In directed content analysis, the researcher draws upon previous research to code for expected themes and also develops additional codes while exploring the data (Hsieh & Shannon, 2005). Based on previous work, I anticipated coding for themes including trip location and destination, types of compensation offered (if any), and types of personal information mentioned (if any). After analyzing the posts, I generated additional codes to capture whether the post mentioned socializing, experiences of hardship, driver ability, vehicle

information, and hygiene, among others. Table 10 shows the full set of codes and corresponding themes.

Table 10 *Codes for Craigslist posts*

| Category | Code | Type | Example codes |
|--------------------|---------------------------|-------------|-----------------------------|
| Post | Region | Categorical | Los Angeles, Fresno |
| | Post type | Categorical | Ride Wanted, Shared Offered |
| | Language | Categorical | English, Spanish |
| | Gender/Sex* | Categorical | Female, Male, NA |
| Trip aspects | Location | Categorical | Intercity, intracity, both |
| | Hauling only | Binary | Yes/No |
| | Time window | Categorical | Hour, day, week, NA |
| | Destination (state) | Categorical | CA, AZ, OR |
| | Destination (city/region) | Categorical | Bay Area, Reno |
| Financial | Any compensation | Binary | Yes/No |
| | Specific dollar amount | Categorical | No, \$10, \$20 |
| | Gasoline/fuel | Binary | Yes/No |
| | Driving | Binary | Yes/No |
| | Trade | Binary | Yes/No |
| Personal | Any personal information | Binary | Yes/No |
| | Name | Binary | Yes/No |
| | Gender/sex | Categorical | No, Female, Male |
| | Career | Binary | Yes/No |
| | Age | Categorical | No, 30s, 40s |
| | Social media | Binary | Yes/No |
| | Socializing | Binary | Yes/No |
| | “Weird/creepy” | Binary | Yes/No |
| Negative | COVID | Binary | Yes/No |
| | Hygiene | Binary | Yes/No |
| | Drugs/alcohol | Binary | Yes/No |
| | Operational safety | Binary | Yes/No |
| Operational safety | Driving ability | Binary | Yes/No |
| | Car make/model | Binary | Yes/No |

Note. *This is distinct from “mention of gender”; in addition to explicit mentions of gender, I determined poster gender based on name and other context clues.

See Table 22 in the Appendix for an application of these codes to the example post in Figure 13.

In the analyses below, I examine trends in post content by request type and region. In analyzing rideshare posts, I established a typology of request types. Craigslist tags rideshare posts

as “wanted” or “offered”. But within the category of “offered,” in some posts, the driver was already traveling to a fixed destination (similar to hitchhiking). In other “offered” posts, drivers offered trips that did not serve their own travel needs. Many of these posts listed recurring trips and did not mention locations but indicated a general service area (e.g., “Im giving rides in Fresno, Sanger, Madera and Casinos in the area” [800]). In contrast to hitchhiking, they better resembled informal taxi services. I thus divide “offered” trips into two categories: Shared Offered and Commercial. This recalls discussions by Acquier et al (2017), Cockayne (2016), and Ravenelle (2017) about what truly constitutes “sharing.”²⁹ Given my emphasis on sharing, I might have eliminated Commercial posts from this analysis. However, I include Commercial trips since they yield interesting insights, particularly in terms of how drivers confront the challenges of informality. Post type thus includes three categories: Ride Wanted, Shared Offered, and Commercial.

3.3 Text mining and analysis approach

I used several packages from the tidytext and tidyverse applications to analyze the scraped post data in the R programming language (using RStudio, version 4.2.2). With text mining packages, the user can tabulate word frequency and identify terms that appear frequently together. The package also enables sentiment analysis, including classification (and quantification) of positive and negative terms (Silge & Robinson, 2017). I examined about 49,000 words from the post descriptions and identified common themes by region and trip request type.

²⁹ Ride Wanted posters sometimes distinguished between seeking Shared Offered versus Commercial trips, as in the following excerpt: *Please note, I am only seeking a bonafied rideshare with someone already going my way that I can share travel expenses with, (as per the section I am posting in)* [331].

3.4 Strengths and weaknesses

This approach has strengths and weaknesses. The strengths of this analysis include the use of mixed methods and the novelty of the data. The weaknesses reflect issues with the external validity of the data. I elaborate on these issues below.

3.4.1 Strengths

The Craigslist data capture information unavailable in most studies of travel behavior. Most people do not rideshare with strangers in the U.S. This makes it challenging to recruit and survey a large sample of rideshare seekers in different locations. Purposeful sampling – in which the researcher collects data from a population of knowledgeable individuals, without seeking full generalizability of their findings – allows researchers to study a phenomenon with information-rich cases (Palinkas et al., 2015; Patton, 1990). I thus targeted my analysis to the language used in informal rideshare requests and offers made on Craigslist. While some studies have investigated the interaction between social and economic factors on Craigslist (Doleac & Stein, 2013), I have not identified any studies that address posts on the rideshare board.

More generally, mixed-method approaches combine the strengths of quantitative analysis – such as the ability to make inferences about larger populations – with those of qualitative methods – by addressing complex decision-making processes, which large surveys fail to capture (Creswell & Creswell, 2018). Most travel surveys – for example, the National Household Travel Survey (NHTS) – do not question respondents about *how* they present themselves to strangers in framing their travel needs. Scholars including Klein (2020) and Lowe (2021) argue that transportation researchers have underemphasized qualitative methods, and this study helps fill these methodological gaps.

3.4.2 Weaknesses

This analytical approach has weaknesses. Many offers and requests to rideshare with strangers do not appear on Craigslist but instead occur in person (as in hitchhiking) or on other digital or non-digital boards. People who post on Craigslist may differ meaningfully from those who do not. First, Craigslist users must have Internet access. Historically, regular Internet users tended to be younger, although age differences in rates of Internet access (particularly via smartphone) have narrowed over the last decade (Faverio, 2022). The same is true regarding the positive association between digital access and income, although again this relationship has weakened in recent years. For example, by 2021, 76 percent of Americans living in households with incomes less than \$30,000 owned smartphones (Vogels, 2021).

In addition to requiring digital access, Craigslist posters may differ from non-posters in other ways. For example, because Craigslist users cannot verify another user's identity through the website, this may skew the user population toward people with lower privacy or personal security concerns.³⁰ Further, the sample only included one post in Spanish (of 874 trip posts), with the remainder in English. The eight regions I studied has a large immigrant population; from 2017-2021, 19.9 of Merced County residents and 18.9 percent in Los Angeles County were born in Latin America (U.S. Bureau of the Census, 2021b), and some portion of these residents cannot speak or write in English. Compared to English-speaking residents, then, non-English speakers may be less likely to post on the Craigslist rideshare board.

Other factors mean that Craigslist post data may not reflect supply and demand for informal ridesharing. For example, I do not account for whether certain people posted frequently. While I eliminated duplicates that were reposted to the top of the page based on the same ID (see Figure

³⁰ In Essay 3 (Sections 4.2 and 4.4) I further explore this issue.

14), I cannot identify whether the same person made several unique posts. Ultimately, the data I analyze reflect what a page viewer saw, not the demand for ridesharing from individual posters.³¹ Additionally, my data do not capture whether the trips mentioned in posts took place via connections made on Craigslist (or at all). This analysis thus addresses how people presented themselves and their travel needs in seeking a ride, and the costs and benefits they anticipated (or at least proclaimed to). With these data, I cannot determine whether their attempts to rideshare succeeded.

Beyond issues specific to Craigslist, I collected data in September 2022 and cannot necessarily generalize the findings to non-pandemic years. The COVID-19 pandemic profoundly affected travel behavior, particularly at its height in 2020 (Parker et al., 2021). Travelers reported increased anxiety about physically interacting with strangers (Leão et al., 2021) and traveling via shared modes (Kiriazes & Edison Watkins, 2022). By September 2022, California’s daily case and death rates had declined to about six and four percent of their highest rates, respectively (Johns Hopkins Coronavirus Resource Center, 2022).³² Meanwhile, state and most regional authorities had relaxed (if not eliminated) social and physical distancing policies by this time (Cal/OSHA, 2022). Still, people who posted on Craigslist in September 2022 may have had lower-than-average concerns about germs (Kiriazes & Edison Watkins, 2022) or rates of automobile access (as with public transit (Paul & Taylor, 2022)). In Essay 3, I further address the potential influence of COVID-19 on the composition and success of rideshare users – and consequences for the board’s long-term popularity.

³¹ Because of this distinction, when I report results, I write, “57 percent of posts listed destinations” rather than “57 percent of posters listed destinations.”

³² California’s highest daily COVID-19 case rate was about 125,000 and the death rate was 530; these rates had declined to 4,500 and 30 by September 2022 (Johns Hopkins Coronavirus Resource Center, 2022).

Other scholars have used data from online resources, including social media and commercial listing sites, to explore (but not necessarily explain) aspects of human behavior. These sources offer cost-effective ways to gather information on large populations and capture user experiences in their own terms. Researchers studying transportation and traveler perceptions – including Klein et al. (2020) examining posts from GoFundMe, Iacobucci (2022) from Reddit, Setiffi and Lazzer (2018) from BlaBlaCar, and Schweitzer (2014) from Twitter – have analyzed data from online postings and activity. Outside of transportation, studies of Craigslist posts have also allowed researchers to detect patterns, for example, in residential rental markets (Boeing & Waddell, 2017) and sexual encounters (Rosenbaum et al., 2013). These researchers acknowledge concerns about the representativeness of the data they analyze. Yet with these data, researchers can gather information about difficult-to-reach populations without the high costs of recruiting and surveying hundreds or thousands of people.

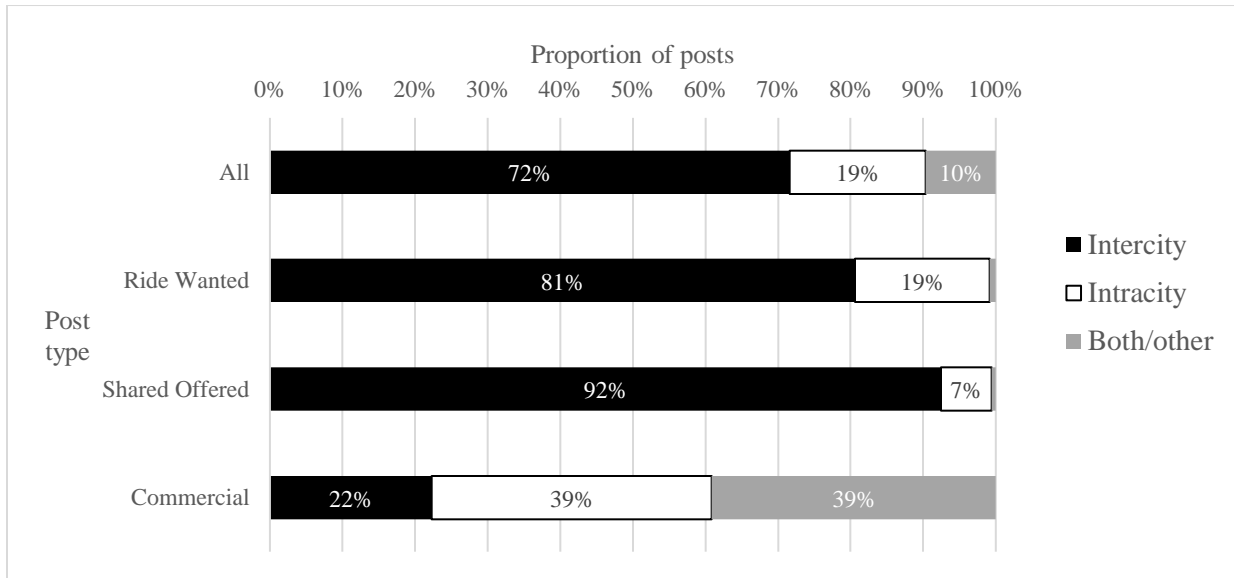
To address issues of representativeness, I considered alternative strategies for data collection. For example, I contemplated examining public poster boards and community centers throughout the study regions. But given logistical issues, including the challenges of completing fieldwork during the COVID-19 pandemic, I rejected those strategies. I also considered other digital data sources, including posts from Facebook groups. I rejected those options due to privacy issues in using information from private social media sites. Finally, to address issues about whether posted trips actually took place, I conducted surveys and interviews with Craigslist posters. I explore those results in Essay 3.

4. Characteristics of informal rideshare posts

Craigslist posters listed many different destinations, which varied by region and post type. The post data suggest some general patterns in the travel needs of people who turned to informal

sharing. Physical patterns particularly differed by post type. Figure 16 shows the distribution of each trip location among all posts and by type, indicating the proportion of inter- and intra-city destinations.

Figure 16 *Trip locations by post type*



Note. n = 874.

Most (72%) posts listed intercity destinations, but this percentage varied by type. Almost all (92%) of Shared Offered posts listed intercity destinations, followed by a slightly smaller proportion (81%) of Ride Wanted trips. The patterns among Commercial trips, however, are distinct. Less than one-quarter (22%) of Commercial posts exclusively listed intercity destinations; instead, the majority either served intracity trips or both. “Both” indicates that the poster wrote that he would serve (or take) a trip within or outside of the city.³³

Table 11 *Top ten destinations listed in posts*

| Rank | Location | Count |
|------|------------------------|-------|
| 1 | San Francisco Bay Area | 108 |

³³ Example excerpt: *Do you need a ride? I do cheap in town and even cheaper out of town rides at any time [...]* [808].

| | | |
|----|-------------------------------|----|
| 2 | Los Angeles | 77 |
| 3 | Sacramento | 45 |
| 4 | Las Vegas, Nevada | 36 |
| 5 | San Diego | 35 |
| 6 | Humboldt County ³⁴ | 27 |
| 7 | California Central Coast | 24 |
| 8 | Santa Cruz | 22 |
| 9 | Fresno | 16 |
| 10 | Portland, Oregon | 15 |

Table 11 shows the top ten most frequently listed destinations (among the posts that listed a single destination or range of destinations). Rideshare destinations in these regions were concentrated in a few areas: the top ten locations captured 59 percent of posts with listed destinations. Table 12 presents trip post counts by an approximate range of distance (again, among those with listed origins and destinations).

Table 12 *Distance of trips*

| Distance range | Post count | Proportion of posts |
|------------------------|------------|---------------------|
| Less than 50 miles | 198 | 26% |
| 50 to 250 miles | 172 | 23% |
| 250 to 500 miles | 255 | 33% |
| 500 to 1,000 miles | 75 | 10% |
| More than 1,000 miles | 64 | 8% |
| Total with known range | 764 | 100% |
| <i>Unknown</i> | <i>110</i> | <i>NA</i> |

Over half (56%) of posts with destinations fell in the 50 to 500 miles range, and about a quarter (26%) fell below 50 miles (many of which listed destinations within the same region). A small proportion (8%) listed distances longer than 1,000 miles; Figure 34 in the Appendix shows the distribution of all listed destinations by state. Additionally, some posters offered or requested

³⁴ Humboldt County is a primarily rural county located in the far northwestern area of California.

pick-ups or drop-offs along a route. For example, a Shared Offered post from the Bakersfield board reads,

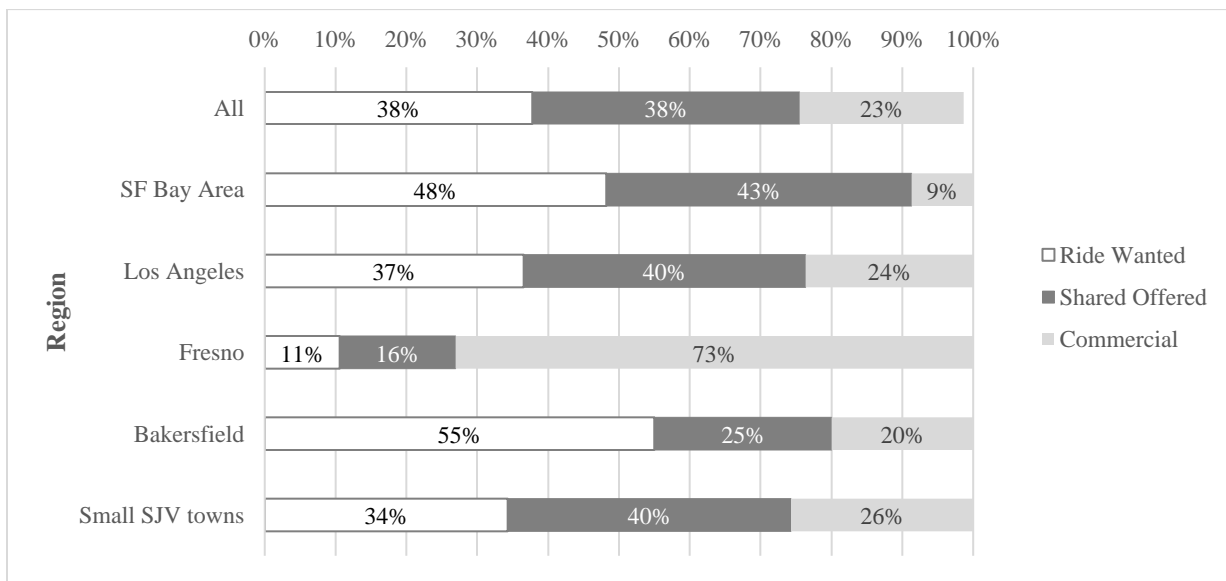
Leaving Saturday afternoon or Sunday morning...for Nebraska...anyone going to Vegas... Denver...points east on I 80...gas money...VERY helpful...call or text SOON... [901].

Further, some posters traveling between two locations – for example, from San Diego to Portland – posted in a third pass-through region – for example, on the Bay Area board – to request a rideshare partner.

4.1 Regional differences

The five regions have different population sizes, spatial structures, and transportation networks, contributing to regional differences in post types, as Figure 17 shows.

Figure 17 Post types by region

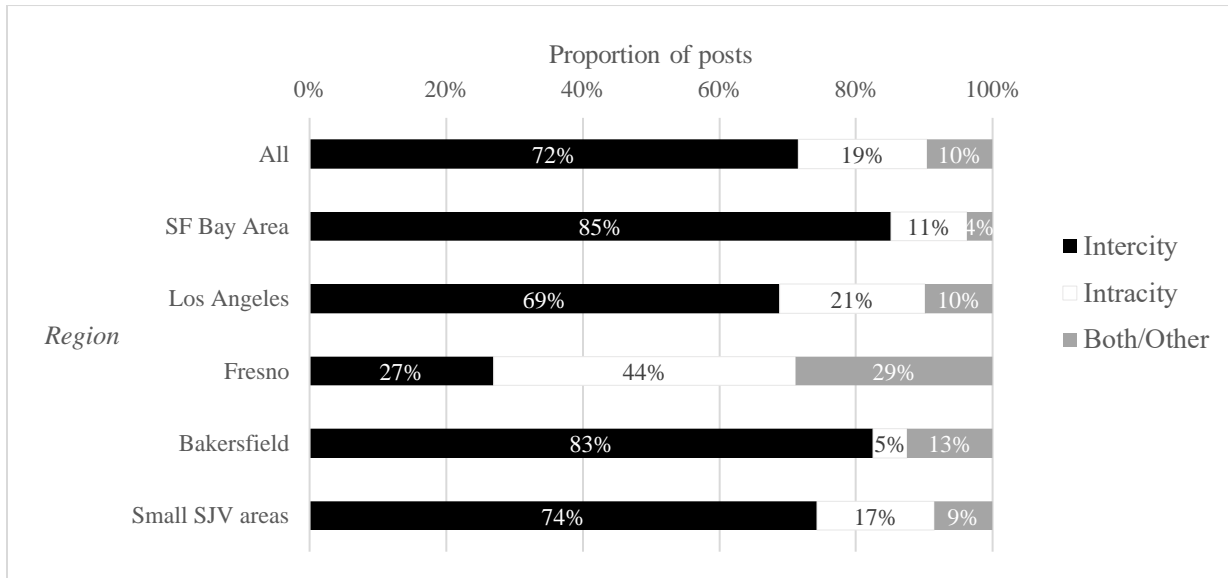


Note. n = 874.

About three-quarters of all posts fell into the noncommercial Ride Wanted or Shared Offered categories. The Bay Area had the largest share (91%) of noncommercial trips. In most

regions, noncommercial trips were split evenly between Shared Offered and Ride Wanted trips. However, Bakersfield had a large share (55%) of Ride Wanted posts. Finally, Fresno’s board was the greatest outlier in terms of post types, as the majority (73%) of its posts were Commercial.

Figure 18 *Trip locations by region*



Note. n = 874.

Regions also varied in terms of intercity versus intracity patterns. Recall that Figure 16 showed that the majority (72%) of all posts listed intercity trips/destinations. Figure 18 indicates that this resembles the share for most regions, with Fresno again an outlier. On the Fresno board, only 27 percent of posts listed an intercity destination (terminating in places like the Bay Area or Los Angeles).

Finally, specific destinations varied by region. Most of the top five destinations for each region fell within the full sample’s top 10 destinations (see Table 11), with two exceptions. The Bay Area page’s fourth most common listed destination was Black Rock City, a rural area in Nevada that hosts Burning Man. Burning Man, an annual outdoor festival, attracted 80,000 participants at its most recent occurrence in early September 2022 (Mullen, 2022). Additionally,

Among all posts, these words included “ride,” “driving,” “gas,” and “need,” terms related to rideshare and automobile travel in general. Table 13 shows the top 10 most frequently mentioned words by post type.

Table 13 *Common words by post type*

| Rank | Ride Wanted | Shared Offered | Commercial | All |
|------|----------------|----------------|------------------|---------|
| 1 | ride | can | ride | ride |
| 2 | can | ride | can | can |
| 3 | gas | driving | need | need |
| 4 | looking | gas | text | area |
| 5 | need | leaving | call | driving |
| 6 | please | area | anywhere | looking |
| 7 | help | need | go | please |
| 8 | get | one | area | get |
| 9 | pay | way | available | way |
| 10 | area | pick | time | one |

Note. Bold indicates that the term occurs in the top 10 most frequent words *only* in that subtype.

Many words occurred regularly across all post types. All subtypes had “ride,” “can,” “need,” and “area” among their most common words. Two subtypes – the noncommercial Shared Offered and Ride Wanted posts – also mentioned gasoline/fuel frequently, while Commercial posts did not. This recalls earlier discussions of how “sharing” may differ in terms of whether people truly share costs or instead engage in profit-seeking activities (Acquier et al., 2017; Böcker & Meelen, 2017).

Yet frequent terms also varied by subtype. Ride Wanted posts frequently included words that express need and appeal to the emotions of the potential ride provider (e.g., “please,” “help,” “need”). Many Shared Offered terms suggest logistical issues associated with coordinating a ride – for example, “driving,” “leaving,” and “one-way” all relate to timing and location of rides. Commercial words tended to emphasize flexibility (“anywhere,” “available,” “go”) as well as communication methods (“text,” “call”). Offered posts – both commercial and noncommercial –

thus appeared to focus on trip characteristics. Meanwhile, Ride Wanted posts emphasized personal connections with potential providers.

5. Anticipated benefits of informality

As I described in Sections 2.2 and 2.3, people share vehicles (and other resources) for many reasons. For example, researchers have compared how economic and time savings, environmental values, and social factors influence the decision to carpool to work (J. Li et al., 2007). Here, I examine the topics people mentioned as motivations to rideshare through Craigslist and differences by requesting and offering status.

5.1 Access

Like with model choice in general, access motivated ridesharing, especially for parties requesting rides. Traditional views of transportation see travel as a derived demand, meaning that people travel to engage in another activity (Mokhtarian & Salomon, 1999). Per post language, ridesharing appears to offer accessibility benefits over other shared mobility options. For long-distance travel, formal shared options in ground transportation – including subsidized rail services like Amtrak and private bus companies like Greyhound and Megabus (L. A. Fischer & Schwieterman, 2011) – offer limited service and schedule flexibility. In seeking informal ridesharing opportunities, some posters identified the shortcomings of formal options. A poster on the Bay Area rideshare board wrote,

Looking to get back to Eugene, but would rather not spend 26 hours on Amtrak. I have a bike (can take apart to minimize space), a suitcase, and a backpack. Willing to share the driving and help pay, as long as it's not much more than the price of a train ticket [676].

In addition to shorter travel times, some posters argued that informal services could offer a cleaner and more comfortable alternative to formal intercity sharing modes. A Commercial poster on the Los Angeles board wrote,

Still haunted by memories of riding the ever so slow, overcrowded, and smelly interstate bus? RELAX, there is a better way out!!! Offering a ride to San Diego or any city along the way [...] if your destination is en route, I will get you there in half the time and twice the comfort of Greyhound bus [...] Asking \$20 / seat. Snacks, water and friendly attitude will be provided at no extra charge [171].

This provider contrasted the positive qualities of his rideshare service with the negative qualities of formal options (but which offer similar accessibility benefits). Yet access did not motivate all ridesharers. For example, one wrote a post titled “Harley ride up the coast Tuesday – Wednesday,” in which he offered to take a passenger for a joyride on his motorcycle:

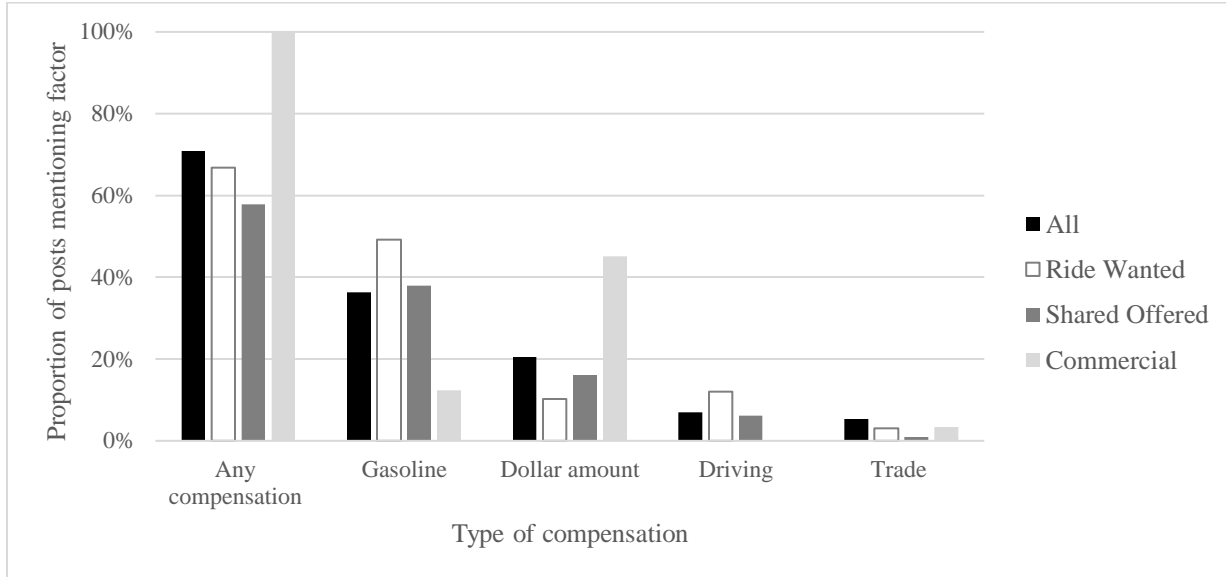
Picking up a road glide in glendale, tuesday morning-- taking a ride, up the coast... stopping to eat, stretch, check stuff out -gonna get some wind therapy ! - it's a tour bike (comfy a f) [167].

Similar to findings on hitchhikers in the previous century (Schlebecker, 1958), some ridesharing parties appeared to rideshare partly for the adventure it offered.

5.2 Economic benefits and financial compensation

Mentions of financial compensation among posts suggest that economic considerations motivate many cases of ridesharing. These include both what offering parties expected and what Ride Wanted parties anticipated would get them a ride. Figure 20 shows the proportion of posts that requested or offered compensation of different kinds. Most rideshare posts (71%) mentioned *some* type of compensation, although this varied by type.

Figure 20 *Mentions of compensation*



Note. Some posts mentioned multiple forms of compensation. n = 874.

Per their definition, all Commercial posts mentioned financial compensation, a rate much higher than among Ride Wanted (67%) and Shared Offered (58%) posts. Many Commercial posters provided approximate rates based on geography. One Fresno poster wrote, “\$10 rides anywhere around town \$15 Nearby towns \$20 casino” [770]. Because trips vary by distance, some Commercial posts cite per-mile or per-hour rates. For example, one poster cited a rate of “\$10 HR + GAS” [204]. A poster who regularly drove for Uber wrote that he “will do it for 80% of the price you pay from any rideshare service” [225].³⁵ Yet most (55%) of Commercial posters did not mention any dollar amount or range. This could reflect driver uncertainty about appropriate prices, given that no external party (like a ridehail or taxi company) sets fares.

In addition to differences in total compensation, Commercial and noncommercial posts differed in their mention of gasoline. As I note in Section 4.2, “gas” was the third most frequent word to appear across all posts. Both noncommercial post types mentioned gasoline more often

³⁵ The use of the term “rideshare” is a misnomer; the post makes references to ridehail services like Uber and Lyft.

than dollar amounts, with the discrepancy for Ride Wanted posts (49% versus 10%) larger than for Shared Offered posts (38% versus 16%). Requests or offers for contributions to fuel appear to reflect the intention to truly “share” costs rather than to seek profit. Commercial posts more frequently mentioned a specific dollar amount (45%) than gasoline (12%).

Rideshare posters could also compensate each other by assuming driving duties. About 12 percent of Ride Wanted posts included an offer to drive for part of the journey. For example, a Los Angeles poster wrote,

Need ride from OC or SD to anywhere in southern Oregon (going to Roseburg).

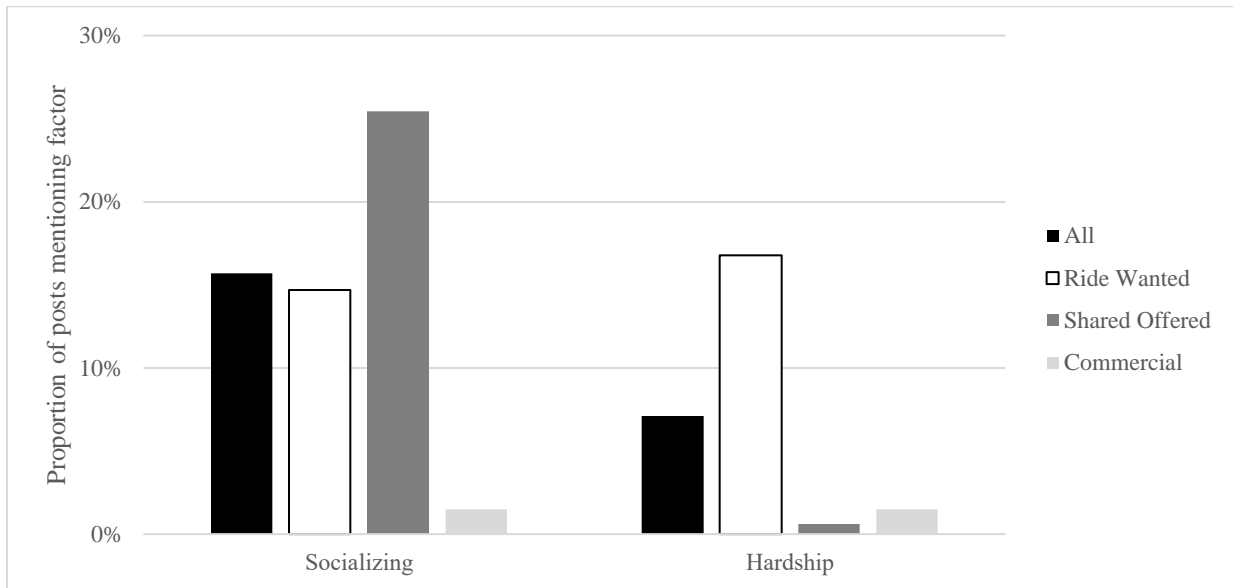
Can pitch in for gas and/or drive. Perfect driving record. [691].

Shared Offered posts also mentioned driving, but less frequently than Ride Wanted posts did (with 6.1% of them requesting that a passenger share driving duties). Yet Commercial posters seldom referred to non-financial exchanges or trades, probably as they sought to make money. Relatively few posts referred to other types of compensation such as trading goods or services. Trades offered by Ride Wanted posters varied but include labor, theft (of gasoline), sexual favors, and drugs.

5.3 Presenting the socioemotional benefits of sharing

Sharing can provide socioemotional value to travelers (see Section 2.3). Language in posts suggests that social opportunities may have motivated some posters to rideshare – or at least that posters believed that mentioning socializing would help them find a match. Figure 21 shows that a minority (16%) of posts mention socializing in some way. Among noncommercial trips, Shared Offered posts mentioned socializing more often than Ride Wanted ones did (in 25% versus 15% of posts, respectively). Among all post types, Commercial posts (1.5%) least frequently mentioned socializing.

Figure 21 *Mentions of interpersonal factors*



Note. n = 874.

One Shared Offered post illustrates how posters characterized the socioemotional value of rideshare:

October first I leave from the East Bay Area to drive cross country to Boston Mass. I did this successfully 5 years ago and the person I met on CL rideshare has been my bestie ever since [...] Obviously must split gas and pay for own accommodation along the way [...] I'm super chill and friendly and social and easygoing. Let's do this! [591].

Socializing also relates to another factor: hardship. Several posters stated that economic challenges caused them to rideshare. Describing hardship to strangers could also appeal to prosocial impulses and the compensatory value of altruism for the driver (i.e., Andreoni's (1990) "warm glow" of giving). It also justifies why a stranger deserves assistance. The following post from the Bay Area board captures this approach:

Hello... I have been stranded in Santa Rosa for about a week and a half now and I just want to go home... I don't really have anything to offer seems how everything I owned got stolen in my friends car... If you happen to be headed that direction tho, maybe even towards Reno, I would be super grateful if I could tag along so I could get home to my family... Thank you for your consideration... [284].

Ride Wanted posts mentioned hardship more frequently than other post types, although 7.1 percent of all posts mentioned hardship in some way (see Figure 21). One Commercial poster, for example, stated that he lost his employment as a limousine driver during the pandemic. He then began to offer rideshare services on Craigslist. These personal aspects of sharing – including the balance between need and altruism – also indicate the fluidity of requests and offers, especially in noncommercial exchanges. One poster wrote,

I'm driving from LA to San Jose on Thursday/Friday. I'm looking for some company on the way up. \$20 for gas or free if you're in need [31].

The flexibility of this request suggests the difficulty of sharply categorizing why any individual sought to rideshare. In some cases, posts on the Craigslist rideshare board fit the “strict” models of sharing (without reciprocity) I described in Chapter 2.

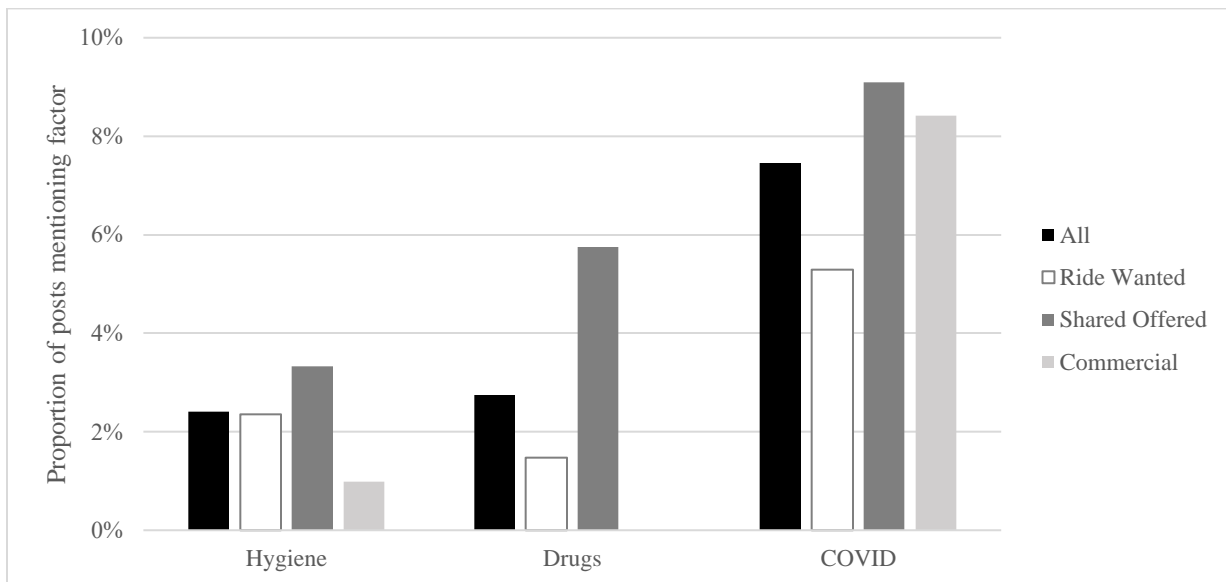
6. Costs of informal ridesharing

While ridesharing provides value for travelers, it also generates costs. Its informal nature, in particular, creates uncertainty about whether a traveler will successfully connect with another traveler and safely arrive at his destination. In this section, I begin by summarizing the factors that posters sought to avoid while ridesharing. I then discuss the types of information travelers provided to reduce uncertainty.

6.1 Identifying barriers

Among other factors, physical appearance and presentation influence whether people feel comfortable interacting with strangers (Goffman, 1971). The appearance of cleanliness may have been particularly salient in late 2022 while the effects of the COVID-19 pandemic lingered. Figure 22 shows how often posters referred to cleanliness, COVID-19, and drug use by post type. Note that the scale (y-axis) is much smaller than in previous figures, as posts mentioned these factors less frequently than they did compensation, for example.

Figure 22 *Mentions of off-putting traveler characteristics*



Note. n = 874.

While a small minority of posters mentioned negative factors, the percentage of posts that mentioned undesirable qualities varied by type. Among all post types, Shared Offered posts mentioned them most often; Ride Wanted posts mentioned hygiene and drugs more frequently than Commercial posts did. Over seven percent of all posts (written in September 2022) mentioned COVID-19, either volunteering vaccination status information, inquiring about the vaccination status of co-travelers, or setting rules for mask-wearing. Commercial posts referred to COVID-19

more often (8.4% of the time) than Ride Wanted posts did (5.3% of the time) and at rates similar to those of Shared Offered posts (9.1%).

Finally, posters often used vague and nebulous language to express discomfort about sharing space with certain types of strangers. They used terms like “weird,” “creepy,” and “funny business.” Examples include: “Don’t be weird” [100], “Please no weird offers” [139], “No weird or pervy stuff please” [159], “Please understand that I have ZERO INTEREST in any weird offers [...] Creeps need not apply” [165], “Nothing weird” [181], “I am a married with kids man so no weird stuff” [380], “Please no drama or weirdos” [471], “No weirdo just casual male” [797], “Please do not respond if you are looking for some funny business” [377], and “No funny business” [769].

Despite their ambiguities, these statements hint at (and sometimes explicitly raise) concerns about sexual motivations or expectations. Uncertainty about the motivations of others presents another form of risk. This is a challenge prominent in some informal interactions and less common in formal ones; one can be reasonably sure, for example, that most transit workers do not drive their routes in pursuit of “funny business.” Not all posts using the language of social contamination, however, expressed concerns about “creeps.” For example, a Bay Area poster seeking a ride to Humboldt County wrote, “Please only respond if you will be driving sober and are good at respecting boundaries” [472]. I cannot evaluate whether these terms effectively filtered out undesirable traveling partners (i.e., “weirdos”). I do, however, explore this issue in Essay 3.

6.2 Providing personal information

Rideshare posters primarily addressed uncertainty in two forms: in terms of “creepiness” and operational factors. As I noted earlier, Craigslist differs from platform economy services that help manage the risks of sharing with strangers. When travelers must do so on their own, they may

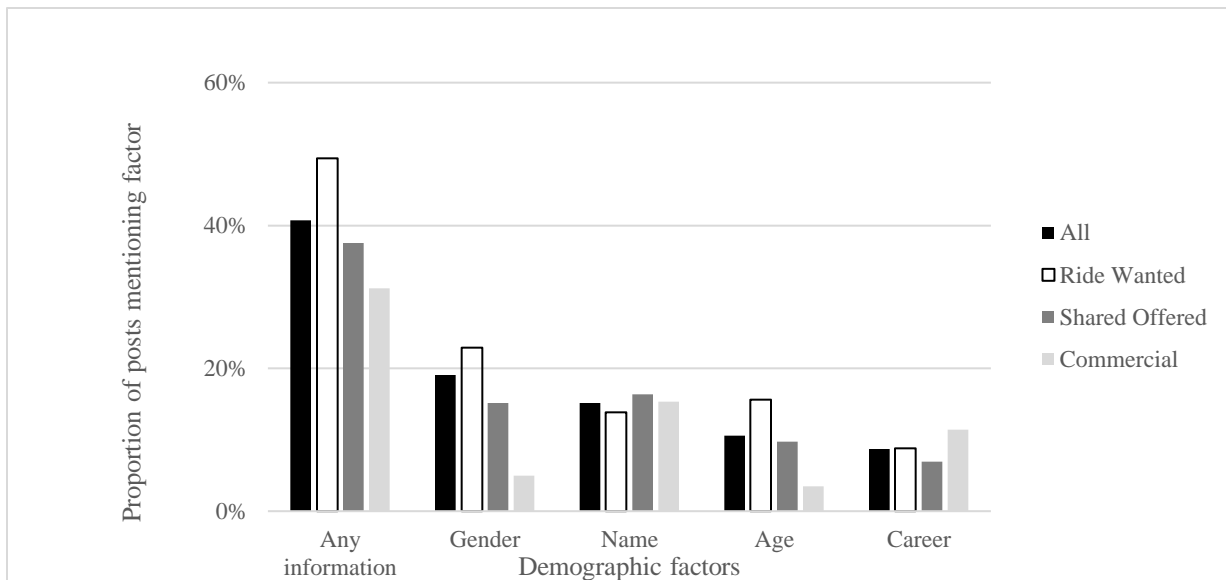
provide and request information. Some Craigslist posters explicitly connected providing personal information and ensuring traveler safety, as one Fresno poster did:

I will take you up to 40 miles for \$1 per mile plus gas, what can I say, any time day or night to drive you wherever you need to go. I drive a 2015 Chevrolet Spark. I am a woman, so ladies, please feel you are safe with me, I know that can be a concern sometimes [686].

Like Uber and Lyft, this poster provided personal information – in this case, gender – to reduce fears that she would harm a passenger. In addition to avoiding negative interactions, posters may describe themselves to connect with like-minded strangers (for example, mentioning tastes in music or politics) and make the trip experience more enjoyable. One poster depicted himself and the traveler he sought thus:

Me: teacher, heading south to see family. you: non-smoking, chill dude with great playlist (Steely Dan-Rush-U2 preferred) [261].

Figure 23 Mentions of demographic information



Note. n = 874.

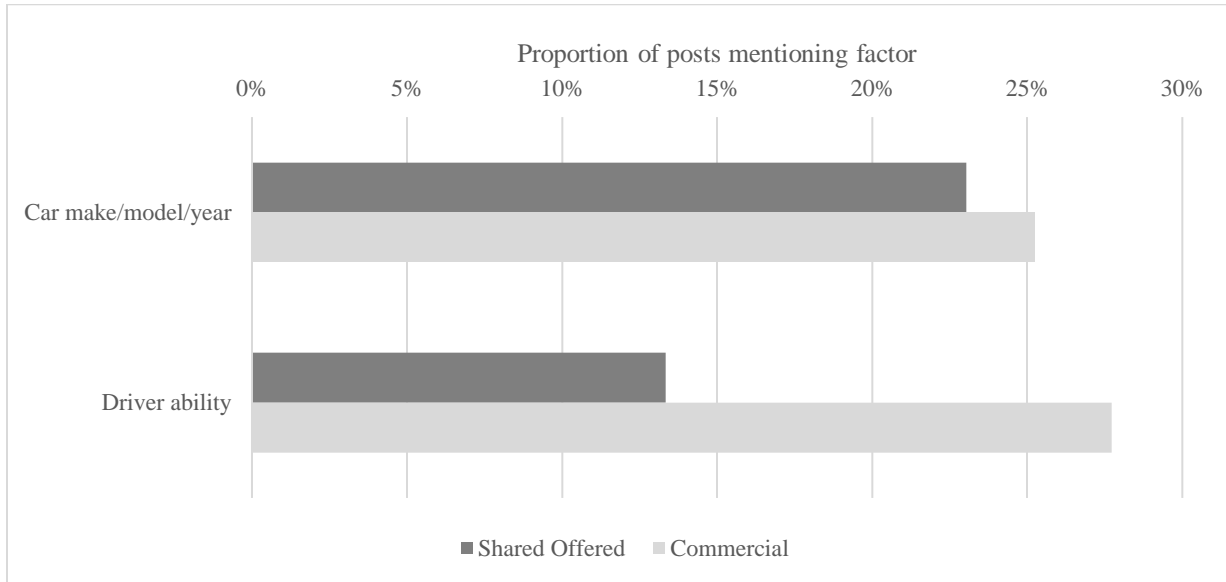
Figure 23 indicates the proportion of posts that included personal information by type. A notable proportion (41%) of posts included some personal information, but this rate varied by type. Almost half (49%) of Ride Wanted posts provided traveler information, while less than a third (31%) of Commercial posts did. The type of information included also varied. Generally, posts mentioned gender most frequently (in 19% of all posts). Yet while 23 percent of Ride Wanted posts mentioned gender, only five percent of Commercial posts did.³⁶ Posts included names and careers at similar rates across all post types. Mentions of age also varied by type – with 16 percent of Ride Wanted posts providing information about traveler age, compared to only three percent of Commercial posts.

6.3 Operational factors and sharing

Beyond the fear of experiencing violence or crime, vehicle and operational safety are other sources of uncertainty for travelers. Similar to Uber and Lyft’s standards for driver records and vehicle condition, some offering parties provided operational information – including vehicle type and driver ability – presumably to alleviate passenger unease. Figure 24 shows that Commercial and Shared Offered posts mentioned car make, model, or year at similar rates (25% and 23%, respectively). Meanwhile, mentions of driver ability differed between commercial and noncommercial ride offers; among Shared Offered posts, the rate (13%) was less than half the rate (28%) among Commercial ones.

³⁶ In addition to explicit mentions of gender, people also provided information (e.g., names or photographs) that allowed me to infer their gender. Per this method, I could determine the gender of 29 percent of posters. Of this 29 percent, 20 percent were male, 6.9 percent female, 1.6 percent a female/male couple or family, and 0.5 percent a mother and child.

Figure 24 Mentions of operational factors among commercial and noncommercial offered posts



Note. n = 532.

Many Commercial posters mentioned having experience as professional drivers. One poster described his background driving for ridehail companies and his dissatisfaction with doing so:

I'm a very responsible, safe driver and I have very high ratings from my time spent driving for the major corporate rideshare companies. They are not treating their drivers fairly, so I'm trying to branch out and get independent rides on my own [...] I will guarantee to match or beat any prices you show from the companies I mentioned above, especially with surge prices at events and for airport pickups. I will also be happy to share my driver ratings with you [529].

Shared Offered posts mentioned driving skills less frequently than Commercial ones; this makes sense, as noncommercial posters did not explicitly sell their labor. Less clear, however, is why mentions of vehicle characteristics did not vary by type.

7. Discussion and implications for scholarship

I conclude the following from this analysis of Craigslist posts:

A. Informal rideshare posts – both offering and seeking rides – were more common for intercity trips than intracity ones, though this varied by region and offer type.

In the posts I analyzed, supply of and demand for informal ridesharing were highest for intercity trips with destinations concentrated in a few locations. Yet posts seldom listed destinations farther than 1,000 miles.³⁷ Informal rideshare exists in a landscape in which residents have specific needs and alternative travel options. Demand for different destinations appears to reflect how travelers anticipated the benefits of ridesharing, in agreement with the mode choice literature (Moses & Williamson Jr, 1963). For example, a passenger may prefer to travel via airplane for a trip longer than 1,000 miles and via taxi or public transit for a trip shorter than 10 miles (Reichert & Holz-Rau, 2015).

While request types and locations did not differ dramatically by location, one region was unique: Fresno. First, many of the posts on Fresno’s rideshare board listed destinations within the region, suggesting unmet local needs there. Like other California regions, Fresno has public transit and ridehail service. But in contrast to the metropolitan areas of the San Francisco Bay Area and Los Angeles, Fresno has lower per-capita transit use and fewer ridehail providers (Taylor et al., 2020). Meanwhile, among other San Joaquin Valley counties, Fresno County has one of the highest rates of zero-vehicle households (7.4% in Fresno County versus 5.3% in Stanislaus County, for example) (U.S. Bureau of the Census, 2021b).³⁸ These factors may contribute to a gap between supply and demand for shared travel in Fresno, one that informal rideshare providers may fill.

³⁷ The gravity model explains why relatively few trips over 1,000 miles take place at all (J. E. Anderson, 2011).

³⁸ See Figure 35, Figure 36, and Figure 37 in the Appendix for measures of commute mode share and rates of zero-vehicle households by county for the California regions included in this analysis.

In addition to regional differences, the physical qualities of trips varied by commercial status. Most noncommercial posted trips – both Ride Wanted and Shared Offered – listed intercity destinations concentrated in a few locations. For noncommercial vehicle-sharing, the benefits of traveling short distances may seldom have justified the costs of posting on the board and coordinating travel with strangers, given the fixed transaction costs of doing so. Meanwhile, Commercial posts more frequently listed intracity destinations. This may reflect the lower transaction costs of arranging rides when drivers regularly coordinated with passengers, perhaps when also driving for Uber and Lyft; additionally, these costs may have been offset by the opportunity to profit financially. Some form of path dependency could also be at play: certain patterns may emerge on geographically specific boards, and people who view the boards are then attracted or repelled by the trips they see on these boards. Particular types of posts could then encourage more similar posts (as in the case, for example, of trips listed between Los Angeles and the Bay Area).

B. Posters presented both economic and social factors as motivating them to rideshare, although their relative importance varied by the individual.

Many noncommercial posts mentioned compensation in requests to rideshare with strangers. This comports with previous findings on travelers who frequently share vehicles (Blumenberg & Thomas, 2014) and the factors that motivate them to do so (Setiffi & Lazzer, 2018). Most noncommercial rideshare posts mentioned *some* financial compensation; however, many solicited reimbursement for gasoline or fuel rather than cash. This finding accords with the literature on exchanges and sharing, in which people prefer to trade or exchange goods rather than money in some situations (Belk, 2010).

In addition to compensation, noncommercial rideshare posters frequently mentioned social motivations to share. Shared Offered posters expressed social motivations more often than Ride Wanted posters did. Whether posters accurately described motivations to share – or stated what they *perceived* as attractive to other travelers – is unclear. However, posters at least viewed social motivations as worth advertising. Because Shared Offered posters appear more likely to have opted-in to ridesharing (rather than doing it because they could not afford to travel alone), they may have especially valued its social aspects.

Explicit income-seeking distinguished Commercial from noncommercial rideshare posters. Many Commercial posters cited general prices or quotes based on location and seldom mentioned gasoline as a form of compensation. As explicit service providers, they offered labor and use of an automobile that did not serve their own trip needs. In addition to describing driving abilities and vehicle characteristics, Commercial posters tended to highlight the professional aspects of the services they offered rather than the social value of sharing. But despite their income-seeking motivations, some Commercial posters mentioned the desire to interact with passengers. Like noncommercial posters, some Commercial drivers may have partly described personal interest in ridesharing insincerely to attract customers. But personal interactions appear to play a unique role in many informal exchanges, especially when people share or sell their personal property (Crawford, 2014). Most economic transactions between individuals – for example, when a cashier makes small talk while ringing up a customer – involve some personal component. When sharing one's private property for pay, and without a third party to create distance, the commercial versus social aspects of the transaction may especially blur.

C. Some rideshare posters anticipated the social costs of sharing and attempted to head them off. Noncommercial posts mentioned negative aspects of sharing more often than Commercial ones did.

Sharing with strangers has costs, and Craigslist rideshare posters cannot rely on a third party to control these costs. Posters identified negative traveler characteristics in their posts – such as hygiene issues and drug use – that they sought to avoid. In the latter stages of the COVID-19 pandemic, some posters requested or provided information about vaccination status, establishing new norms around cleanliness and health inquiries. Altogether, noncommercial posters mentioned these push factors more often than Commercial ones did. This could be because they tended to take longer trips and thus faced greater costs when encountering poor traveler hygiene or drug use. Further, posters who offered services for payment may have been less selective with passengers, prioritizing income. Such differences could also reflect how different types of sharing – for example, sharing space versus sharing use of a good – relate to personal behavior and social interactions, as Belk (2010) suggests.

Other posters appeared to struggle to articulate the unattractive qualities of sharing candidates. References to “weird” and “creepy” behavior suggest that people held concerns about the motivations and behaviors of travelers.³⁹ Craigslist previously hosted personal advertisement boards for personal encounters but removed them after Congress passed an act to combat sex trafficking in 2018 (M. Kennedy, 2018). This history, coupled with the expression of concerns about “creeps” or “weirdos” in posts, suggests poster unease about expectations of sexual favors or a lack of boundaries with other travelers. Yet Commercial posters may have held fewer concerns

³⁹ A relatively small proportion of posts make explicit references to “creepy” or “weird” people. I can identify the poster’s gender for an even smaller number of cases. Thus, I cannot firmly conclude whether gender is associated with any mention of poster discomfort with these factors. I explore the relationship between gender and risk in Chapter 5.

about “weird” behaviors. By establishing explicit expectations about exchanging money for rides, Commercial posters may have developed firmer interpersonal boundaries between themselves and their passengers.

In some cases, posters provided personal information, apparently to alleviate the safety concerns of other parties and/or to connect with compatible travelers. Among types of demographic information, posts most frequently mentioned gender. Noncommercial posters – both seeking and requesting rides – provided more personal information than Commercial ones did, again suggesting the particular socioemotional challenges (and opportunities) they faced in sharing. Meanwhile, providing less information may have benefitted Commercial providers by enabling them to maintain professional boundaries. These barriers may be useful, as revealing information about one’s identity can undermine the legitimacy of professional duties (Weber, 2016).

D. Informality in ridesharing may mitigate or exacerbate transportation inequity, reflecting the challenges that arise from sharing with strangers.

Informal ridesharing may especially benefit people with limited resources. Ride Wanted posters, in particular, valued informal rideshare over formal shared services and anticipated its accessibility benefits. They also emphasized need, hardship, and difficult circumstances beyond their control, and frequently used emotional words to appeal to ride providers. For Commercial actors, informal ridesharing offered the potential to make money outside of formal employment. Indeed, many Commercial posters cited experience driving for Uber and Lyft and expressed dissatisfaction with ridehail working conditions and compensation.

Informal ridesharing may also impose unequal financial costs on travelers. Because many Ride Wanted posters faced hardship, they may have engaged in ridesharing solely because they

lacked better travel options; however, I cannot verify this from the posts alone. Meanwhile, most posts did not cite exact dollar amounts. This could lead to price discrimination (Stole, 2007), insofar as requesting parties worry about getting a ride more than drivers worry about finding a passenger. Other research suggests this can occur in informal transportation. For example, Valenzuela et al. (2005) found that undocumented immigrants, facing limited formal travel options, paid higher fares for rides via *camionetas* than for equivalent ones via formal services like Greyhound. The same might occur with Craigslist rideshare. Concerns about the sexual motivations of other parties and violence may also place sharers in unsafe circumstances. When facing constraints, rideshare passengers may accept uncomfortable situations. Further, the provision and use of personal information on rideshare boards could lead to discrimination based on, for example, race or class. Analyzing posts alone cannot address these issues, which I explore in Chapter 5.

8. Policy implications

High rates of SOV travel in the U.S. lead to a substantial supply of travelers with empty seats in their vehicles. Meanwhile, data from Craigslist posts suggest that in addition to these empty seats, travelers have unmet needs – particularly in moving between cities – that informal sharing might address. Successful rideshare boards may benefit travelers by increasing their mobility (and without placing more vehicles on the road). Ridesharing – particularly in its most informal forms – thus deserves further study by transportation researchers seeking a more efficient transportation system.

While these findings can inform public policies to increase vehicle-sharing, establishing formal services may not be the solution. Markets for informal services often arise in settings – like Global South cities – with limited public infrastructure (Mukhija & Loukaitou-Sideris, 2014). Due

to its sprawling regions, extensive interstate highway system, and automobile-oriented landscape, the U.S. has limited intercity rail and bus services between most cities and regions (Lane, 2012). As in parts of the Global South, informality may thus better serve intercity U.S. travelers than fixed-route services. Instead of instituting new formal services, then, public agencies might best act as *facilitators* of informal ridesharing between strangers; I expand upon this idea in Chapter 5 (Section 4.6).

Informal rideshare offerors often mentioned personal and operational information – including sex, age, career, vehicle type, and driving record – in what appear to be efforts to reduce uncertainty among those looking for rides. The provision of personal information mimics practices in the formal platform economy (like Uber and Lyft). The frequency with which ride offerors provided this information suggests that travelers valued it. Public efforts to encourage carpooling via new smartphone applications, for example, might consider incorporating demographic or vehicle information and allow users to evaluate each other. Ridesharing applications might enable users to view information about vehicle year, make, or model. They could also allow female drivers to only accept requests from female passengers. This analysis also suggests that sex/gender plays a unique role in sharing with strangers and in travel. Recent transportation efforts and scholarship have emphasized planning for women’s concerns (Loukaitou-Sideris & Fink, 2009; Whitzman, 1992) and should remain a priority.

Many San Joaquin Valley posters also mentioned casinos, which prevailing formal shared travel modes poorly serve. Alcohol consumption may dissuade people from driving to and from casinos (Cotti & Walker, 2010). Fixed-route transit is poorly suited to serve these trips since many patrons keep irregular hours. Casinos are often located on Native American reservations far from central-city areas, and long travel distances between the casinos and population centers can make

ridehail and taxi services prohibitively expensive for many travelers. Yet casinos are also important centers of social life in these regions, particularly for elderly people (Loroz, 2004; Zaranek & Chapleski, 2005). While government agencies have previously evaluated potential roles for public transit services to casinos (Cherwony, 1984), most rural casinos currently have limited shared transportation services (Cotti & Walker, 2010). Similarly, ridesharing for local trips may have special value in Fresno, given that many Commercial posters anticipated demand for travel there. While micro-transit services could improve access in the area, rideshare programs – perhaps with formal components – may offer more cost-effective solutions for travel to San Joaquin Valley casinos and within the Fresno region.

9. Conclusion

This essay has explored patterns among ride requests and offers on the Craigslist rideshare board. It has documented the costs and benefits of informality that posters anticipated and the physical characteristics of the trips they sought. Yet I have not addressed whether the rideshare board *actually* meets poster travel needs. In the following chapter, I examine the self-reported experiences of posters, including their successes and failures in connecting with other travelers. I also explore the strategies they use to manage uncertainty and how they balance risk and reward in sharing with strangers.

CHAPTER 5 – Essay 3. *No one rides for free*: Risk, reward, and uncertainty in ridesharing

1. Introduction

Spending time and space with strangers is an unavoidable – and often enjoyable – part of modern life. Living in cities, in particular, requires that strangers share physical space, public goods, and many private ones. Yet sharing with strangers has both its risks and rewards. Sharing access can benefit people by splitting costs between users, increasing access to a diversity of resources, and offering opportunities to interact with others. Limited information about strangers, however, introduces risks. These risks include the uncertainty of accessing the desired good, the potential for higher financial costs (should another party act dishonestly), and the social costs of an unpleasant – even violent – interaction. To mitigate these risks, organizations help people to *share out* with strangers. For example, public organizations regulate access to quasi-public and club goods. Private organizations handle compensation and ensure that users treat shared resources responsibly. Without the support of external mediators, however, people must negotiate exchanges with strangers by themselves. How they do so – and whether their efforts lead to successful sharing – is the topic of this paper.

In addition to its potential to enhance the efficiency of the ground transportation system, informal vehicle-sharing may help close mobility gaps between disadvantaged travelers and other travelers. As I noted in Chapter 2, sharing can increase access to fixed resources (like automobiles) and lower the cost of operating vehicles (for example, by splitting gasoline or toll costs). Budget-constrained people especially value financial savings, so disadvantaged travelers share vehicles more often than non-disadvantaged ones do (see Essay 1). However, when people draw upon their social networks, they tend to reach people with similar resources to themselves (Mijs & Roe, 2021). Disadvantaged people who turn to their social networks, then, may only reach under-

resourced people like themselves (Wilson, 2006). By expanding access to resources beyond one's immediate social circle, informal vehicle-sharing may especially benefit people facing extreme transportation disadvantage. Further, informal markets tend to offer goods and services at lower prices than formal markets – again, a quality particularly valuable to disadvantaged people.

In this analysis, I use surveys and interviews with Craigslist rideshare posters to examine how travelers balance the risks and rewards of informal sharing. Craigslist, a personal advertisement website, only requires a poster to provide an email as a form of verification (Leon, 2022); its highly informal nature thus presents unique costs and benefits. To understand the experiences of its users, I surveyed dozens of Craigslist rideshare posters via text message. Based on these replies, I identified the factors that contributed to making successful rideshare connections. I also explored their decision-making processes via text responses and interviews. I thus highlight how potential ridesharers manage uncertainty. Craigslist users cannot immediately access information – such as driver/passenger ratings or verified identities – about other travelers. This lack of information distinguishes it from ridehail providers (e.g., Uber/Lyft) and peer-to-peer carsharing services (e.g., Turo). These companies handle payments, insure travelers against accidents, and verify information like registration and licensing (Zhu, 2022). Craigslist ridesharers must thus assess and manage these and other risks on their own but may reap rewards when they do so.

Surveys and interviews with Craigslist posters suggest that factors specific to the individual and the trip influenced ridesharing outcomes. Craigslist posters tended to successfully find rideshare partners when they offered rides and posted trips to destinations along major highways. Posters struggled to successfully rideshare when seeking rides and/or experiencing great need. Meanwhile, some respondents expressed concerns about physical violence, sexual harassment, and

passengers refusing to pay agreed-upon fares. They used different heuristics to manage risk and screen for negative qualities among co-travelers. Other posters – particularly Commercial ones – had lower perceptions of risk and engaged in little (if any) screening. Individual travelers also had idiosyncratic characteristics that influenced their propensities to share with strangers. A history of ridesharing or hitchhiking appears to make travelers more comfortable using the Craigslist rideshare board. In part due to COVID-19, however, some posters perceived that the rideshare board’s utility had faded in recent years.

Ridesharing, while informal, has the potential to increase the sustainability of the formal transportation system while maintaining mobility for under-resourced travelers. Shared transportation options like intercity buses and rail, for example, did not appear to meet the demands of many posters. Yet this analysis also indicates real and persistent barriers to informal sharing. Public policies could encourage ridesharing by lowering the transaction costs of sharing with strangers, raising the cost of non-sharing, or some combination of the two; these efforts may help increase supply and demand for shared trips. I expand on policy solutions in Section 4.6 below.

2. Literature review

In this section, I draw on social science, planning, and policy research to establish relationships between the availability of information, perceptions of risk, and interactions with strangers. I then discuss these issues in the context of two informal types of private vehicle-sharing: casual carpooling and hitchhiking. Next, I review how platform economy companies provide access to personal information and lower risk for users. Finally, I conclude by reviewing gaps in the literature and how this analysis fills them.

2.1 Danger, risk, and interacting with strangers

Many social scientists have explored the complexities of urban social interactions. In large communities, people must interact and cooperate with strangers, about whom they have limited information. This introduces uncertainty, which influences how people manage risk and reward in different situations. An extremely large body of literature explores these issues, and not all researchers agree on the cognitive processes at work. Further, some of this work lies beyond the scope of this analysis and its focus on informal ridesharing. I thus briefly review some of the more influential theories on social interactions with strangers.

Classic works from sociology have identified roles for self-presentation in how people manage interactions with strangers. Goffman (1959) theorized that in social interactions, people inhabit different roles that vary by context. People selectively present information to create impressions that serve them well; they similarly process the information proffered by others to make judgments about their positions, motivations, and trustworthiness (Goffman, 1959). A city dweller, however, encounters many people about whom he has limited information. This makes interacting with strangers challenging. Milgram (1970) used the analogy of “information overload” to explain how people cope with the cognitive burdens of life in cities. Faced with excessive information about other people, urban residents adapt by limiting interpersonal contact with strangers (Milgram, 1970).

People also rely on heuristics when dealing with the uncertainties of interacting with strangers (Goffman, 1971). When using heuristics, people rely on immediately accessible information alongside past experiences to judge unsure situations (Tversky & Kahneman, 1974). While heuristics help people cope with information overload, reliance on them has downsides

(Tversky & Kahneman, 1974). The use of heuristics may result in systematic biases that lead to inaccurate conclusions about people and situations (Gigerenzer, 2008).

A related phenomenon is statistical discrimination. Economists often contrast it with tasted-based discrimination, in which people prefer to discriminate against certain types of people (G. S. Becker, 1993). In cases of statistical discrimination, a person – for example, an employer – has limited information about other individuals, but does *not* have a preference to discriminate (Guryan & Charles, 2013). But because he has limited information, the employer then – sometimes subconsciously – relies on characteristics such as race, gender, or age to make inferences about other qualities like labor productivity (Aigner & Cain, 1977). Various studies have assessed how statistical discrimination disadvantages minorities (and in the U.S., particularly Black people) in hiring (Baert, 2018) and mortgage lending (Ladd, 1998), among other situations. Economists disagree on the “efficiency” of statistical discrimination, although it has social costs for many of the people it affects (Norman, 2003; Schwab, 1986).

Statistical discrimination occurs in formal commercial transactions, but people also statistically discriminate during informal social interactions. For example, ethnographer Anderson (1990) examined how people draw conclusions based on physical appearance – particularly the “master” heuristics of race and class – when encountering strangers in an urban setting. In his diverse neighborhood study site, he observed that residents associated certain characteristics with danger – primarily being male, young, and Black – and often crossed the street to avoid interactions with people who held them (E. Anderson, 1990). Particularly in public spaces, people may discriminate against and avoid members of marginalized groups. These include non-white people, people with mental health issues, and unhoused people, among others (Pain, 2000; Toolis & Hammack, 2015; Whitley & Prince, 2005).

In addition to stranger avoidance, social scientists have studied the cases in which people *do* engage with and/or help strangers. To this end, researchers have examined contexts in which people participate in prosocial behavior, or help strangers without the explicit promise of a reward or compensation (Penner. et al., 2005). Studies of prosocial behavior thus capture how people balance the positive aspects of helping others with the negative aspects (e.g., risks) of doing so.

In studies of prosocial behavior, social scientists have studied how community size, gender, socioeconomic status, and race influence rates of helping strangers. To operationalize prosocial behavior, researchers frequently test the factors that influence “bystander intervention” (Penner. et al., 2005). As one illustration of this approach, researchers in the 1970s hired confederates to approach strangers at home, ask to use the telephone, and measured the rates at which they gained access to residences (Levine et al., 1976; Milgram, 1970). In such a situation, assisting a stranger has no discernible economic or long-term social value for the resident. Providing the favor should generate only small monetary costs, such as a small addition to one’s phone bill. However, these costs also depend on the risks of interacting with strangers, including the potential for physical harm. Comparing the results of the telephone audit study in New York City versus in small towns, researchers found that small-town residents provided access to their homes more often than urbanites. Participants also admitted women to homes more frequently than they did men. On the former point, people in smaller towns may feel better equipped to manage risk in places with fewer strangers; on the latter point, residents may have engaged in statistical discrimination, perceiving men as more dangerous than women (Levine et al., 1976; Milgram, 1970).

In terms of transportation, fear, uncertainty, and risk may dissuade people from both formal and informal vehicle-sharing with strangers. Women (Pain, 2001) and older adults (Ceccato & Bamzar, 2016) tend to express greater fear of crime. Researchers have found that even facing low

levels of risk, some people withdraw from situations they associate with danger (Hale, 1996). Fear of crime may dissuade travelers from using shared modes (Foster et al., 2013; Hale, 1996). Studies have found that when women perceive danger in taking public transit, they may respond by avoiding travel at night, wearing certain clothes when traveling, carrying weapons, or not taking transit at all (Ding et al., 2020). Some travelers also express discomfort and concern in traveling via ridehail, fearing other passengers on shared routes (e.g., UberPool) (Morris et al., 2020) and drivers on non-shared routes (Turnbull, 2022). But despite the perceived danger of traveling with strangers, doing so may also have psychological benefits. For example, even casual interactions with strangers on public transit can make people happier (Gunaydin et al., 2021). Researchers have also studied how people develop a sense of community on regular bus routes (Fink, 2012; Nash, 1975).

Prosocial behavior could also influence informal vehicle-sharing among strangers, affecting the balance between its benefits and costs. For example, as with the respondents who provided access to their private telephones, travelers – especially drivers – may engage in positive discrimination. Hitchhikers, in particular, often rely on this possibility (see Section 2.2.2 below). How people view the balance of risks versus rewards in helping strangers may affect rates of sharing, insofar as sharing comprises an act of generosity (Widlok, 2013).

2.2 Risk and reward in casual carpooling and hitchhiking

Other types of informal vehicle-sharing – not mediated by digital technologies – illustrate how people manage risk. To cope with uncertainty, travelers often rely on available heuristics such as clothing and gender presentation. Here I review research on two types of informal sharing:

casual carpooling and hitchhiking. These practices offer insight into how information availability and perceptions of danger operate in vehicle-sharing with strangers.⁴⁰

2.2.1 Managing risk in casual carpooling

Casual carpooling is one example of ridesharing with strangers. In casual carpooling – also called “slugging” – people ride in cars with strangers along fixed routes. Casual carpooling serves the urban cores of Washington D.C., San Francisco, and Houston (Burriss & Winn, 2006). To participate in casual carpooling, drivers and passengers queue up at regular pickup and drop-off points, often near transit hubs or parking lots. These locations provide casual carpoolers with access to high-occupancy vehicle (HOV) or high-occupancy toll (HOT) lanes (Zmud & Rojo, 2013). Casual carpooling benefits the driver by providing access to a restricted lane, resulting in shorter travel times and/or reduced tolls (Shaheen et al., 2016). It benefits the passenger by providing time and cost savings over public transit (Zmud & Rojo, 2013). When casual carpooling, travelers do not pre-arrange their travel and rarely maintain ongoing relationships. Further, external agencies seldom directly coordinate casual carpools (Burriss & Winn, 2006). Unlike other types of ridesharing, casual carpooling serves regular (and usually fixed) routes within a single region. They also have well-established “rules” that people obey (Burriss & Winn, 2006).

But despite the popularity and standardized nature of the practice, casual carpoolers have expressed concerns about the possible dangers of sharing with strangers. Researchers surveyed casual carpoolers in Houston, San Francisco, and Washington, D.C. (Zmud & Rojo, 2013). Many of their respondents expressed fears about the safety of traveling with people they did not know. However, casual carpoolers’ anxieties declined as they gained experience. Many new participants with safety concerns gained exposure to the practice by first riding with a friend or acquaintance.

⁴⁰ See Figure 12 in Chapter 4 for a representation of how different forms of private vehicle-sharing fall along a spectrum of formality to informality and their characteristics.

Researchers also found that safety concerns interacted with gender norms in casual carpooling. For example, Houston sluggers respected the norm that women should not be left alone at a pickup point; women often skipped lines to ensure this norm held (Burris & Winn, 2006; Zmud & Rojo, 2013).

And despite the fairly standardized nature of routes and pickup points across the three regions, social norms appeared to vary by location. Because government agencies or private companies did not enforce norms, their widespread acceptance suggests that participants self-regulated both economic and social behaviors. For example, surveyed Houston and Washington, D.C. passengers did not compensate their drivers, while Bay Area drivers expected passengers to contribute financially to bridge tolls.⁴¹ Additionally, some Houston drivers skipped over sluggers dressed in casual (rather than business) attire while Bay Area drivers did not. Norms even differed within regions (for example, between the cities of Oakland and Vallejo in the San Francisco East Bay). In places like Houston and Vallejo, casual carpoolers appeared more likely to develop ongoing personal relationships or engage in regular social interactions; this did not occur in Washington, D.C. and Oakland (Zmud & Rojo, 2013).

2.2.2 Managing risk in hitchhiking

Hitchhiking, another type of informal vehicle-sharing, serves a more diverse set of routes and travelers than casual carpooling. In hitchhiking, a driver offers a ride to a passenger who solicits one from the side of the road. The driver does not usually request formal compensation, although this practice varies among travelers (Schlebecker, 1958).⁴² As with casual carpooling, its participants must also manage risk and reward. But compared to casual carpooling, hitchhiking

⁴¹ As of 2023, drivers of vehicles with three occupants pay half-price tolls on the Bay Bridge during the morning and afternoon peaks; the toll drops from \$7 to \$3.50 (Bay Area FasTrak, 2023).

⁴² See the crass slogan frequently seen on bumper stickers: “Gas, grass, or ass – nobody rides for free.” Popik (2011) states that this phrase back to at least 1978, as evidenced by a print advertisement in *Baseball Digest*.

has less clear economic benefits for drivers; for example, people who pick up hitchhikers seldom benefit from access to HOT or HOV lanes. Driving a hitchhiker may thus more strongly reflect norms related to prosocial behavior. And for the purposes of this analysis, hitchhiking – which tends to serve longer trips not along regular fixed routes, unlike casual carpooling – may have the most in common with trips posted on the Craigslist rideshare board.

Schlebecker (1958) conducted a history of hitchhiking in the U.S. from the early 1900s to the 1950s, tracing its origins as an activity of disadvantaged people, its evolution into a mainstream activity, and finally its decline in popularity (at the time of writing and before its resurgence in the 1960s and 70s). While in the 1920s, some journalists emphasized the negative aspects of hitchhiking, many accounts celebrated the bravery and ingenuity of hitchhikers. As automobile ownership expanded in the post-World War II era, rates of hitchhiking declined, and the media increasingly depicted hitchhikers as criminals and deviants. Yet writing in the 1950s, Schlebecker still presents a positive view of hitchhiking, even noting that its practice “reflected a general attachment to democracy” by providing private spaces in which strangers participate in the “free exchange of ideas” (p.327) (Schlebecker, 1958).

While Schlebecker presents hitchhiking in a positive light, many subsequent scholars have highlighted society’s negative views of the practice. Mahood (2016) examined hitchhiking among Canadian youths from the 1930s to the 1970s. She found that its 1960s-era counterculture version contrasted with its more mainstream 1930s incarnation. While the media often framed hitchhiking as a positive transitory experience for young men, it drew stronger negative associations (and especially moralistic ones) for young Canadian women (Mahood, 2016). Chesters and Smith (2001) reviewed newspaper articles on hitchhiking from Western and Europe. They attribute the

decline of hitchhiking from the 1960s to the 1990s, in part, to negative press accounts of the dangers of traveling with strangers (Chesters & Smith, 2001).

As with its representations in the media, studies of hitchhiking emphasize the role of gender. Greenley and Rice (1974) surveyed female hitchhiking students in the 1970s. They found that frequent hitchhikers viewed it as less dangerous than infrequent hitchhikers did. Respondents reported few negative experiences of hitchhiking, although women who had negative experiences may subsequently have stopped doing so. Yet regular hitchhikers also described developing skills in dealing with challenging interpersonal situations over time. The researchers also found an association between exposure to hitchhiking among friend groups and frequent participation in it (Greenley & Rice, 1974). More recently, Gao et al. (2020) studied gendered views of hitchhiking on the South Sichuan-Tibet trail among Chinese backpackers. They found that perceptions of the prevalence of sexual violence and the vulnerability of female tourists influenced travelers' hitchhiking experiences (Gao et al., 2020).

While many studies of hitchhiking have taken ethnographic or historical approaches, one 1970s-era study took an experimental approach. It offers insight into how drivers use heuristics to manage risk when picking up hitchhikers. Conducting research in Texas and Connecticut, psychologists Crasweller et al. (1972) tested whether people dressed “normally” versus alternatively (“hip” in their parlance) received rides more often.⁴³ They found that well-dressed hitchhikers received more rides than “hip” ones and that both types of hitchhikers received rides more frequently in higher-income areas than in low-income ones. Further, drivers who stopped to

⁴³ It is worth quoting the research design at length: *The same hitchhiker was used for all conditions. Two types of clothing were worn. The hip hitchhiker's clothing consisted of bell-bottoms, a peace shirt, beads, and a bandana around the forehead to keep shoulder-length hair in place. The hip hitchhiker wore no shoes and socks and had a cigarette. The well-dressed hitchhiker's clothing consisted of socks, shoes, pressed slacks, shirt, tie, and jacket. The hair looked short and well-groomed. (Long hair became short hair by pulling back the hair behind the ears, making a ponytail, and tucking the ponytail inside the shirt.)* (Crasweller et al. (1972), p.44).

offer rides had more liberal opinions than the average traveler. When researchers questioned drivers about their motives for picking up the hitchhiker, they frequently cited previous experience hitchhiking as the reason for stopping (Crassweller et al., 1972). These findings suggest that prosocial orientation and statistical discrimination play roles in the practice of giving rides to strangers.

2.3 Digitally facilitated sharing and risk

In the previous sections I addressed how people rely on in-person information to deal with uncertainty, but new digital technologies have expanded opportunities to share with strangers (Bodó, 2021).⁴⁴ Many of these new technologies enable users to verify a stranger's identity and assess trustworthiness from afar. Platform economy companies, in particular, succeed not only by connecting parties to facilitate exchanges but also by helping users manage risk (Schor, 2016). Some platform companies coordinate the exchange of money between users (Feeney, 2015). They may also verify user identities through formal means, conduct background checks, and remove users who violate service agreements (Hesse et al., 2020). Platforms often allow users to rate each other, thus crowdsourcing reputational information (Dann et al., 2020). Finally, many companies have insurance to protect users from financial damages (Zhu, 2022).

Despite the benefits they offer, digital technologies that coordinate sharing – including through the platform economy – have their drawbacks. Private companies that run platforms generally charge fees, which increases the monetary costs of sharing. The formal rules imposed by a company may also reduce the flexibility associated with informality; for example, ridehail drivers hesitate to deviate from proffered routes, even when better alternatives exist (Möhlmann & Zalmanson, 2017). Third, digital platforms require the use of an application or website, a

⁴⁴ In this section, I focus on exchanges of physical goods and services rather than, for example, digital content.

possible deterrent for people uncomfortable with or unable to afford new technologies (Nimrod, 2018). Finally, insofar as they provide information to facilitate trust, digital platforms also provide opportunities to discriminate against other users (Schor & Attwood-Charles, 2017). I thus address findings on digital discrimination in two types of shared transportation services: BlaBlaCar and ridehail.

As I described in Essay 2, BlaBlaCar is an application that facilitates long-distance ridesharing between strangers, primarily in Western Europe (Gheorghiu & Delhomme, 2018; Shaheen et al., 2017). The BlaBlaCar platform provides personal information about the driver and passenger and coordinates the exchange of money (based on a range of prices corresponding to trip length) (Setiffi & Lazzer, 2018). This information eases the burden on travelers to establish trust and negotiate and arrange compensation (Setiffi & Lazzer, 2018; Shaheen et al., 2017). Researchers have identified the types of heuristics that BlaBlaCar passengers use to select drivers. Based on uptake rates, riders in France appear to discriminate against drivers with Arabic-sounding names (Farajallah et al., 2019). Further, Créno and Cahour (2014) conducted interviews with French BlaBlaCar passengers about their approaches to choosing among ride options. Their interviewees described using age as a proxy for driving speed; they perceived older drivers as safer ones and younger drivers as offering faster trips. None of the interviewees, however, mentioned concerns about physical violence (Créno & Cahour, 2014).

Researchers have also found evidence that Uber and Lyft drivers discriminate against passengers based on race. BlaBlaCar and Craigslist rideshare, unlike ridehail companies, do not offer explicitly commercial services or promise profit to drivers. In contrast to BlaBlaCar, then, ridehail more closely resembles taxi services, albeit with people using their personal vehicles

rather than commercially-licensed ones (Angrist et al., 2021).⁴⁵ Ridehail platforms allow people to access information about drivers and passengers (Lyft, 2023; Uber, 2023). As part of the matching process, the driver chooses to accept the trip request from the passenger and can thus screen by passenger or trip characteristics; passengers may do the same. Researchers have found evidence of discrimination against Black people in the rates of trip cancellation by U.S. drivers (Ge et al., 2020), although at rates lower than among traditional taxi drivers (A. E. Brown, 2019).

2.4 Gaps in the literature

Despite its potential to increase traveler mobility, few researchers have examined the management of risk in informal vehicle-sharing. As I noted in Chapters 1 and 2, the transportation planning literature tends to address formal types of vehicle-sharing. In limited studies of informal sharing with strangers, researchers have examined carpooling for the commute along fixed routes, including casual carpooling. Other studies of informal vehicle-sharing have analyzed sharing among family, friends, and acquaintances (e.g., Lovejoy and Handy (2011) and Blumenberg and Agrawal (2014)). But despite its long history in the U.S., hitchhiking's decentralized and informal nature makes it difficult to collect and analyze data about the practice. Social psychologists, anthropologists, and sociologists – rather than transportation planners or engineers – have conducted the few studies of hitchhiking.

Meanwhile, researchers studying digital discrimination have measured its prevalence in formal commercial transactions and less often in informal ones. Studies have addressed digital discrimination in Airbnb (Edelman & Luca, 2014), Uber and Lyft (A. E. Brown, 2019; Ge et al., 2020), eBay (Nunley et al., 2011), and TaskRabbit (Hannák et al., 2017). But in these cases, consumers have the legal right to nondiscrimination (Civil Rights Act, 1964). Further, with these

⁴⁵ See Figure 12 in Chapter 4 for a representation of different types of vehicle-sharing based on their levels of formality.

services, companies bear — and thus mitigate — some of the risks of exchanging with strangers. For example, Uber and Lyft verify driver information, conduct background checks, and handle payment (Lyft, 2022a; Uber, 2022b). Outside of these formal settings, travelers may use other strategies — such as relying on heuristics — to manage risk.

Craigslist offers an optimal example to study informal vehicle-sharing within digital — but not formally mediated and managed — environments. In part due to a lack of oversight, Craigslist presents a unique context in which people may (or may not) present themselves and assess others strategically; unlike with the interactions Goffman (1959) first addressed, these assessments do not occur in person. Further, as with hitchhiking, the media often depicts Craigslist in a negative light (Dewey, 2016). This reflects another issue unique to Craigslist: the website previously allowed people to place personal ads, some of which involved sexual content. It has since suspended these forums, in part due to a Congressional Act passed in 2018 to combat sex trafficking (M. Kennedy, 2018). Yet patterns among the posts in Essay 2 suggest that this reputation has lingered. Negative representations of Craigslist may thus affect the success of the ridesharing board and the strategies people use to arrange rides.

3. Methods

In the following sections, I describe the processes of data collection, coding, and analysis. I then describe the strengths and weaknesses of my methodological approach. I conclude with a discussion of measures taken to mitigate the weaknesses.

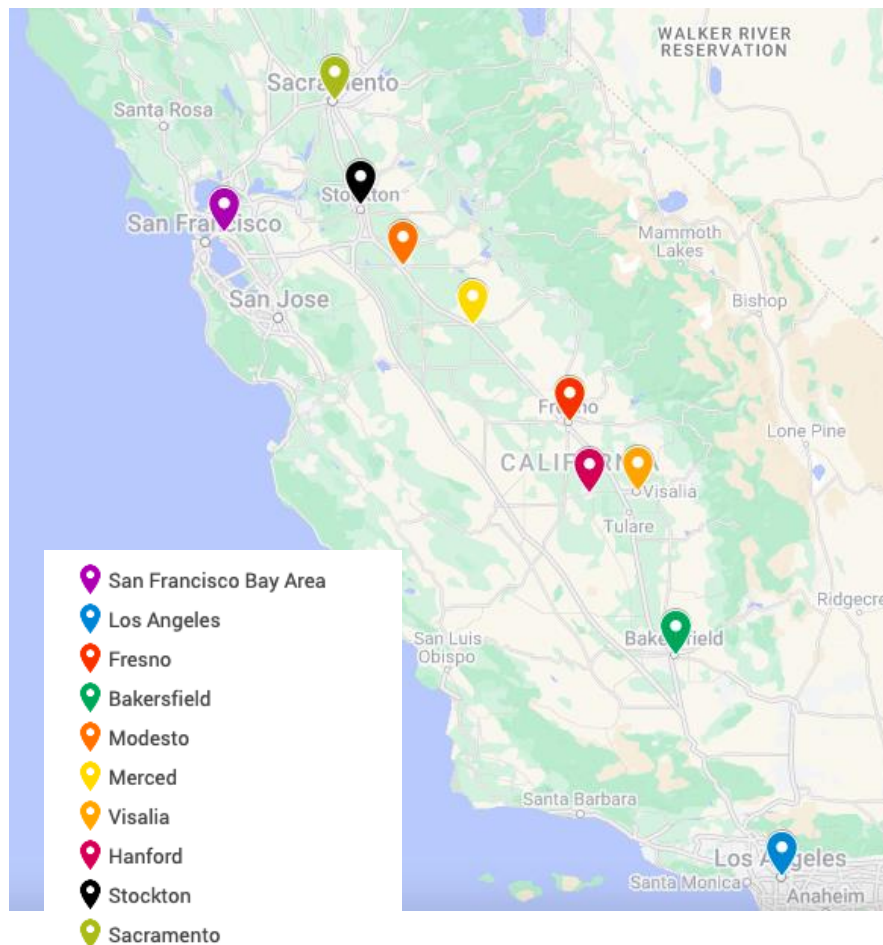
3.1 Data collection and methods

This analysis uses data from text messages and interviews with Craigslist rideshare posters.⁴⁶ To gather contact information, I regularly perused the boards for ten regions

⁴⁶ See Essay 2 (Section 3.2) for a longer description of Craigslist, the rideshare board, and detail about the post typology categories of “Ride Wanted,” “Shared Offered,” and “Commercial.”

(Bakersfield, Fresno, Hanford Los Angeles, Merced, Modesto, Sacramento, San Francisco, Stockton, and Visalia/Tulare).⁴⁷ Figure 25 is a map of these ten regions. I contacted posters via text message between September 2022 and March 2023 (checking for new posts once per week). I had originally planned to also contact users via email. However, Craigslist’s spam filters prevented my emails from reaching posters. I thus only sent text messages to people who included telephone numbers in their posts.⁴⁸ I did not offer compensation to contacts and sent all (but one) initial text messages in English.

Figure 25 *Locations of ten California study regions*



⁴⁷ This essay includes data from two regions – Sacramento and Stockton – not analyzed in Essay 2.

⁴⁸ Craigslist posters must provide an email address but may additionally include a phone number. I estimate that about one-third of posts include a phone number (in addition to an email address) as a contact method.

To facilitate high levels of participation, in the first text message, I asked two to four questions specific to the post type (see Table 24 in the Appendix for a list of first-round questions). I had pretested questions with initial poster contacts in July 2022. To prevent respondents from guessing the aims of my project (and thus providing biased responses), these questions do not reveal a specific interest in the social processes of interacting with strangers. Instead, the questions focused primarily on trip success and compensation. After receiving a response, I sent a handful of questions relevant to their reply. For example, one person wrote in a text message that his trip had not occurred via Craigslist rideshare because he had “not found a suitable match” [T-36]. I responded, “Why was the match unsuitable?”

Table 14 *Usable text responses by region and type*

| Region | Ride Wanted | Shared Offered | Commercial | Total |
|------------------------|-------------|----------------|------------|-------|
| Bakersfield | 1 | 3 | 1 | 5 |
| Fresno | 3 | 1 | 5 | 9 |
| Hanford | 0 | 0 | 0 | 0 |
| Los Angeles | 2 | 8 | 6 | 16 |
| Merced | 0 | 0 | 0 | 0 |
| Modesto | 0 | 1 | 0 | 1 |
| Sacramento | 6 | 6 | 3 | 15 |
| San Francisco Bay Area | 6 | 6 | 3 | 15 |
| Stockton | 0 | 1 | 0 | 1 |
| Visalia | 0 | 0 | 1 | 1 |
| All posts | 18 | 26 | 19 | 63 |

I contacted 190 people via text and received 67 responses. As I stated earlier, these 190 contacts only include cases in which the poster provided a phone number; I also only sent one text message to each phone number, meaning that I did not contact duplicate posters. Of the 67 text responses, 63 were usable, for a total response rate of 33 percent. Table 14 shows the count of

these text responses by region and by post type. Post type, as I described in Essay 2, refers to whether a post was tagged “wanted” (the poster requests a trip) versus “offered” (the poster offers a trip). Among offered trips, I further distinguish between Shared Offered and Commercial posts. In the former, a person travels with a destination in mind and offers a seat to a passenger. In the latter, a poster acts more like a taxi or ridehail driver, offering rides to requested locations for payment.

I contacted one poster in Merced but received no response; further, over the period, the Hanford board had no posts with phone numbers to contact. Response rates did not vary greatly by post type (from 30% among Commercial to 36% among Shared Offered posters). Across the larger regions, response rates varied slightly (from 27% in Fresno to 36% in Los Angeles). Table 25 and Table 26 in the Appendix include response rates by region and post type.

In addition to these posts, I completed eight interviews with posters who responded to initial text messages. These semi-structured interviews lasted from 12 to 42 minutes. These interviews covered topics including past use of rideshare, motivations for posting on the rideshare board, opinions about Craigslist, use of other travel modes, and selection of co-travelers. I recorded and transcribed the interviews. I describe information from these interviews alongside text responses in the following sections (identifying text responses with the prefix “T” and interview responses with the prefix “I”). Because all of the interview participants also initially sent text message responses, there is a [T-5] excerpt and an [I-5] excerpt; they capture responses (text and verbal) from the same poster. Due to privacy concerns and to limit respondent burden, I did not collect demographic information on posters. However, in over half of the cases, I inferred some information (such as gender or age) from the posts and responses, so I include it when quoting text

or interview responses. I directly report quotations, including spelling and grammar errors, with small edits to provide context.

3.2 Coding approach

After collecting text responses and conducting interviews, I manually coded the survey text and interview data. I also identified differences in rates of success among post types (see Table 15). Before analyzing the data, I anticipated coding for themes including the success of making a rideshare connection, use of alternative modes (for rides that did not take place via Craigslist), and exchange of money (for those that did). I also used directed content analysis to develop additional themes.⁴⁹ Additional codes include reasons for ridesharing failure (when appropriate) and primary motivations for using Craigslist rideshare. I also coded for whether the posters received *any* replies to the advertisement, mentioned unsettling (including “creepy”) qualities of potential travelers, and engaged in screening. I used the same themes coding interview and text responses.

Midway through data collection, I realized that my contact methods account for the risks and rewards people perceive when interacting with strangers via Craigslist. In contacting users, I initially sent a handful of questions to lower barriers to participation and increase responses to my inquiries. I also wrote to “thank [the respondent] in advance for their help,” which drew on their prosocial instincts to help a stranger (see Section 2.1 above). In my choice of language, I sought to present myself as trustworthy and non-threatening while also protecting my privacy. For example, I used a variation on my distinctive first name and contacted users from a Google Voice account to maintain some anonymity. The Google Voice number I used had a local area code that supported my claim of living in California. Finally, I cited a relationship with a well-known research institution to legitimize my project and build trust. This was particularly necessary

⁴⁹ See Essay 2 (Section 3.2) for an explanation of this approach.

because Craigslist has a reputation for fee fraud scams, in which organizations send counterfeit emails to trick posters into sending them money (Jones & McCoy, 2014).

My identity likely influenced the data I collected. The high response rate may partly reflect my presentation as a female university student. Further, two interviewees (both male and aged 65+) specifically mentioned that I should not attempt to use Craigslist rideshare; my positionality may have caused interviewees to raise issues related to gender and safety more often than with a male interviewer. Further, one poster repeatedly asked whether I “had a picture,”⁵⁰ suggesting some personal interest in me beyond the research project. While this did not particularly bother me, it *was* irritating (and gave me empathy for Craigslist users who navigated obnoxious contacts from unserious or “creepy” board posters).

3.3 Methodological strengths and weaknesses

In this analysis, I build upon the novel data source that I analyzed in Essay 2. In addition to examining posts and destinations, I verified whether posted trips took place and if they occurred due to a connection made on the Craigslist rideshare board. Similar to in Essay 2, I gathered information on a difficult-to-reach population (and one with apparently unique characteristics, as suggested by research on hitchhiking (Chesters & Smith, 2001)). Further, in responding to open-ended questions in text surveys and interviews, Craigslist rideshare posters described their experiences directly. I thus captured a wider array of perspectives than a traditional travel survey provides. In the extended interviews, in particular, I drew out complicated feelings people had about ridesharing.

One potential weakness concerns sampling and response bias: whether the responses I received reflect the experiences of all Craigslist rideshare posters (as well as rideshare seekers that

⁵⁰ This person provided virtually no information about the rideshare experience, so I did not include him as a “usable response.”

do not use the website). First, I only contacted people who included telephone numbers in their posts. People who post phone numbers may be more open to interacting with strangers. While I estimate that about one-third of all Craigslist posts include phone numbers, they might systematically differ from the other two-thirds of posts. My analysis could thus understate the sensitivity to danger of the average Craigslist poster. Second, the people who responded to my inquiries could also systematically differ from non-responding posters. They might have stronger social motivations to rideshare, as they responded to my queries without any remuneration. This could lead me to, for example, overestimate the level of prosociality among rideshare posters. Third, people who responded to my inquiries could be more likely not to have received a ride and thus were actively monitoring their phones for messages from strangers; I may thus underestimate rideshare success.

Yet a few pieces of evidence suggest that response bias does not fully undermine the value of my surveys and interviews. First, many people who responded to texts mentioned discomfort with strangers, suggesting that this orientation alone did not prevent their participation in the study. Second, the fact that many respondents had successfully made a rideshare connection suggests that people in my sample did not solely include people who had not received a ride, for example. Ultimately, I cannot rule out the possibility of response bias; this analysis, however, is exploratory. In reporting the experiences of many Craigslist posters, I do not extend my findings to all people seeking opportunities to rideshare with strangers.

In addition to representativeness, respondents may have inaccurately reported their behavior, a phenomenon called social desirability bias (Van de Mortel, 2008). For example, in speaking with some interviewees, none explicitly admitted to discriminating by race, even though previous research finds that digital users regularly do (although perhaps subconsciously) (Doleac

& Stein, 2013; Farajallah et al., 2019). My approach – including prompts and scenarios I posed – helps mitigate this issue. Other evidence suggests that social desirability bias did not strongly influence how people characterized their travel experiences. For example, while some travelers mentioned altruism as causing them to rideshare, the vast majority cited cost as the strongest incentive (arguably, a less noble motive). As I discussed above, my positionality likely influenced the survey and interview responses I received. The potential for interviewer bias due to identity, however, is inherent in this method of data collection; no research design can control for every interviewer characteristic that influences how respondents answer questions (Norris, 1997). Further, communicating over the telephone and via text message provided posters with visual anonymity, which may reduce respondent self-consciousness and the influence of interviewer characteristics on responses (Salazar, 1990).

4. Results

I divide the results into four sections. I begin by presenting rates of success and failure in ridesharing and the factors that contributed to these outcomes. I also describe the alternative travel modes used by posters who did not rideshare. I then explore how people perceived risk, the strategies they used to manage it, and how they balanced risk and reward in seeking informal exchanges.

4.1 Ridesharing success, failure, and alternatives

While new posts regularly appeared on the Craigslist rideshare boards, most respondents did not successfully connect with other travelers. Of 63 responses, only 21 (33%) posters stated that a ride took place due to their posted Craigslist ad. An additional 13 respondents had successfully rideshared before, meaning that more than half (54%) of respondents had experience traveling via Craigslist rideshare.

Table 15 *Outcomes of Craigslist rideshare posts by type*

| Outcome | Ride Wanted | Shared Offered | Commercial | Total |
|-----------------------------------|-------------|----------------|------------|-------|
| Successful Craigslist arrangement | 0 | 6 | 16 | 22 |
| Previous successful arrangement | 2 | 10 | 1 | 13 |
| No successful arrangement | 16 | 10 | 2 | 28 |
| All posts | 18 | 26 | 19 | 63 |

Table 15 indicates that Commercial posters reported higher rates of success than Ride Wanted posters; indeed, *none* of the Ride Wanted respondents successfully connected with a Craigslist user for that particular trip. Commercial posters seldom listed single destinations or trips but rather recurring availability and locations. This accounts for their higher rates of trip success. Further, because some of them advertised on several digital platforms (including Facebook and Instagram), Commercial respondents could not always identify whether a contact came from Craigslist. Thus, the reader should not directly compare success rates among Commercial posters to those among Ride Wanted and Shared Offered posters.

The travel alternatives cited by Ride Wanted posters included receiving a ride from an acquaintance (3), traveling via Amtrak (3), Greyhound bus (1), airplane (1), or ridehail (1), and approaching a stranger in-person (1). Ride Wanted posters also deferred their trips (3), remained waiting for a ride (2), or had no clear outcome (3). Meanwhile, most of the Shared Offered posters who made no connections with others drove alone. Commercial posters simply did not make the trip (as their purpose was to transport another person). In terms of alternatives to giving rides via Craigslist, 12 of 19 Commercial posters reported driving for Uber, Lyft, food delivery services, and private limousine companies.

Respondents frequently mentioned logistics and timing (21) and disturbing messages of a sexual or personal nature (8) as causes of rideshare failure. Logistical challenges reflect the many

variables that make coordinating travel difficult. For example, both offering and requesting parties saw travel plans change quickly; one woman who posted a ride from Los Angeles to Sacramento explained that due to a party cancellation, she did not make the trip she had offered. The response from a poster seeking to travel from Sacramento to the Midwest illustrates the many obstacles to arranging a ride:

I had to postpone the trip due to bad weather here in Northern California [...] I did receive a handful of offers from quite the variety of people. The first being a guy who asked to see my [expletive], [expletive] weirdo kept texting me after I didn't reply so I blocked him. The second guy was a normal guy who was asked \$100 for the ride – very reasonable – but he was leaving right there and then. I didn't have enough time to pack. The third person was a chick who was driving down from Oregon with her roommate [...] it fell through when I was told they had no room in the car for my luggage. Only enough room to fit one person, no bags [T-48].

Unpredictable weather in California over part of the data collection period caused people like the poster above to delay long-distance trips or seek alternate arrangements. Due to severe rain, Greyhound suspended bus service between Sacramento and Oregon for several days in February 2023 (Halbleib, 2023), causing some bus users to turn to the rideshare board as an alternative. Other respondents stated that because they posted shortly before preferred trip departure times, they had small windows to connect with other travelers. They surmised that this contributed to their failures to find rideshare partners. Reflecting the challenges of uncertainty in travel plans and traveler unreliability, four people specifically complained about “flakiness” on the rideshare board. One Shared Offered poster explained, “We need a real platform to connect with people better [...] less flakes” [T-29].

Successful Shared Offered posters often listed trips along popular and regular routes, such as between the Bay Area and Southern California; others offered to pick up or drop off passengers along the way. When asked about how often he successfully found a passenger, one Shared Offered respondent explained,

Whenever I go to Sacramento – about three to four times a year – I put a posting to get a rider from Crescent City to Sacramento. I can go [via Highway] 101 or the 5. But there are always people in Eureka who need a ride – it’s a long way by bus otherwise [T-55].

Another poster who had successfully rideshared many times explained that having a backup option helped him cope with the inconsistency of drivers:

I might talk to two people because one person might flake. I try to get two people to agree, and then confirm the one that seems most guaranteed. One time I made an arrangement with one person. He didn’t show up. So, I contacted the other person. She said, I’m sorry, I left already, but my friend is there. And so [the friend] gave me a ride [I-60].

Yet some long-timer users perceived that Craigslist’s utility as a viable platform had diminished recently. Five respondents specifically mentioned this issue unprompted. One person attributed the decline of the rideshare board to “Craigslist’s worsening reputable as a haven for the disreputable” [T-1] and the four others to health concerns during COVID-19. One Shared Offered poster who did not find a passenger via Craigslist for that particular trip, but had done so previously, explained,

It’s been tough since COVID began. It changed the dynamics. People used to be comfortable traveling in other people’s vehicles. Now they’re more leery [....]

Before COVID I'd have about 50% of my rides accepted. Now it's about 10% [I-33].

Meanwhile, only one respondent expressed apprehension about contracting COVID-19 (and required that any passengers show proof of vaccination). This suggests that ridesharers in late 2022 and early 2023 may not have been particularly sensitive to health concerns.⁵¹

4.2 Perceptions of risk

As I noted above, perceptions of risk loom large in the decision to share with strangers (and particularly in enclosed spaces); one source of uncertainty concerns the honesty and motivations of other travelers. I thus describe rideshare posters' perceptions of risk below. Among others, respondents identified concerns about physical violence, expectations of sexual favors, and nonpayment.

4.2.1 Risk of physical violence and murder

Three respondents cited their perceptions of physical risk (and in an extreme form, murder) as informed by media representations of hitchhiking and Craigslist. One man, for example, noted that he took a cautious approach to Craigslist, as "everyone is watching that Jeffrey Dahmer show" [I-26]. Another Ride Wanted poster who did not find a ride wrote,

I was so crazy in the blind. But then again, I thought, these people are just going to take me out to Washington state and kill me. Kind of like, you know, the Craigslist killer kind of deal [T-8].

About one-third of respondents (18) mentioned safety issues as affecting their experiences with the Craigslist rideshare board. Yet safety concerns affected travelers differently, suggesting varying levels of sensitivity to the risk of physical violence (and *very* little sensitivity among some

⁵¹ I raised this issue in Essay 2 (see Chapter 4, Section 3.4.2).

posters). One Shared Offered poster described a previous experience in which a person called him at midnight in response to his advertisement. He later learned from law enforcement that his contact had been fleeing the scene of a murder he had committed hours earlier. When asked if this experience changed his views of Craigslist rideshare, the respondent answered negatively. He explained that he had avoided the murderer because of his ability to screen potential riders.

Another regular Craigslist poster admitted that ridesharing was “safe, but maybe not the safest thing you can do” [I-58]. The Shared Offered poster described his last experience providing a ride via Craigslist thus:

The person I picked up – he asked me if I wanted to check his bag to make sure he wasn't carrying an ax. And I said – as a joke – well how do you know I don't have a gun under my seat? But maybe it wasn't totally a joke [I-58].

While in both of these cases, men expressed low concerns about physical safety, I return to the themes of risk management and the use of heuristics – including by women – in Section 4.3 below.

4.2.2 Risk of sexual motivations and favors

In addition to general concerns about violence, some respondents mentioned uncertainty about sexual motivations, expectations of favors, and even violence. Unlike with the issue of murder, more posters expressed concerns that nebulous expectations about sexual favors might make rides awkward (rather than resulting, for example, in assault). But while 14 people mentioned the issue of sexual factors, only eight described these factors as decisive in preventing them from ridesharing. One Ride Wanted poster found the responses she received too unsettling to pursue, explaining,

I did get multiple responses from the ad on Craigslist, but wasn't comfortable accepting any of them because of the requests that the other traveler was making, or the information they were sharing with me. It [led] me to believe that they were interested in more than just giving me a ride. Several asked me to send them a picture of myself, which I considered an unusual and unnecessary request for a ride. No money was exchanged with any of the people who responded to the ad, although I was offered \$500 cash by one individual to cover MY expenses and time [T-61].

Another Ride Wanted poster had a similar experience, writing,
I actually was harassed by a few people and ended up [getting] a ride through an acquaintance [...] people made sexual and perverted comments, tried to solicit acts in return for the ride. Stuff like that [T-46].

In both of these cases, respondents stated that sexual messages caused them to avoid ridesharing entirely. Another poster characterized a response that inquired about his gender as “odd” [T-42]. Other posters, however, stated that references to gender or soliciting personal information did not dissuade them from ridesharing. For example, a male Ride Wanted poster who failed to receive a ride explained,

The people who offered to give me a ride only wanted to give me a ride if I was female [...] Didn't make me so much uncomfortable as doubting whether I'd get a ride or not [T-40].

In this case, inquiries about his gender being a factor did not cause concern about the driver's motivations, but rather the uncertainty of receiving a ride. However, inquiries or requirements about gender may not necessarily suggest sexual motivations. Instead, a driver might

feel safer taking a woman rather than a man, as with the telephone audit study mentioned in Section 2.1 (Levine et al., 1976; Milgram, 1970). I further explore the use of heuristics to select co-travelers in Section 4.3 below.

4.2.3 Financial risk

Parties offering rides – especially Commercial one – expressed concerns about nonpayment. They worried that after agreeing upon financial compensation, the passenger would refuse to pay at the end of the trip; because the rider had already reached their destination, the driver would have no leverage to negotiate (as the service provided could not be retracted). This posed a particular problem for Commercial drivers who sought to make money but lacked the formal methods of pre-payment that platforms like BlaBlaCar or Uber/Lyft require. Drivers listing long-distance rides mentioned this issue frequently. Yet while a problem for drivers, some respondents did not characterize the risk of nonpayment as more concerning than the risk of injury. One female Commercial poster noted,

I've been doing this 13 years and have enjoyed it [...] In 13 years I've only had two bad rides and nothing bad, just wouldn't pay [T-57].

A male poster offering rides from San Jose to Watsonville explained that he regularly gave rides for pay via Craigslist rideshare and that he had had no negative experiences “yet” [T-63]. He then texted several weeks later, writing,

Just had my 1st bad or negative experience on a ride from San Francisco to Moss Landing the other day. Took a chance on getting paid cash after the ride. Almost paid me with fake money! Guess that's what I get for trusting ppl lol [T-63].

Additionally, some Shared Offered posters expressed concern that people unable to contribute financially might create additional obligations. I asked one Shared Offered respondent

about his flexibility in compensation for a trip from Los Angeles to San Francisco. He said that he would accept less money than stated in his post. However, he worried that someone with *no* money might reach the end of the trip without a place to stay. Exchanging money made him feel “safer” [I-58] and less concerned about later requests for assistance. Another poster explained that he declined to drive a young woman who requested to join him on a trip from the Midwest to California. When he pressed her about her travel plans via phone, she had no clear destination and did not mention compensation. He worried about her ending up “stranded” [I-5] and feeling responsible for her predicament. Informal ridesharing may thus raise the potential for lingering financial or even emotional obligations absent in more formal types of vehicle-sharing.

4.3 Managing risk

Despite perceptions of using Craigslist as a risky practice, all respondents had posted on the rideshare board, suggesting some receptiveness to interacting with strangers. But in the process of negotiating offers, risk tolerance differed. Some people perceived the negative possibilities of interacting with unknown people as significant enough to deter them from ridesharing at all, similar to the cases of female public transit riders (Ding et al., 2020). Other regular users, however, described strategies they used to manage the risks that they recognized. I detail these below.

4.3.1 Intuition, heuristics, and discrimination

Many travelers relied on heuristics – including forms of communication, travel locations, and appearance – to assess suitability as a traveling partner. Offering posters, in particular, frequently mentioned relying on intuition; five people independently used the term “gut feeling” in selecting a passenger. A Commercial driver who gave regular rides noted,

I determine who to take by intuition. I can usually tell if a person is being honest by how they write and/or how they communicate with me [T-3].

Several posters reported that talking on the phone allowed them to assess the qualities of a co-traveler more efficiently than text or email. When asked why he preferred to speak with a person who responded to his advertisement, a male Shared Offered poster explained,

You're being invited into my home.⁵² We need to interact, like adults, participate in a human interaction. I have a crazy filter [...] When you talk on the phone, it's harder to hide who you are and what kind of person you are. Meeting in person is best, but that's hard to do [before the trip begins] [I-64].

In addition to screening for information, some people used language in their posts to head off undesirable matches (as I observed in Essay 2). One Shared Offered poster had provided rides several times over the years. He explained that he wrote “no ghetto [people]” in his advertisement because a previous rider had tried to transport several pounds of marijuana in his car. He usually spoke on the phone with other travelers before giving rides:

It's hit-and-miss. I always vet people before I do it. I'll offer the ride, see if I like the vibe. But if it's just a bad vibe [...] trust your gut, if you have a bad feeling, you can always take the train [I-26].

Travelers also screened people based on location. One Commercial driver who regularly provided inter-regional trips explained that she preferred to serve trips to casinos, as

I know people have money. I will turn down people if they sound like they don't have money [...] you have to trust your gut. I once got a request to drop someone off at a homeless shelter. I won't make that trip [...] I won't take someone who has an odor [I-52].

⁵² He was referring to his vehicle.

People also used heuristics when arranging rides in person. One Ride Wanted poster, stranded at a casino, stated that he received no viable contacts from his Craigslist advertisement. He then walked around the casino and asked people for a ride to his home (about 35 miles away). When asked how he decided whom to approach, he explained that he “picked the best-looking girl who look[ed] liked she might have been alone to ask” and then offered her “gambling money” [T-40].

Some of the filtering strategies involve statistical discrimination, for example, in assuming a person traveling to a shelter has an odor. But whether travelers used heuristics to address physical danger, or just to avoid unpleasant characteristics, appears to vary by the individual and their perceptions of risk. The Commercial driver above, for example, explained that she provided a “professional service” [I-52], and that having unpleasant odors in her vehicles would alienate clients and harm her reputation. She thus expressed greater apprehension about financial rather than physical harm, similar to the posters in Section 4.2.3.

4.3.2 Verifying information

While using heuristics may reduce uncertainty in some situations, strangers may not provide reliable information via semi-anonymous interactions on the Internet.⁵³ Some Craigslist posters thus managed risk by using external resources to verify poster information. Four respondents specifically mentioned requesting social media profile information. One man explained that he requested a link to a Facebook profile to ensure that his passenger had a “good character” (exemplified by not making “highly political” posts) [I-5]. He also preferred that a passenger – and especially a female one – exercise similar caution. He noted,

⁵³ Hence the famous adage from a 1993 New Yorker cartoon: “On the Internet, nobody knows you’re a dog” (Fleishman, 2000).

I've had females ride with me. And if they hadn't been cautious and shown concern about riding with me, I may not have taken them. It's a two-way street [T-5].

Other strategies people mentioned included verifying that the contact's phone number matched the name they provided (3) and asking for a photograph of the contact (3). Two Commercial drivers who requested photographs also drove for Uber or Lyft, so they may have adopted this practice from the platforms. One experienced ridesharer stated that before making a shard trip, he would take a photograph of his driver's license and send it to the person who contacted him. He then requested the other traveler do the same and send the photograph of his license to a family member.

While these five ridesharers saw their methods as sensible and perfectly acceptable, others did not. One Shared Offered interviewee viewed requesting social media profile information as invasive. He explained,

If I ask too many questions, a rider might feel uncomfortable. When you're talking to strangers, you can't just ask them for their social media [...] I'm not judgmental, I'm not trying to find negative things about you. I don't need to know if you're gay, lesbian, married, have kids. I'm not going out of my way to learn about you [I-60].

This person saw a middle ground in the information a person might provide or request from a stranger. While he sought enough information to feel safe, asking for more might blur interpersonal barriers that formal exchanges better maintain. And in some cases of ridesharing, providing personal information may impose additional demands to interact with a person. Withholding information (such as sexuality or marital status, as with the above poster) may help some posters control the costs of interacting with strangers (Milgram, 1970). And unlike most

respondents, this interviewee appeared to be more concerned about alienating other travelers than being alienated himself.

4.3.3 Defensive measures

In managing risk, six respondents described physical conditions that mitigated their safety concerns. One man stated that “I’m a bigger person so I’m not very afraid of being physically assaulted. I’m more concerned about not getting along with the person” [I-58]. Another Shared Offered poster similarly stated,

It’s different for guys than for girls. I’m a big guy, and there’s not a lot I can’t handle. So, I don’t have to be too discerning about who I pick. Not much scares me. But I wouldn’t want my daughter offering rides on Craigslist [I-33].

He reflected on other ways to protect oneself in a vehicle:

It used to be no big deal to pick up hitchhikers. People don’t do that anymore. You don’t see them on the road. In the old days, I could have them ride in the bed of the truck, so that way the person happily gets a ride, but you don’t have to worry about safety [I-33].

Additionally, four people stated that they traveled with weapons. One woman regularly provided rides for pay between Sacramento and the San Francisco Bay Area. She wrote that she felt comfortable driving men, as “I have safety precautions in place, [which are] firearm, mace, taser :-)” [T-31]. Another Commercial driver explained that “she gets hit on a lot” and traveled with both a firearm and taser under her seat. She also brought her fiancé when giving rides in the early hours of the morning. In addition to these precautions, she also stated,

I'm a pretty good driver, so if someone were bothering me, I could just pull on the brakes and make them hit their head [...] I don't act scared. When people see you act scared, then they notice and will hurt you. I act like a lion, not a mouse [I-52].

Two men who offered rides stated that they regularly carried firearms when traveling, although they concealed them from rideshare passengers.

4.3.4 No filter

In contrast to posters who described using strategies to screen other travelers, other respondents – particularly Commercial ones – stated that they did not filter respondents at all. Illustrative responses include “I don't need the names. I just drive them and go” [T-56], “I just go by destination and location” [T-28], and a person who drove “anyone who calls” [T-14]. All of these Commercial drivers offered intra-city rides (in Fresno and Los Angeles); they may have viewed the risks of physical violence or nonpayment as lower than in noncommercial intercity trips.

Among inter-city travelers and noncommercial posters, the rigor of travelers' screening processes varied. Their screening processes appear to reflect differences in how travelers perceived and assessed risks in their co-travelers. For example, one man who frequently engaged in ridesharing described a previous trip he took as a passenger. After posting on Craigslist, he had already received one offer, when:

Another person – a gay person – wrote me and said you're cute. I said I'm not gay though, man. If you give me a ride, we can talk and be normal. But if you want sexual favors or anything, unfortunately, I cannot give those to you. He said that's fine. It didn't work out but if that gay person had given me a ride it would have

been fine. Him being gay didn't really push me toward the other ride much, maybe it was a slight barrier... but not that significant [I-60].

While this interaction may have dissuaded some travelers, this respondent appeared to have a unique orientation toward danger and risk. He was male and young, both demographics that tend to report less fear of crime and violence (Elchardus et al., 2008). This may have contributed, then, to his comfort with continuing to negotiate with a driver who had complimented his looks.

4.3.5 Managing financial risk

As I note above, offering parties – especially Commercial ones – expressed apprehension about non-payment. To reduce their concerns, several of them required riders to pay the entire fare or gas contribution before the start of the trip. One woman ran a professional service with several drivers and required that, for long-distance trips, people place a deposit two days before the travel day. Another Commercial poster explained that passengers could pay for trips under 100 miles upon pickup but must pay before pickup for longer trips. One Shared Offered poster regularly gave trips over 500 miles from Oregon to California. He said that many people asked to visit an automated teller machine (ATM) at their destination; he always insisted that they pay him before departure. Finally, another Shared Offered poster had passengers pay for gasoline halfway through the trip.

4.4 Risk versus rewards

As with any activity, people managed the risks and rewards of ridesharing. The balance of the two depended on the user, reflecting the rewards they anticipated and their perceptions of risk. As with other forms of sharing, rewards included the potential to save on travel costs. This was particularly relevant to travelers experiencing hardship. Other ridesharing motivations included the pleasure of social interactions and comfort with shared travel that developed over time. As did

posters in Essay 2, respondents described the barrier between economic versus personal motivations to sharing as permeable; however, financial motivations dominated the decision-making of most respondents, as I detail below.

4.4.1 Sharing costs and making income among Offered posters

Most posters who offered rides (40 of 45) stated that financial factors motivated them to engage in ridesharing. For many of them – including the noncommercial ones – the exchange of money defined the co-traveler relationship. One Shared Offered poster from the San Francisco Bay Area board explained,

I've driven Craigslisters down to LA many times over the last 10 years. I don't feel uncomfortable exchanging money. It's a business transaction [T-30].

Another Shared Offered poster stated that seeing “empty cars” traveling on roads annoyed him, as they contributed to traffic delays and air pollution. But as to why he continued to rideshare, he said,

It's mostly about saving money. That's a bit more of a motivator. The saving money part is what makes it appealing [I-60].

Commercial posters also stated that the informality of Craigslist offered them the potential to make more income from providing rides than in formal shared mobility services. One poster who gave rides in the Sacramento region explained,

As long as you know you need to get somewhere and I need the money to get you somewhere everything should work out. I drove for Uber. I drove for Lyft. I'm a people person. Five star driver, five star rating, good feedback. But [the ridehail companies] are just too greedy for me [T-41].

Seven other Commercial posters previously (or currently) drove for ridehail companies but expressed dissatisfaction with the compensation they received on these platforms.

4.4.2 Dire circumstances among Ride Wanted posters

Reflecting similar economic motivations, several Ride Wanted posters relied on Craigslist rideshare because they found themselves in challenging circumstances. For example, one woman posted that she needed assistance moving her trailer, as “Cops are coming in morning.” She did not offer any compensation in her post. In response to questions about whether the trip took place, she explained,

Many people contacted me via Craigslist, I would have to say. Although me saying we were two females needing help got a lot of responses, 98% of them had ulterior motives. But we were just looking for honest help [...] When I have nowhere else to turn, I have turned to Craigslist and it has helped me in my most dire moments. But there is a risk because of obvious reasons [...] Most people that said they would help wanted to exchange the help for sex, or wanted to not really help [T-44].

An acquaintance ultimately helped the poster move her vehicle. Another Ride Wanted poster mentioned personal challenges she faced in her post requesting an intercity rideshare trip. When asked why she mentioned these challenges in her post, she explained, “I guess I felt like I need to explain why I was so short on funds, [and couldn’t] make the trip with a rental car as I had originally planned” [T-61]. She felt compelled to justify why she deserved help, a factor found to influence assistance in other situations (Petersen et al., 2012).

Even when faced with less dire circumstances, some respondents stated that the monetary benefits of informality drove them to Craigslist rideshare over other formal options. One man who posted an intra-city ride request within the greater Los Angeles area explained,

I did not get a ride. I recently lost my car just last week and I wanted to find cheaper alternatives to Uber and Lyft. But ultimately I went back to doing that for now [T-7].

Five Ride Wanted posters viewed Craigslist rideshare as a less expensive alternative to other modes of travel (such as driving alone, flying, or taking ridehail); another four thought it was more convenient than relying on shared travel options like Amtrak and intercity buses. But because Ride Wanted posters had limited success in ridesharing, eight of 18 ended up using formal shared travel resources anyway.

4.4.3 Risk and reward in social interactions

While most respondents mentioned the financial benefits of informal ridesharing, several sharing parties – especially offering ones – highlighted the positive interpersonal interactions they had in previous shared trips. One person explained that in selecting a passenger,

I want someone to have a brain. While it's nice to have help with gas money, the trip goes faster if you have someone to yap with [I-33].

Some people saw pleasant interactions as akin to compensation. One Shared Offered party drove a passenger from Los Angeles to Tennessee. He stated that in terms of compensation, “No monies [were] exchanged, just conversation” [T-35]. However, most positive rideshare interactions that people described did not evolve into long-term relationships. One person mentioned regularly staying in contact with previous riders, but only via updates on Facebook. Most people did not maintain contact at all.

While the desire for social interactions usually accompanied financial motivations, one poster wrote an advertisement in which he offered to help move items and did not request compensation. His offers actually generated costs for him. In explaining why he posted ride offers on the Craigslist rideshare board, he wrote,

I started doing this three summers ago, before COVID. I got a lot of responses, met a lot of interesting people, and drove an interesting assortment of items, people, and people with an item to various places around northern California [T-1].

He explained that his primary motivation for rideshare was “a little search for adventure.” Most recently, he drove a college student to her parents’ vacation house and helped a person move a kayak to Santa Cruz. He characterized both of these experiences as positive opportunities to meet new people and enjoy novel experiences, rather than as occasions to make money.

Posters also acknowledged that they might incur socioemotional costs from ridesharing. One respondent stated he did not request compensation as “I just know some people need help with rides, especially during ski season, to get to jobs” [T-38], anticipating the hardships that Ride Wanted posters mentioned. He further described the qualities of his preferred passenger:

Clean, not crazy, able to have conversations. Not the whole ride of course. I had taken a girl from [West Hollywood] up to San Francisco last year and she talked on her phone the whole time and it was kind of rude [T-38].

Another man mentioned that while giving two women a cross-country ride, they began to engage in a “political” conversation that made him uncomfortable. They also criticized him for stopping to sleep during the trip. Due to their unpleasant behavior, he stated that he would not drive this party in the future. Another experienced ridesharer said that of the few non-positive trips he had, two of his passengers had experienced serious psychiatric issues. He cited another negative

experience driving a passenger with poor hygiene: “There was this one guy, I guess he had been going to some Grateful Dead shows, and it had been a long time since he bathed. I mean it was like, wow” [I-64].

4.4.4 Primary versus ancillary motivations

Drawing a dichotomy between financial and social motivations may be inappropriate, as the results from Essay 2 suggest. For example, in his advertisement, one Commercial poster attached a photograph that identified him as a Black man. In response to inquiries about his services, he explained that he offered a service similar to a limousine and sought to make a profit. However, he mentioned that in addition to making money, he

Just wanted to make African Americans comfortable with taking rides. So much has happened in the media and many blacks feel discouraged to ride [T-10].

Social desirability bias may have led Commercial posters to overemphasize the personal nature of the transportation services they offered. Some posters acknowledged that profit-making caused them to post on Craigslist rideshare, but that friendly behavior from passengers was an additional perk of the job. One man explained,

I always feel comfortable whether [it] is a woman or is a man and name or no name it's fine for me, but what makes me way more comfortable is having a respectful and nicely down-to-the-earth human being riding in my car. That makes my day [T-21].

Another man regularly made long-distance trips from Oregon to California and stated that he had provided hundreds of rideshare rides over the past 15 years. He aimed for rideshare passengers to cover half the cost of gasoline for his trip and would not drive a passenger for free.

He also described 99 percent of the rideshare trips he had provided as being positive, “just peachy.” Addressing his ridesharing experiences, he explained,

A lot of [my success ridesharing] has to do with the kind of person I am. I like interacting with people, I’m extroverted. I’m a people person and I like to know what makes people tick. I’m kind of a Pollyanna. I really do believe that everyone out there is a wonderful person [I-64].

Several other people mentioned that while saving money primarily motivated their ridesharing, they had personalities that left them uniquely oriented to enjoy – or at least not object to – interacting with strangers. Another poster, for example, stated, “I’m just not a judgmental guy [...] I like to talk to people” [I-33].

4.4.5 Past histories of sharing

As with Crasweller et al.’s (1972) hitchhiking study, many people stated that past histories of vehicle-sharing motivated them to rideshare. One driver in his 70s regularly provided rides when driving from the Midwest to the San Joaquin Valley. He often requested money for gasoline but seldom received it. When asked why he continued to seek out passengers, he explained,

When I was young, I hitchhiked all of the time and had plenty of people pick me up. I’ve probably hitchhiked over 30,000 miles. Before I leave [for my trip] I look through [Craigslist ads] to help people and pay it back [I-4].

Another Shared Offered respondent said that he relied on the Craigslist board for making rideshare connections (and mentioned cost-sharing as his primary motive). However, he occasionally picked up travelers from the side-of-the road:

One time I was going to Safeway, and I was driving through open land, like three miles from town. And I saw a girl walking and I was like, if you’re going in that

direction [....] Before I had a car I walked everywhere, so I know that three miles is a lot. Also, I grew up in the South. There it's normal, it's common courtesy to give someone a ride. Especially in Louisiana. Here [in California], it's not [I-60].

This traveler's perception of ridesharing culture echoes studies that find that people in rural areas are somewhat more likely to help strangers and engage in prosocial behavior (Stebly, 1987). The respondent also identified a role for cultural and place-specific norms in giving and getting rides. Previous researchers have documented similar norms of providing informal transportation assistance in small towns in the U.S. (Combs et al., 2016).

5. Discussion and implications for scholarship

From these data, I draw four major findings. These findings contribute to the literature on informal vehicle-sharing and how people balance risk and reward when sharing with strangers.

A. The Craigslist rideshare board offered limited success for posters, reflecting the drawbacks of its decentralized and informal nature.

Among my sample of respondents, less than half of posters saw their trips take place via the Craigslist rideshare board. Posters mentioned logistical issues contributing to rideshare failure more often than social discomfort. Those offering regular routes, perhaps cases in which supply and demand for trips match better, had more success connecting with other travelers. Commercial posters also reported high rates of rideshare success, but these experiences are not comparable to noncommercial outcomes (given the recurrent nature of the trips that they offered). Ride Wanted posters had the least success of all poster types; indeed, none of the Ride Wanted respondents reported that their ride took place via Craigslist rideshare.

This last point may dispirit planners enthusiastic about informality as a tool to reduce transportation inequity. Ride Wanted posters in this analysis and Essay 2 appear to have

experienced especially high levels of need. This finding agrees with other studies on the characteristics of people who depend on informal transportation (Cervero & Golub, 2007; Garnett, 2001). Some Ride Wanted posters who failed to make connections via Craigslist used other formal sharing options (like Amtrak rail, Greyhound bus, and ridehail). Others received rides from people they met in person. None of them drove their own vehicles, suggesting that many (if not most) of them did not own a vehicle – or at least one reliable enough for long-distance travel. And more than a quarter of those unable to arrange a ride deferred their trips entirely. Meanwhile, most Shared Offered posters tended to make the posted trip by driving alone. While they may have suffered higher financial costs than had they found a passenger, at least they *did* complete their trips. Insofar as Craigslist rideshare can help people gain access to automobile travel at low costs, it did so least successfully for posters seeking rides.

In assessing the challenges of informal ridesharing, contrasting Craigslist rideshare with casual carpooling may be instructive. Casual carpooling differs from Craigslist rideshare (and hitchhiking) in terms of the costs and benefits it offers travelers and the physical nature of trips. Because casual carpooling routes traverse HOV or HOT lanes, drivers and passengers have the immediate benefits of either faster travel speeds or reduced tolls. Casual carpooling also serves regular routes, which generally lead into (or out of) downtown central business districts with high densities of activity. This provides both drivers and passengers access to a large pool of potential sharers. And because casual carpooling occurs frequently and with regular users, the practice has developed accepted norms (Burriss & Winn, 2006). These norms include conventions around compensation, traveler selection, and social behavior (Zmud & Rojo, 2013). Without the adoption of similar conventions, Craigslist rideshare posters face greater friction in the process of negotiating shared travel. This may further contribute to its limited success in connecting travelers.

Because of my contact methods, I may have oversampled unsuccessful posters. I contacted new posters weekly; posts that remained on the site at the times I checked for contacts may have met with limited success. But many Shared Offered posters *had* successfully connected and left their posts online. Further, results from Essay 2 indicate that few people removed their posts immediately after their trips took place; most posts either expired or were removed several days after the planned date of travel. My sampling method thus likely did not cause me to underestimate the success of Ride Wanted posters; the low levels of successful ridesharing among Ride Wanted posters (relative to offering parties) appear to reflect actual patterns of trip completion.

B. Many users applied heuristics – either systematically or based on intuition – to select co-travelers when ridesharing. These strategies may lower the real and perceived risks of exchanges in informal markets.

Many Craigslist posters screened contacts to manage risk and avoid physical danger, economic uncertainty, or general discomfort. While no respondent mentioned discriminating based on, for example, race, sexual orientation, or age, many described exercising personal judgment to maintain safety. In two cases, offering parties (one Shared Offered and one Commercial) explicitly mentioned that they discriminated by socioeconomic status.

Screening strategies also varied. Beyond explicitly stated rules about the types of people they sought to avoid, travelers also relied on subjective feelings and intuition (and thus heuristics such as voice, names, and motivations for travel). Several respondents also stated that women must carefully choose travel partners. Many noncommercial rideshare posters (and some Commercial ones) also used specific strategies to verify information about other people. Their methods included speaking with contacts via phone, examining a digital footprint (e.g., a Facebook profile), and asking for a last name or driver's license. Meanwhile, some Commercial providers did not

engage in screening at all, other than ensuring the traveler could pay the fare (and sometimes requiring payment before travel). This latter approach to ensure payment, in particular, mimics how formal sharing options like BlaBlaCar and ridehail providers reduce financial risk for drivers.

For the most part, posters did not describe systematically discriminating against travelers, except for the two cases noted above. However, poster screening strategies raise questions about discrimination based not on socioeconomic status or race but potentially on personality and social skills. When users mentioned concerns about “creepiness,” they attempted to identify parties who had inappropriate sexual motivations or poor social boundaries. Yet some of the “creeps” may have been people who struggle to communicate in conventional ways; this could include, for example, neurodivergent people or people with limited language proficiency. Indeed, the ambiguity of some posters’ filtering methods suggests that even *they* could not identify the qualities they found intolerable; these could, indeed, have led them to discriminate based on race, age, or class.

Taken together, it is tempting to conclude that many rideshare posters make unjust or inaccurate judgments about other travelers. However, heuristics allowed posters to make decisions in situations of uncertainty (Tversky & Kahneman, 1974). Given the informality of Craigslist rideshare, many posters may *only* choose to engage with strangers when they can access heuristics. Meanwhile, studies suggest that people significantly overestimate their ability to identify the thoughts or emotions of other people based on speaking with or observing them (Gladwell, 2019). From this analysis, however, I cannot address whether traveler screening strategies resulted in their preferred outcomes.

C. Fear of sexual harassment and violence played roles – although not always decisive ones – in ridesharing arrangements.

In agreement with recent work on hitchhiking and sharing (Gao et al., 2020; Mahood, 2016), I find that issues related to sexual violence and/or motivations loomed large for rideshare posters. Many male and female respondents mentioned these as relevant in both the contact stage and during trip-making. No ridesharing parties described experiencing physical violence, although one Commercial driver described witnessing one passenger push another passenger from her moving vehicle. Among these respondents, anxiety about the possibility of danger – rather than actual experiences of violence – exerted a stronger influence on their decision-making processes. This agrees with findings in the wider literature on fear in public spaces (Hale, 1996; Pain, 2000). Further, experienced male and female ridesharers attributed their avoidance of danger to their savvy, skill, and positive attitudes. This echoes the “blame-the-victim” discourse that Gao et al. (2020) found among both female and male hitchhikers in China.

The experiences of Craigslist rideshare posters also raise questions about digital harassment, something that some people turning to informal resources felt they must endure. Both men and women cited examples of “weirdos” or “perverts” contacting them, asking for unnecessary information, and sending explicit and unsolicited photographs. While these cases did not inflict bodily violence, they may have imposed psychological burdens on certain posters (while others did not find them troubling). Some respondents acknowledged discomfort with these interactions but lacked better options. The psychological costs of interacting with strangers on Craigslist, then, may be highest for people with limited resources.

D. Individual personality factors and mobility biographies influence feelings about ridesharing.

In addition to the above trends, respondent opinions suggest that ridesharing is a deeply personal – and often idiosyncratic – practice. Some of this reflected cultural backgrounds and

youthful experiences. Several regular ridesharers stated that their knowledge and experiences taught them how to successfully connect with good co-travelers; this echoes other findings of “learning” in both casual carpooling (Zmud & Rojo, 2013) and hitchhiking (Greenley & Rice, 1974). As with those other cases of informal vehicle-sharing, experienced ridesharers also expressed less fear about bodily harm. While many people who engaged in ridesharing had done so previously, this could also indicate attrition – i.e., people who have negative experiences then stop ridesharing, leaving a population of ridesharers with only positive experiences.

Finally, many long-time Craigslist rideshare users stated that the board’s popularity had declined in recent years. One respondent mentioned that falling gasoline prices and airfares made ridesharing less economically competitive. Others attributed its decline to a growing negative stigma associated with the website itself. However, most long-term ridesharers drew a connection between pandemic-era social norms and discomfort with sharing more broadly. These perceptions aligned with findings from other recent surveys of U.S. travelers; during the COVID-19 pandemic, travelers reported less comfort traveling in shared modes like ridehail and public transit (Kiriazes & Edison Watkins, 2022). However, I cannot predict whether – or to what degree – these effects linger as the pandemic recedes.

6. Policy implications

This study may not, at first glance, appear to have direct implications for public policy. Indeed, Chesters and Smith (2001) suggest that policymakers lack a natural role in facilitating a practice like hitchhiking (which Craigslist rideshare strongly resembles, albeit in a digital form). Most public agencies do not elect to take risks but instead focus on maintaining public safety (Chesters & Smith, 2001). Because many people perceive ridesharing as risky behavior, the

government may not want to encourage its use. Yet policymakers may draw four lessons from this analysis.

First, this analysis highlights the formidable challenges to informal ridesharing. The experiences of Craigslist rideshare posters demonstrate the difficulty of matching people based on similar origins and destinations and overcoming the transaction costs of doing so. Craigslist posters regularly struggled to arrange shared transportation, unlike travelers using formal shared services. With BlaBlaCar and ridehail, for example, third parties reduce transaction costs by coordinating trip locations, managing compensation, and gathering reputational information about drivers and passengers (National Academies of Sciences, Engineering, and Medicine, 2016). Borrowing from their success, semi-formality could help improve the process of ridesharing in the U.S. Ride Wanted and Shared Offered posters complained that “flakiness” on the part of other travelers made it challenging to arrange rides. Public agencies could provide a minimal level of formality, for example, by developing a non-profit smartphone application similar to BlaBlaCar; such an application could match users based on origin and destination. It could also allow users to evaluate each other to disincentive “flakiness” and mitigate the uncertainty associated with ridesharing.

Some precedent exists for public management of ride-matching programs for intraregional carpooling. In the 1990s, agencies developed programs in Bellevue, Washington, Los Angeles, Riverside, Sacramento, and Seattle, but none of them generated sufficient demand to justify their administrative costs (Levofsky & Greenberg, 2001). Studies of more recent programs indicate that barriers to their success remain (Deakin et al., 2010). Much like ordinary carpool matching programs, the incentives have seldom matched the benefits of reduced monetary and time costs compared to other travel modes (Deakin et al., 2010).

Two recent incarnations of ridesharing applications – one private and one public – have exploited improvements in technology and user comfort with digital platforms. They also help solve problems of information asymmetry, which increase the transaction costs of coordinating with strangers (National Academies of Sciences, Engineering, and Medicine, 2016). One Shared Offered poster I spoke to mentioned using Waze Carpool, an application owned by Google that targeted workplace commutes. It charged users a small fee and required some exchange of money (much like BlaBlaCar). However, Google ended the service in 2022, with the company citing the COVID-19 pandemic as the reason for its closure (Malik, 2022). And in 2022, six agencies in the San Francisco Bay Area created Merge, a free ride-matching service that seeks to mitigate traffic congestion and reduce greenhouse gas emissions (Metropolitan Transportation Commission, 2022). Because the program is new, planners have not yet assessed its effectiveness. But even if Merge successfully matches San Francisco Bay Area commuters, creating similar programs for interregional trips raises questions about agency responsibility. Determining responsibility could be particularly challenging for interstate trips. Still, multiple Craigslist rideshare respondents expressed interest in technologies to enhance the matching process. Policymakers should explore their potential to increase vehicle-sharing.

Second, while Craigslist posters had limited success finding rides, they also anticipated that rideshare could offer substantial financial and accessibility benefits. Ride Wanted posters, in particular, experienced transportation disadvantage and met with a poor supply of formal intercity transportation options. But as I stated in Chapter 4, building an expansive intercity transportation system is not an efficient use of resources in most areas of the U.S. Meanwhile, many drivers – who do *not* post on Craigslist – travel long distances with empty seats. Public policies could encourage drivers to offer these spots to other travelers, including by highlighting the potential to

save money via sharing. Raising the cost of driving alone, including via distance-based road pricing, could increase supply *and* demand for informal ridesharing (Cavallaro et al., 2018). This would then enhance the efficiency of the matching process. Further, expanding the number and types of people who share – thus reducing transportation stigma (Schweitzer, 2014) – may enhance ridesharing’s appeal. However, simply dramatically increasing the cost of driving to motivate sharing could make some people – particularly those facing transportation disadvantage – worse off. Many trips are not currently amenable to sharing with strangers. Thus, policymakers might selectively implement road pricing and offer vouchers or return revenue to low-income people (D. King et al., 2007; Manville & Goldman, 2018). This could ensure that distance-based pricing does not reduce mobility for disadvantaged travelers, but that it does encourage more efficient use of automobiles.

Third, while personal characteristics orient people toward sharing, experience also plays a role. Frequent ridesharers spoke fondly of their past sharing experiences. Their testimonies help combat the negative perceptions of ridesharing as solely associated with sexual violence or deviance. This may explain the divergences between firsthand and secondhand experiences of ridesharing. Researchers have argued that negative depictions helped hasten the decline of hitchhiking’s popularity in the mid-20th century (Chesters & Smith, 2001; Mahood, 2016). Yet researchers find that most hitchhikers and casual carpoolers report no firsthand experiences of violence (Greenley & Rice, 1974; Rinvoluceri, 1975; Zmud & Rojo, 2013). This suggests a mismatch between perceptions of danger and the likelihood of experiencing physical harm when ridesharing with strangers.

Moving forward, the COVID-19 pandemic presents a challenge for ridesharing’s future. Even before the pandemic, studies identified perceptions of physical contamination as dissuading

people from sharing with strangers in carsharing and other access-based services (Hazée et al., 2019). Concerns about germs and cleanliness only grew during the global pandemic (Kiriazes & Edison Watkins, 2022). Further, norms appear to strongly influence informal sharing practices (including via exposure in one's social group) (Greenley & Rice, 1974). Thus, ridesharing may struggle to combat negative perceptions resulting from the pandemic.

In transitioning from this era, planners should consider policies to facilitate learning to rideshare. Scholars have found that childhood exposure to non-automobile modes of travel like public transit increases the likelihood of using these modes later in life (Smart & Klein, 2018). Like programs that offer subsidized passes to children and create a “habit” of riding public transit, agencies might pursue opportunities to increase ridesharing among younger travelers. These opportunities could include, for example, efforts to encourage ridesharing among university students, where “strangers” maintain membership in a common group. As with the female university hitchhikers surveyed in the early 1970s (Greenley & Rice, 1974), exposure to the practice may help new travelers gain skill and confidence to rideshare effectively and enjoyably. Similar programs could benefit shared formal travel modes like public transit. Public transit ridership in the U.S. has struggled to recover since the start of the COVID-19 pandemic (Paul & Taylor, 2022). Public interventions could help travelers re-learn to share, overcoming their anxieties much like casual carpoolers do.

Fourth, the experiences of Commercial providers suggest that gig economy workers face unfavorable working conditions. Commercial posters regularly expressed dissatisfaction with the compensation they received driving for Uber and Lyft. In one interview, a former ridehail driver calculated exactly the fare a passenger would pay to travel between two cities and the price the driver would receive (which she stated was 50% of the full fare). She then accused the companies

of “only working for the consumer, not the driver” [I-52]. These problems may solve themselves: if ridehail companies cannot solve the mismatch between what drivers earn and what riders will pay (without subsidizing fares), their business models may simply collapse (Grabar, 2022). In the meantime, more Commercial providers may turn away from the formal platform economy – and to informal websites like Craigslist – to make money. Policymakers should anticipate whether this poses challenges or opportunities for the U.S. transportation system.

7. Conclusion

This essay has explored the factors that contribute to successful ridesharing via Craigslist, the perceived risks and rewards of sharing, and how people manage uncertainty in informal environments. In the next chapter, I synthesize findings from the three essays. I conclude by addressing related issues that deserve further study.

CHAPTER 6 – Conclusion. *Why not study automobile sharing?*

High rates of automobile travel in the U.S. occasion substantial benefits to travelers. In doing so, however, they impose large costs on individuals and society. The ubiquity of the automobile has increased gaps between mobility haves and have-nots in the U.S. (D. A. King et al., 2019). Meanwhile, transportation professionals have sought to increase access by, among other strategies, increasing vehicle-sharing via public transit. Less frequently and with fewer resources, they have attempted to increase private vehicle-sharing, including by instituting high-occupancy vehicle (HOV) and high-occupancy toll (HOT) lanes and requiring employers to establish carpool and vanpool programs. Yet despite these efforts, many empty seats remain in cars both traveling and at rest. Increasing rates of *sharing in* and *sharing out* can help fill these seats and increase access for millions of Americans without placing more vehicles on the road.

The three essays in this dissertation address how informal automobile sharing offers utility to travelers in different situations. The costs and benefits of informal sharing vary by the person, her resources, and her travel needs. In Essay 1, I find that many Americans already engage in informal vehicle-sharing, especially with household members. Further, transportation disadvantage – in terms of reduced vehicle access, travel-limiting medical conditions, and poverty – has a strong association with automobile sharing. This is particularly true in cases of sharing resources across households. However, situational factors related to the individual trip – particularly non-work travel needs – better predict informal sharing than disadvantage does.

Essays 2 and 3 provide additional insight into a unique and understudied form of vehicle-sharing. The Craigslist rideshare board offers one venue through which strangers may connect to share. While it entails many transaction costs, informal sharing with strangers may benefit travelers financially and even socially. Ridesharing with strangers appears to best compete with formal

sharing modes for longer-distance trips. Among the Craigslist posts I analyze in Essay 2, most offering and requesting parties explicitly mentioned financial compensation for travel, sometimes alongside socioemotional benefits like opportunities to socialize. Several posters offering rides for pay also expressed dissatisfaction with the compensation they received from ridehail companies; they thus turned to Craigslist and created new informal markets for transportation. Posting patterns also suggest unmet demand for shared travel in parts of California, including within the Fresno region and to casinos throughout the San Joaquin Valley.

But despite strong demand for shared travel on the Craigslist rideshare board, a minority of posters I surveyed and interviewed received rides from their posts. This was particularly true of people seeking rides, many of whom reported experiencing economic hardship. Survey respondents and interviewees also provided an array of perspectives on the risks and rewards of sharing with strangers, reflecting idiosyncratic mobility biographies. Many respondents mentioned fears about sexual violence and physical danger as ultimately dissuading them from traveling with strangers; others reported effectively using heuristics to manage risk. Finally, some longtime ridesharers expressed concerns about the long-term viability of sharing with strangers in small spaces, given lingering concerns from the COVID-19 pandemic. Findings from interviews and surveys also illuminate the time and effort under-resourced people regularly put into getting rides through informal channels.

Future research directions

Given its prevalence, there is a need for additional research on informal vehicle-sharing. This holds especially true in the rapidly changing U.S. transportation context, where declines in public transit ridership and access to ride-matching applications have changed how people travel. The 2020s have also seen rising inflation, increased suburbanization, and growing rates of working

from home. Continued work on informal vehicle-sharing and poverty, including in the contexts of these changes, may help inform efforts to reduce transportation equity.

The rise of the platform economy also offers an opportunity to reconsider transportation sharing. Some critics argue that the platform economy is simply a reorganization of existing services, with ridehail replacing taxi services and Airbnb replacing hotels (Acquier et al., 2017). Yet if in nothing more than its marketing strategies, the platform economy has brought the transformational potential of sharing access to the forefront of consumers' and users' minds. This, in turn, may facilitate new norms around sharing. Future research should further address whether platforms have changed how people feel about sharing transportation with strangers, including outside of profit-making enterprises.

Scholars of shared transportation should also continue to examine how past travel experiences influence future behaviors. To do so requires gathering data via extended interviews and surveys with travelers. These approaches require time and money. Meanwhile, urban planners increasingly rely upon big data to make sense of complex phenomena. Big data certainly allow professionals to react quickly and cost-effectively to identify, for example, widespread changes in traffic volumes. Yet researchers enthusiastic about big data must understand not only its opportunities but also its shortcomings. I am not the first person to state, of course, that big data can answer questions about *what* people do, but not *why* they do it. Still, surveys and interviews with people – despite their costs – are necessary for social scientists and planners to answer interesting and meaningful questions. Mixed methods like the ones I use in this dissertation offer one approach to grappling with complex social issues.

Transportation policy and the Middle Way

Informal automobile sharing may offer “low-hanging fruit” for policy efforts to address the mobility limitations that disadvantaged travelers face. Informal vehicle-sharing can increase access to vital goods and services for these travelers while minimizing the negative impacts of car travel on the environment. However, public policies tend to reflect what public sector actors see as their traditional domains. In the past, transportation professionals and policymakers have used certain mechanisms to influence travel behavior. In the case of vehicle-sharing in the U.S., the typical approach has been to incentivize shared travel (for example, via providing heavily subsidized transit fares or building carpool lanes) rather than to require non-shared travelers to pay for the social costs of driving (for example, via congestion pricing for automobiles) (Meyer, 1999). But these efforts have met with limited success in increasing mobility and reducing congestion in the U.S.

Some policies that might facilitate sharing – such as increasing the cost of driving and thus increasing the pool of potential sharers – are not politically popular in the U.S. (D. King et al., 2007). Yet sharing may offer great value to people with limited resources and to society. Informal ridesharing with strangers partly fails due to a limited supply of travelers willing to share empty seats in private cars while going to the same places at the same times. Incentivizing more people to share, then, could increase the efficiency of the matching process among U.S. travelers. Further, raising the costs of solo driving, over the long term, may facilitate a denser and more compact built environment conducive to sharing.

In addition to the influence of the transportation policy context, personal factors – and positionality – may explain the limited research on informal vehicle-sharing. As I noted early on, transportation research disproportionately addresses non-automobile travel, despite the reality of how U.S. residents currently move around. Part of this reflects the “egocentric self-anchoring” that

Ralph and Delbosc (2017) identified as prevalent among transportation professionals. Via surveys, Ralph and Delbosc (2017) found that transportation planners and engineers reported using non-automobile modes such as transit and walking and lived in urban areas more often than the average American does. Further – and likely as a result – multimodal transportation professionals also underestimated the proportion of Americans who drive for most trips (Ralph & Delbosc, 2017). This suggests a disconnect between the perspectives of transportation professionals and the actual lived experiences of most U.S. travelers.

These biases extend beyond professionals and into the academic community. Some of this affects the student body. For example, in surveying transportation planning and engineering students in the U.S., Ralph et al. (2022) identified a remarkable level of homophily in the values held by planning students. A supermajority of them believed, for example, that public policies should reduce reliance on automobiles, increase public transit access, and shift trips from driving to active modes or public transit (Ralph et al., 2022). These rates of support were much higher than those among the general public (Ralph et al., 2022). Student beliefs may diverge from faculty opinions. However, the planning pedagogy often emphasizes the transformative potential of non-automobile travel and underappreciates the value of informal ridesharing.

Beyond personal experiences and interests dictating research and policy priorities, visibility and novelty may influence the priorities that urban planners set. On the first point, the very ubiquity of informal sharing may obscure its potential as a tool for change. People may overlook, for example, the empty seats in cars and more directly notice the empty seats on buses; the phenomenon of noticing novel things also reflects the prevalence of “selective attention” (Johnston et al., 1990). This occurs, of course, when elected officials court the attention of their constituents via “ribbon-cutting” opportunities (Taylor, 2004). However, prizing novelty can occur

in less cynical manifestations. Most planners and professionals want to make an impression on the landscape. Building and seeing new projects and infrastructure, such as subway lines and protected bicycle lanes, may satisfy the personal need to influence the built environment, in a way that changing the use of existing resources may not. For many urban planners, researchers, and policymakers, carpooling and ridesharing are not particularly sexy solutions to stubborn problems.

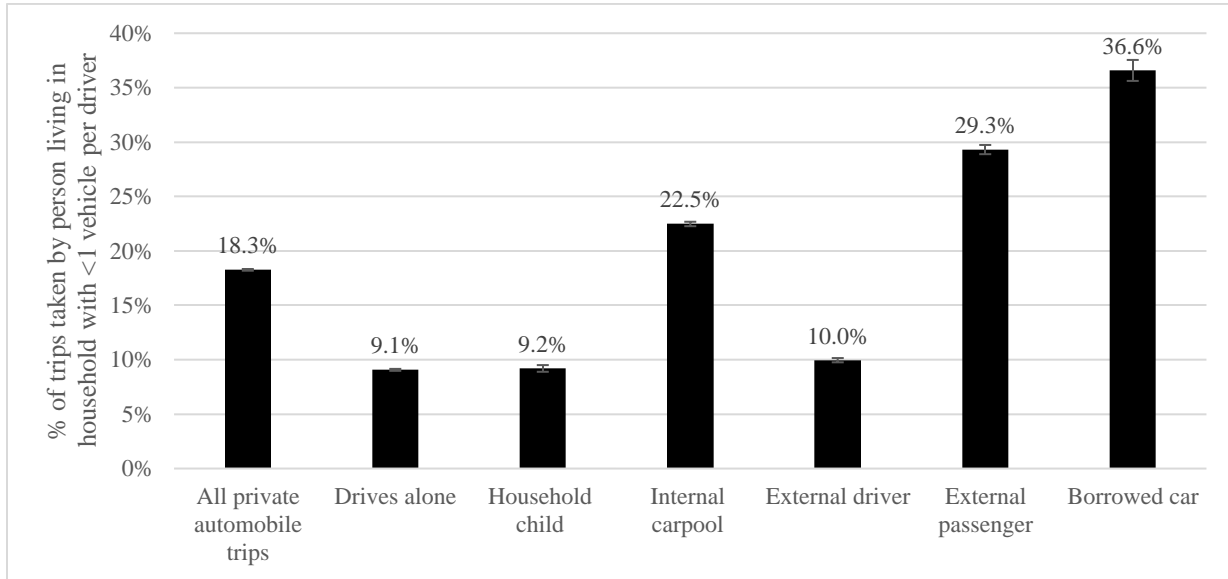
It is both understandable and laudable that many urban planners look to multimodal options to address equity challenges while minimizing impacts on the environment. However, overemphasizing non-automobile modes in research – and championing modes that inefficiently serve many U.S. neighborhoods – may prevent planners from rapidly and efficiently meeting the needs of disadvantaged travelers. Planning professionals should certainly provide alternatives to the automobile for those who want them. But they must also acknowledge the urgency of redressing inequality in transportation access in the U.S.

In introducing the anti-fanatical and “palatable” nature of Zen Buddhist philosophy, Alan Watts (1957) explains,

All forms of Buddhism subscribe to the Middle Way between the extremes of angel (deva) and demon (preta), ascetic and sensualist, and claim that supreme “awakening” or Buddhahood can be attained only from the human state (p.30).

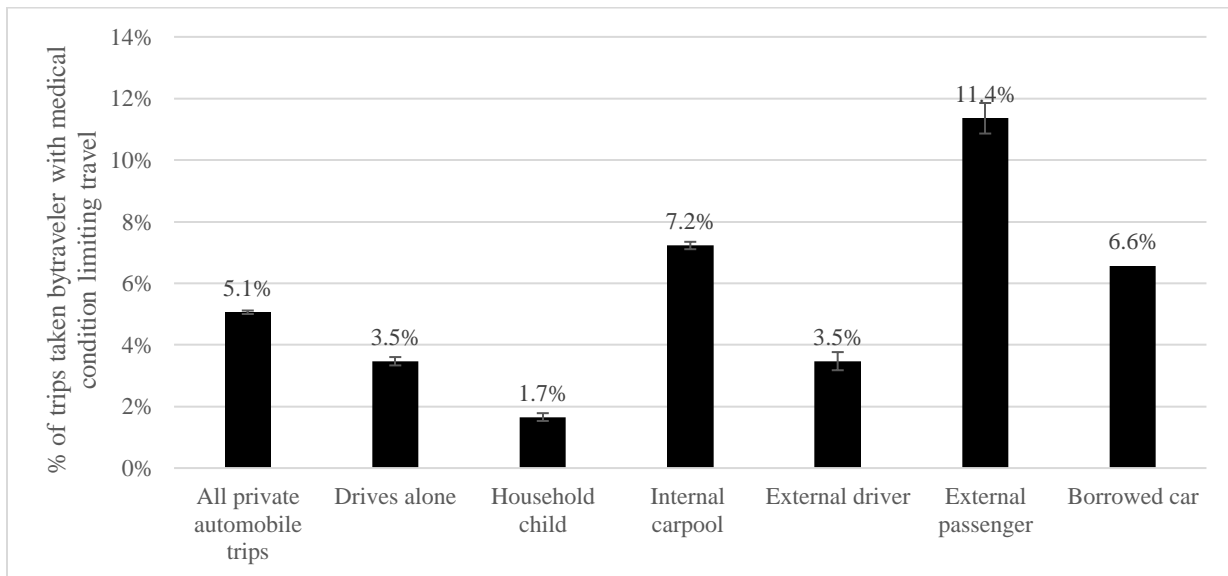
Perhaps informal vehicle-sharing is not the sensual type of shared mobility that can capture the imagination of some urban planners. But in its many forms – carpooling, ridesharing, and borrowing cars – informal vehicle-sharing may offer one such Middle Way.

Figure 26 *Traveler vehicle access by automobile trip type*



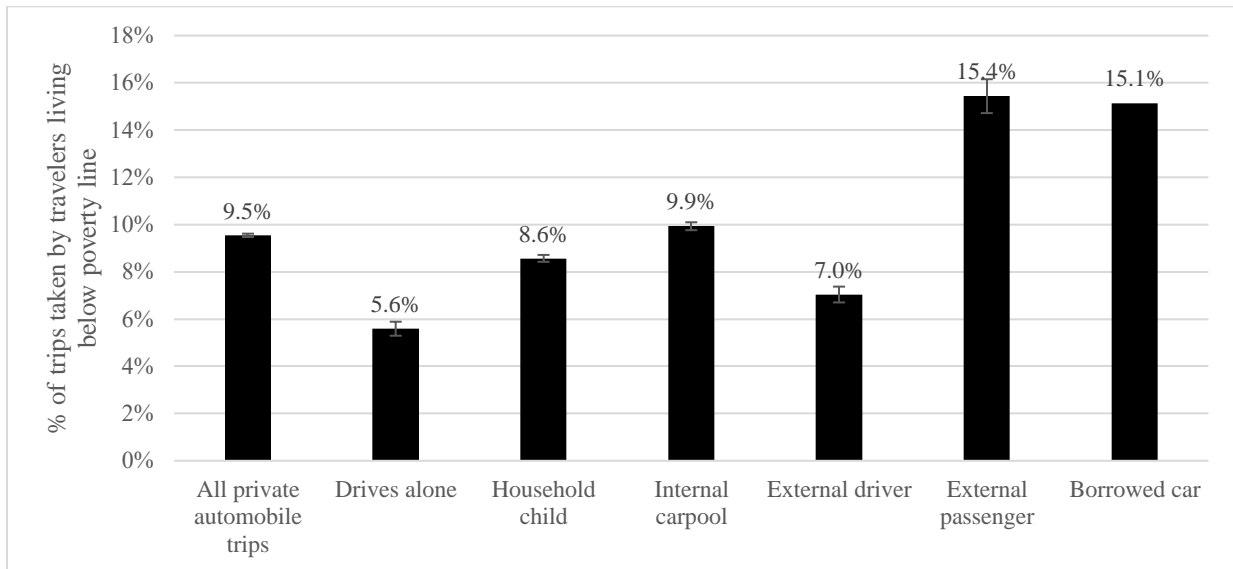
Note. Error bars indicate 95% Confidence intervals.

Figure 27 *Traveler medical condition by automobile trip type*



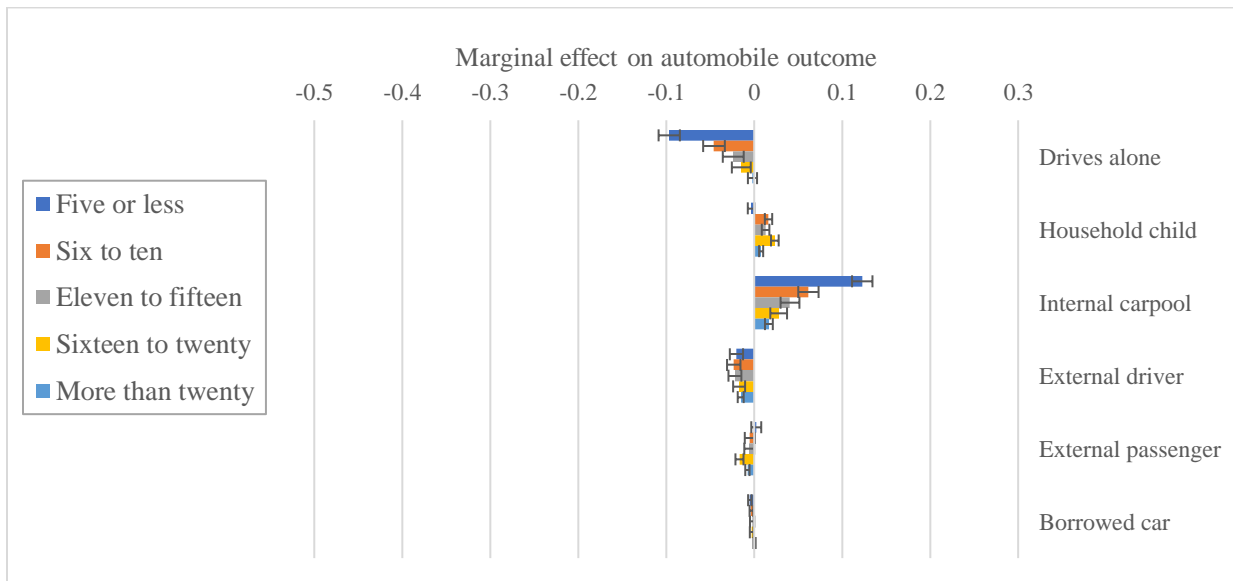
Note. Error bars indicate 95% Confidence intervals.

Figure 28 *Traveler poverty status by automobile trip type*



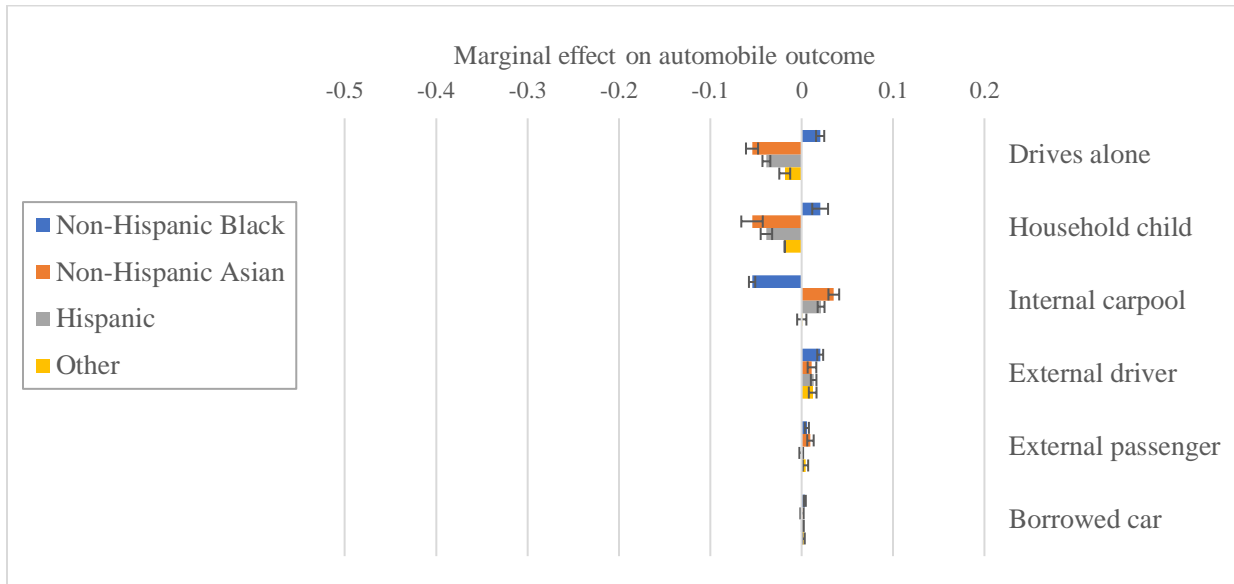
Note. Error bars indicate 95% Confidence intervals.

Figure 29 *Marginal effects of years of residence on average probability of travel sharing type*



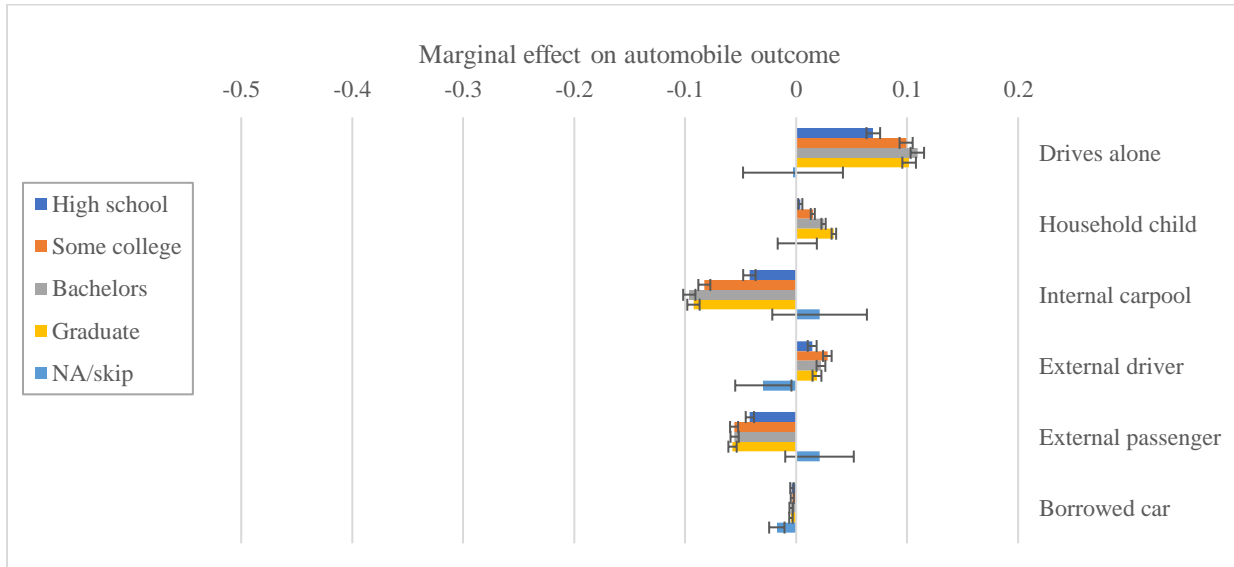
Note. Reference category is native-born. Error bars indicate 95% Confidence intervals.

Figure 30 Marginal effects of race/ethnicity on average probability of travel sharing type



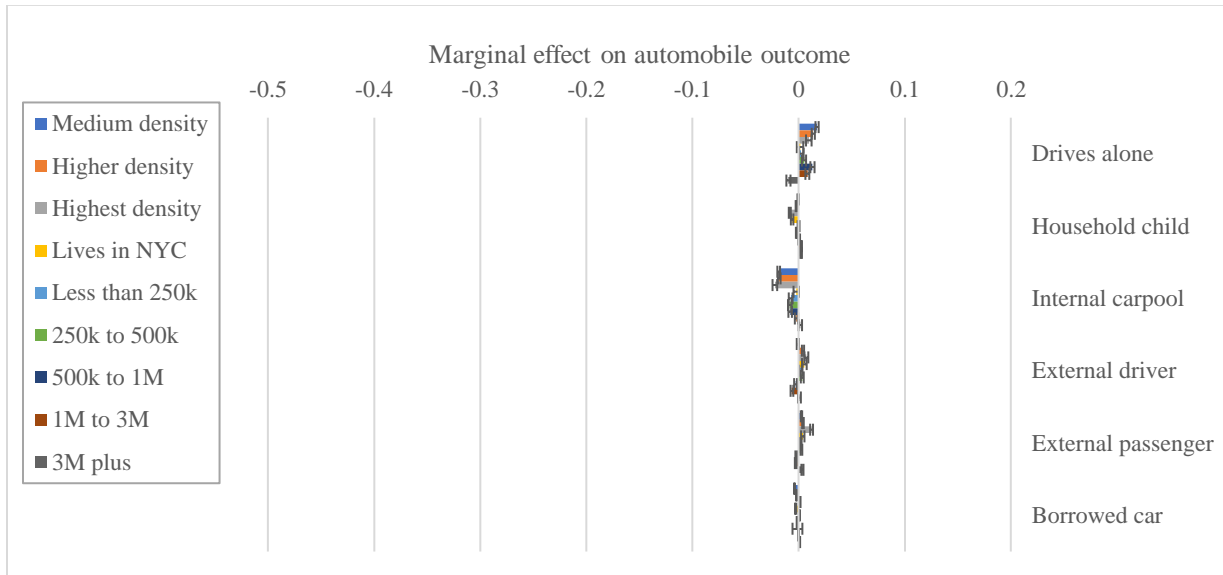
Note. Reference category is non-Hispanic white. Error bars indicate 95% Confidence intervals.

Figure 31 Marginal effects of education level on average probability of travel sharing type



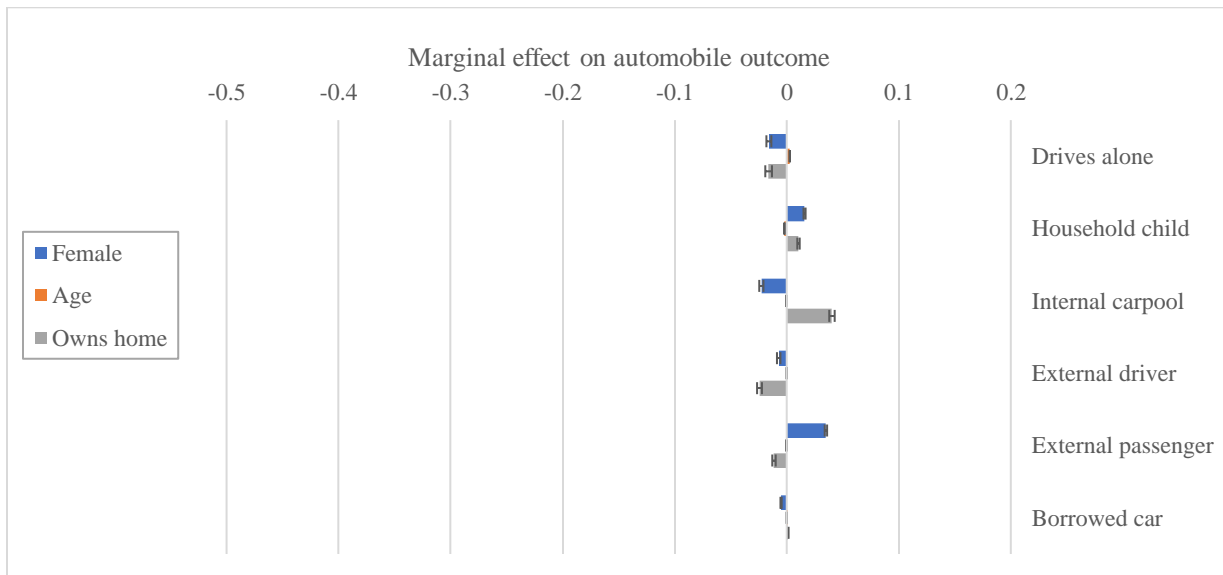
Note. Reference category is having less than high school education. Error bars indicate 95% Confidence intervals.

Figure 32 Marginal effects of residential population density, MSA size, and residence in New York City metropolitan area on average probability of travel sharing type



Note. Reference categories are living in a low population density area, not living in the New York City metropolitan area, and living outside of an MSA. Error bars indicate 95% Confidence intervals.

Figure 33 Marginal effects of sex, age, and homeownership on average probability of travel sharing type



Note. Reference categories are being male and not owning a home; age is continuous. Error bars indicate 95% Confidence intervals.

Table 16 *Difference-in-means tests of measures of transportation disadvantage (private automobile trips versus other trips)*

| Measures of transportation disadvantage | Private automobile trip | Other trips | P value, difference in means test |
|--|-------------------------|-------------|-----------------------------------|
| <i>Automobile access</i> | | | |
| Lives in zero-vehicle household | 1.42% | 25.40% | p<.001 |
| Lives in vehicle deficient household | 14% | 42% | p<.001 |
| Household vehicles-per-driver (average) | 1.12 | 0.768 | p<.001 |
| <i>Physical limitations</i> | | | |
| Has a medical condition that limits travel | 4.80% | 6.30% | p<.001 |
| <i>Financial constraints</i> | | | |
| Household income (median) | 50k to 75k | 50k to 75k | NA |
| Lives below the poverty line | 7.80% | 15.80% | p<.001 |
| Lives below 200% of the poverty line | 23% | 32% | p<.001 |

Table 17 *Income categories for poverty status*

| Household members (n) | Poverty line (2017) | Cutoffs (Categorical variable from NHTS) |
|-----------------------|---------------------|--|
| 1 | 12,060 | \$10,000 |
| 2 | 16,240 | \$15,000 |
| 3 | 20,420 | \$25,000 |
| 4 | 24,600 | \$25,000 |
| 5 | 28,780 | \$25,000 |
| 6 | 32,960 | \$35,000 |
| 7 | 37,140 | \$35,000 |
| 8 | 41,320 | \$35,000 |
| 9 | 45,500 | \$50,000 |
| 10 | 49,680 | \$50,000 |
| 11 | 53,860 | \$50,000 |
| 12 | 58,040 | \$50,000 |
| 13 | 62,220 | \$50,000 |

Table 18 Summary of difference-in-means tests of automobile trip types by disadvantage factors

| | Automobile deficiency | Medical condition | Poverty line |
|--------------------|-----------------------|-------------------|--------------|
| Drives alone | (-) ^a | (-) | (-) |
| Household child | (-) | (-) | (-) |
| Internal carpool | (+) | (+) | (+) |
| External driver | (-) | (-) | (-) |
| External passenger | (+) | (+) | (+) |
| Borrowed car | (+) | (+) | (+) |

Note. All two tailed T-tests are significant at $p < .001$.

Table 18 summarizes the results from a series of t-tests comparing rates of traveler disadvantage among all private automobile trips versus the sharing subtype. For example, ^a indicates that among *Drives alone* trips, the rate of automobile-deficient travelers is lower than among all other automobile trips (at $p < .001$). Compared to all private auto trips, *Drives alone*, *Household child*, and *External driver* trips are made by people with lower rates of disadvantage (across all three measures), while the reverse is true for the other three types of sharing trips. Figure 26, Figure 27, and Figure 28 also illustrate these relationships, including means and 95% confidence intervals.

Table 19 Likelihood of informal automobile sharing relative to driving alone based on binary measure of transportation disadvantage (Multinomial probit model A)

| | Household child | Internal carpool | External driver | External passenger | Borrowed car |
|------------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Transportation disadvantage status | 0.108*** (0.009) | 0.656*** (0.006) | 0.151*** (0.007) | 0.788*** (0.007) | 0.703*** (0.011) |

| | | | | | |
|---------------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
| Constant | -1.694*** (0.004) | -0.839*** (0.003) | -1.138*** (0.003) | -1.687*** (0.004) | -2.438*** (0.006) |
| Observations | 737,812 | | | | |
| Chi-square (degrees of freedom: 5) | 21,295.67 | | | | |
| Log-likelihood | -939,813.94 | | | | |

Note. Standard errors in parentheses. *, **, *** indicates significance at the 90%, 95%, and 99% level, respectively.

Table 20 Likelihood of informal automobile sharing relative to driving alone based on trip purpose only (Multinomial probit model B)

| Independent variables | Household child | Internal carpool | External driver | External passenger | Borrowed car |
|---|----------------------|----------------------|----------------------|----------------------|----------------------|
| <u>Trip purpose</u> (Reference: Commute/work-related trips) | | | | | |
| Shopping/maintenance | 0.863*** (0.019) | 1.896*** (0.013) | 0.597*** (0.011) | 1.313*** (0.021) | -0.015 (0.029) |
| School/church/daycare | 1.034*** (0.032) | 2.431*** (0.017) | 0.794*** (0.020) | 2.076*** (0.027) | 0.336*** (0.053) |
| Healthcare | 0.827*** (0.039) | 2.202*** (0.019) | 0.569*** (0.025) | 1.789*** (0.032) | 0.088 (0.069) |
| Social/recreation | 1.084*** (0.021) | 2.491*** (0.013) | 1.165*** (0.012) | 2.336*** (0.020) | 0.619*** (0.029) |
| Transporting someone | 2.963*** (0.021) | 2.034*** (0.018) | 1.970*** (0.015) | 1.810*** (0.029) | 0.276*** (0.055) |
| Other | 0.070 (0.053) | 1.816*** (0.021) | 0.837*** (0.022) | 1.964*** (0.030) | 1.694*** (0.037) |
| Constant | -3.469*** (0.016) | -2.743*** (0.012) | -2.231*** (0.009) | -3.717*** (0.019) | -4.011*** (0.021) |
| Observations | 737,812 | | | | |
| Chi-square (degrees of freedom: 30) | 106,291.12 | | | | |
| Log-likelihood | -897,196.34 | | | | |

Note. Standard errors in parentheses. *, **, *** indicates significance at the 90%, 95%, and 99% level, respectively.

Table 21 Likelihood of informal automobile sharing relative to driving alone based on binary measure of transportation disadvantage, trip purpose, and interaction of the two (Multinomial probit model C)

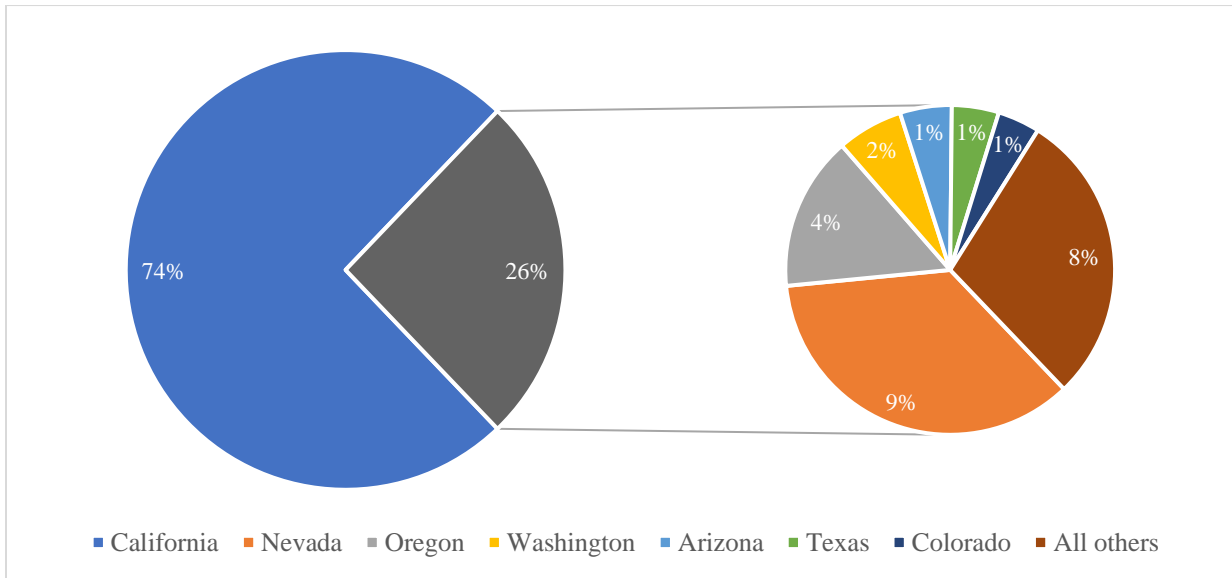
| Independent variables | Household child | Internal carpool | External driver | External passenger | Borrowed car |
|---|----------------------|----------------------|----------------------|----------------------|----------------------|
| Transportation disadvantage status | 0.091*** (0.031) | 1.068*** (0.018) | 0.127*** (0.021) | 1.057*** (0.023) | 0.866*** (0.026) |
| <u>Trip purpose</u> (Reference: Commute/work-related trips) | | | | | |
| Shopping/maintenance | 0.660*** (0.011) | 1.416*** (0.009) | 0.527*** (0.008) | 0.892*** (0.013) | 0.198*** (0.017) |
| School/church/daycare | 0.843*** (0.019) | 1.866*** (0.013) | 0.704*** (0.014) | 1.396*** (0.018) | 0.386*** (0.032) |
| Healthcare | 0.693*** (0.024) | 1.576*** (0.017) | 0.528*** (0.019) | 1.005*** (0.025) | 0.065 (0.048) |
| Social/recreation | 0.910*** (0.012) | 1.946*** (0.009) | 0.973*** (0.008) | 1.658*** (0.013) | 0.708*** (0.016) |
| Transporting someone | 2.099*** (0.014) | 1.579*** (0.014) | 1.551*** (0.012) | 1.417*** (0.018) | 0.623*** (0.029) |
| Other | 0.272*** (0.028) | 1.331*** (0.017) | 0.677*** (0.017) | 1.348*** (0.021) | 1.178*** (0.023) |
| <u>Interactions</u> | | | | | |
| Shopping/maintenance * transportation disadvantage | -0.009 (0.035) | -0.487*** (0.021) | -0.040* (0.024) | -0.271*** (0.026) | -0.121*** (0.033) |
| School/church/daycare * transportation disadvantage | -0.058 (0.052) | -0.586*** (0.030) | 0.003 (0.037) | -0.263*** (0.036) | 0.051 (0.054) |
| Healthcare * transportation disadvantage | -0.123** (0.058) | -0.390*** (0.032) | -0.027 (0.041) | -0.005 (0.041) | 0.188*** (0.067) |
| Social/recreation * transportation disadvantage | -0.085** (0.038) | -0.633*** (0.022) | -0.063** (0.025) | -0.437*** (0.027) | -0.286*** (0.035) |
| Transporting someone * transportation disadvantage | -0.271*** (0.040) | -0.492*** (0.029) | -0.094*** (0.031) | -0.598*** (0.037) | -0.353*** (0.055) |
| Other * transportation disadvantage | 0.293*** (0.076) | -0.136*** (0.038) | 0.194*** (0.045) | -0.257*** (0.046) | -0.352*** (0.054) |
| Constant | -2.441*** (0.009) | -2.215*** (0.008) | -1.753*** (0.007) | -2.736*** (0.011) | -2.826*** (0.012) |

| | |
|-------------------------------------|-------------|
| Observations | 737,812 |
| Chi-square (degrees of freedom: 65) | 114,001.35 |
| Log-likelihood | -887,004.03 |

Note. Standard errors in parentheses. *, **, *** indicates significance at the 90%, 95%, and 99% level, respectively.

Chapter 4

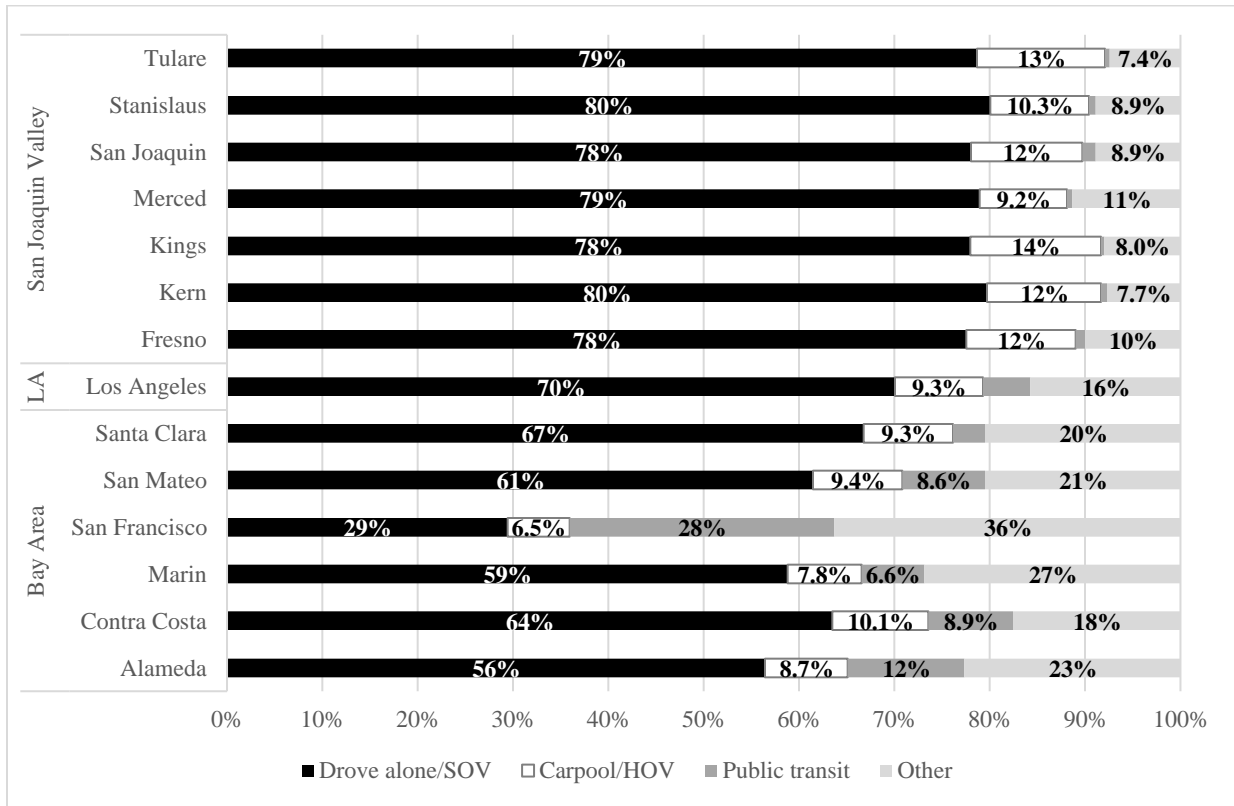
Figure 34 Top state destinations among rideshare posts



Note. Only includes posts with a single listed destination or range of destinations.

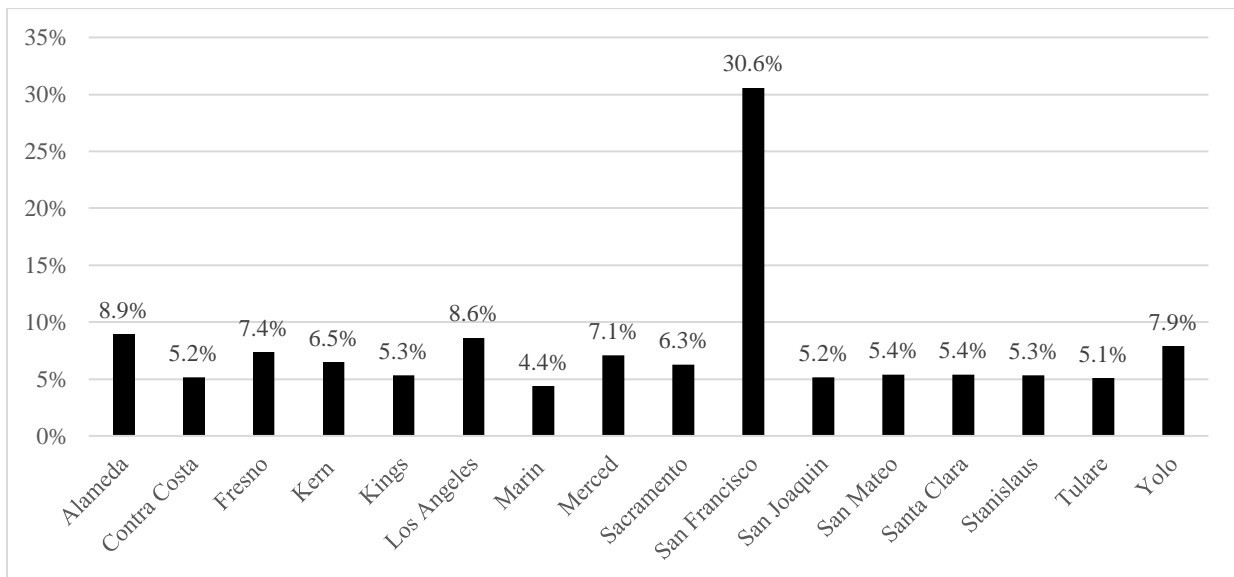
Figure 34 shows the distribution of state locations among posts with listed destinations for posts from Essay 2. Almost three-fourths of trips list destinations in California. Posts also had destinations in bordering states like Nevada (82), Oregon (34), and Arizona (11). Other common destinations include Washington (14), Texas (10), and Colorado (9). While a small minority, several posts listed destinations in the Midwest (12) or on the East Coast (12).

Figure 35 Commute-to-work mode among select California counties, 2017-2021



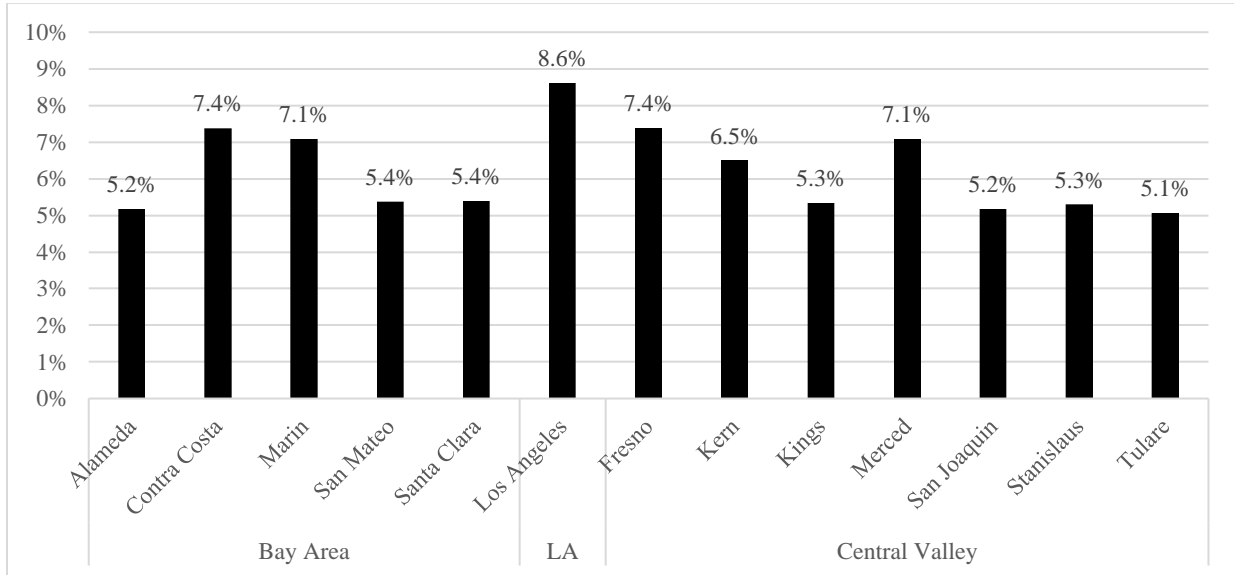
Note. Data source is U.S. Bureau of the Census (2021b)

Figure 36 Proportion of zero-vehicle households in Bay Area, Los Angeles, and San Joaquin Valley counties, 2017-2021



Note. Data source is U.S. Bureau of the Census (2021b)

Figure 37 Proportion of zero-vehicle households in Bay Area, Los Angeles, and San Joaquin Valley counties (excluding San Francisco County), 2017 to 2021



Note. Data source is U.S. Bureau of the Census (2021b)

Table 22 Application of codes to example post

| Category | Code | Type | Example codes |
|--------------|---------------------------|-------------|---------------|
| Post | Region | Categorical | Los Angeles |
| | Post type | Categorical | Ride Wanted |
| | Language | Categorical | English |
| | Sex | Categorical | NA |
| Trip aspects | Location | Categorical | Intracity |
| | Hauling only | Binary | No |
| | Time window | Categorical | Hour |
| | Destination (state) | Categorical | CA |
| Financial | Destination (city/region) | Categorical | Burbank |
| | Any compensation | Binary | Yes |
| | Specific dollar amount | Categorical | No |
| | Gasoline/fuel | Binary | Yes |
| | Driving | Binary | No |
| Personal | Trade | Binary | No |
| | Any personal information | Binary | No |
| | Name | Binary | No |
| | Gender/sex | Categorical | No |
| | Career | Binary | No |
| | Age | Categorical | No |

| | | | |
|--------------------|-----------------|--------|----|
| | Social media | Binary | No |
| | Socializing | Binary | No |
| | “Weird/creepy” | Binary | No |
| Negative | COVID | Binary | No |
| | Hygiene | Binary | No |
| | Drugs/alcohol | Binary | No |
| Operational safety | Driving ability | Binary | No |
| | Car make/model | Binary | No |

Table 23 *Top five destinations by region*

| Region | Top 5 destinations | Counts |
|------------------------|-------------------------|--------|
| San Francisco Bay Area | 1. Bay Area | 44 |
| | 2. Los Angeles | 38 |
| | 3. Humboldt County | 26 |
| | 4. Black Rock City | 25 |
| | 5. Sacramento | 25 |
| Los Angeles | 1. Bay Area | 49 |
| | 2. Los Angeles | 33 |
| | 3. Las Vegas | 25 |
| | 4. San Diego | 15 |
| | 5. Sacramento | 11 |
| Fresno | 1. Fresno | 12 |
| | 2. Bay Area | 6 |
| | 3. Casinos | 3 |
| | 4. Los Angeles | 3 |
| | 5. Sacramento | 3 |
| Bakersfield | 1. Bay Area | 5 |
| | 2. Southern U.S. states | 5 |
| | 3. Bakersfield | 4 |
| | 4. Las Vegas | 3 |
| | 5. Los Angeles | 3 |
| SF small towns | 1. Bay Area | 4 |
| <i>Hanford</i> | 2. Casinos | 3 |
| <i>Merced</i> | 3. Sacramento | 3 |
| <i>Modesto</i> | 4. Casinos | 2 |
| <i>Visalia/Tulare</i> | 5. San Diego | 2 |

Chapter 5

Table 24 *Text of initial messages sent to posters by post subtype*

| Post type | Text message |
|---------------|--|
| Ride Wanted | <p>Hello, my name is ____, and I am a UCLA student studying transportation and saw your Craigslist ad. I am curious whether (1) your ride took place, (2) if it took place with someone who contacted you via CL, (3) you exchanged any money with the other traveler, and/or (4) if there was anything that made you feel comfortable arranging that ride. Thanks in advance for your response!</p> |
| Shard Offered | <p>Hello, my name is ____, and I am a UCLA student studying transportation and saw your Craigslist ad. I am curious whether (1) your ride took place, (2) if it took place with someone who contacted you via CL, (3) you exchanged any money with the other traveler, and/or (4) if there was anything that made you feel comfortable arranging that ride. Thanks in advance for your response!</p> |
| Commercial | <p>Hello, my name is ____, and I am a UCLA student studying transportation and saw your Craigslist ad. I am curious whether (1) you gave a person a ride, (2) if there was anything that made you feel comfortable arranging that ride. Thank you and have a lovely day!</p> |

Table 25 *Text response rate by region*

| Region | Contacted | Usable Responses | Response rate |
|------------------------|-----------|------------------|---------------|
| Bakersfield | 8 | 5 | 63% |
| Fresno | 33 | 9 | 27% |
| Los Angeles | 44 | 16 | 36% |
| Merced | 1 | 0 | 0% |
| Modesto | 6 | 1 | 17% |
| Sacramento | 44 | 15 | 34% |
| San Francisco Bay Area | 43 | 15 | 35% |
| Stockton | 7 | 1 | 14% |
| Visalia | 4 | 1 | 25% |
| All posts | 190 | 63 | 33% |

Table 26 *Text response rate by post type*

| Post type | Contacted | Usable Responses | Response rate |
|----------------|-----------|------------------|---------------|
| Ride Wanted | 58 | 18 | 31% |
| Shared Offered | 71 | 26 | 36% |
| Commercial | 61 | 19 | 30% |
| All posts | 190 | 63 | 33% |

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