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The Taxi: Friend or Foe? Understanding Planners' Perceptions of the Taxi Industry

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The Taxi: Friend or Foe?

Understanding Planners' Perceptions of the Taxi Industry

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ABSTRACT OF THE THESIS

The Taxi: Friend or Foe?

Understanding Planners' Perceptions of the Taxi Industry

by

Earl Kim Kaing

Master of Urban and Regional Planning

University of California, Los Angeles, 2012

Professor Brian D. Taylor, Chair

The story of the taxi in the system of urban mobility is a story of so much unmet potential: There are many opportunities for taxis to play a much larger role in urban mobility, and yet, transportation planners have by and large overlooked these opportunities in practice. In this thesis, I examine whether perceptions—internalized and likely unexamined assumptions about the taxi, largely false—are to blame. I highlight seven commonly held misconceptions about the taxi, and survey a sample of 133 transportation planners to gauge the extent to which these misconceptions are held to be true. The results of the survey at least partially confirm the hypothesis. Taxis appear to be viewed as neither friend nor foe: an isolated industry divorced from transportation concerns, rather than a true partner in a comprehensive system of urban mobility.

The thesis of Earl Kim Kaing is approved.

Vinit Mukhija

Martin Wachs

Brian D. Taylor, Committee Chair

University of California, Los Angeles

2012

To mom and dad – for this gift that I will forever struggle to comprehend

And to 上海 – where I learned to walk

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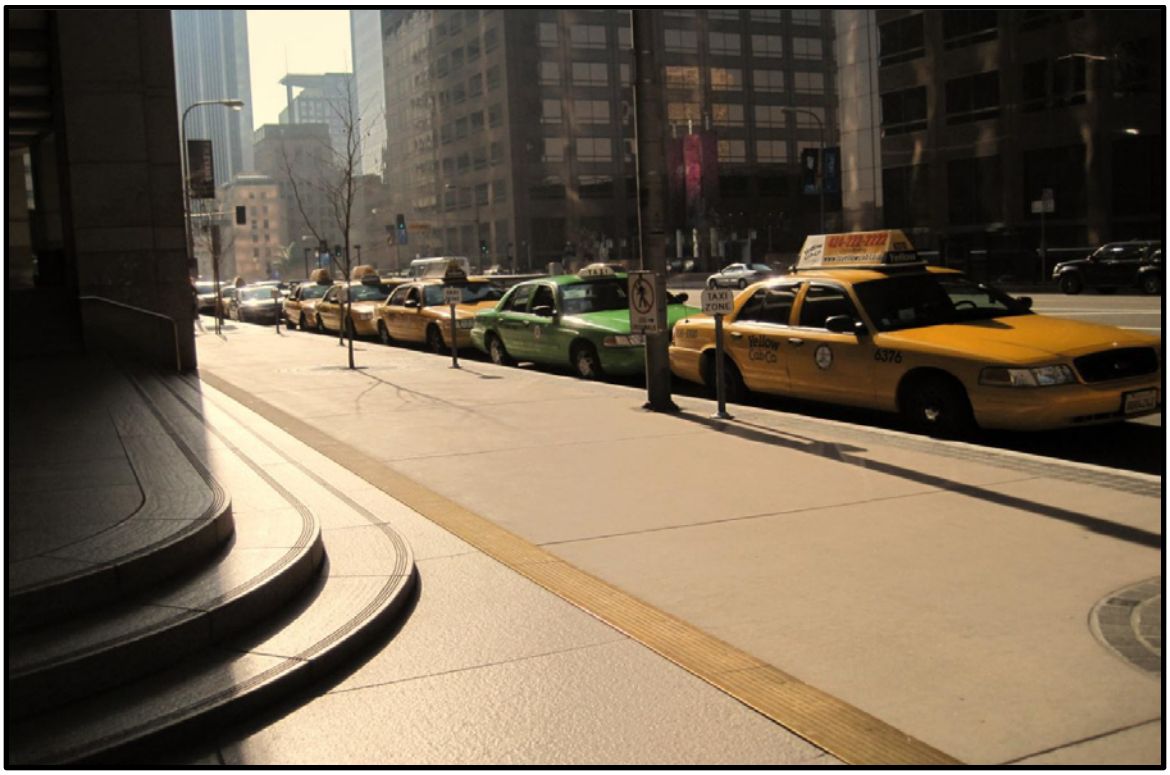

Taxis "standing" curbside in the Bunker Hill neighborhood of Downtown Los Angeles. *(Source: Author)*

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CHAPTER I. INTRODUCTION

Anne Vernez Moudon, Professor of Urban Design and Planning at the University of Washington, argues that "the car is not the enemy, nor is the elimination of cars the solution. It is our societal bias toward cars that must be questioned." The problem, in other words, is not automobile technology—but automobile *dependency*.

The problem of automobile dependency is not that the car expanded metropolitan footprints, but that people enacted policies which expanded these footprints too far. These policies channeled growth away from what were formerly fine-grained, densely built landscapes, toward a new pattern of porous and sprawling development—stretched thin by multi-lane arterials, high-capacity freeways, and ample free parking. The inflated scale of these new urban landscapes makes walking unpleasant (if not impossible), transit impractical (and not very cost effective), taxis too expensive, and thus leaves residents with little choice but to drive.

Correcting these policies is difficult because the economics of car ownership creates a political constituency that opposes change. It is difficult to convince car owners—who make up the vast majority of Americans, and who rely on automobiles for the vast majority of their trips—to support policies that would make it more expensive than it already is to own and operate their cars, or that would—in the short-run at least—increase congestion and make it unpleasant to drive. Thinking about automobile dependency this way highlights the political dimension to the problem, and thus suggests a political solution.

In this thesis, I explore the taxi as one such political solution. I begin in Chapter 2 by reframing automobile dependency as a political problem, arguing that by filling a gap in urban mobility that would otherwise be bridged through car ownership, the taxi helps build the political constituency needed to reshape urban transportation policy for the better. Chapter 3 provides a

brief empirical overview of the taxi as an industry and as a contemporary mode of transportation. In Chapter 4, I highlight the potential of the taxi as explored by paratransit and combined mobility scholars, and then in Chapter 5, examine reasons for why this potential has for so long remained largely unmet. I argue that it is not simply a matter of regulations suppressing opportunity, and that taxis are actually overlooked as a mobility partner because of planners' perceptions about the taxi—perceptions which are largely unfounded.

Chapter 6 hypothesizes what these perceptions might be, and examines their veracity in greater detail. Chapter 7 briefly discusses how I designed research to test the extent to which these perceptions are held by planners, and Chapter 8 discusses the key findings from the experiment.

I synthesize the findings in the final chapter, concluding that planners view taxis as neither friend nor foe. They are indifferent, in other words. This result at least partially confirms the hypothesis set forth in this thesis: Taxis are overlooked by planners because of misconceptions about the industry. I argue that, to unlock the full potential of the taxi in urban transport, planners need to start seeing taxis as friends—as true partners in a comprehensive system of urban mobility.

CHAPTER II. REFRAMING AUTO-DEPENDENCY

"The car is not the enemy, nor is the elimination of cars the solution. It is our societal bias toward cars that must be questioned." -Anne Vernez Moudon

A. THE SYSTEM OF AUTOMOBILITY

The automobile has extended unprecedented mobility to the overwhelming majority of US households, 92 percent of which possess at least one car, and over half (59%) of which own two or more (Pucher and Renne 2003). Even among lower-income households (those earning less than $20,000), roughly half (48%) owned one car, and a quarter owned two or more. Trips by automobile, furthermore, account for the lion's share (91% in 1995) of all urban trips in the United States, whereas trips made on public transport, by bike, or on foot accounted for only 9% of all urban travel in 1995 (Pucher and Renne 2003).

Without a doubt, the flexibility, reliability, and speed afforded by the automobile have led to benefits for both the individual and society at large. The automobile has not only expanded the range of social, cultural, recreational, health care, and innumerable other opportunities available to us, it has enabled us to fit a greater number of these opportunities into our limited daily schedules. This unprecedented mobility is one of the primary reasons why automobile ownership rates continue to rise not only in the United States, but across the entire Western world (Giuliano and Hanson 2004).

These benefits, however, accrue at great cost. According to the 2012 Edition of the American Automobile Association's "Your Driving Costs" report, which has been published annually since 1950, it costs families $8,946 each year to own and operate an average sedan (American Automobile Association 2012). This figure amounts to roughly 17% of median U.S. household income in 2010, which was $51,914 according to the latest U.S. Census.

The fact that an overwhelming majority of US households are willing to devote a substantial portion of their income to own and operate an automobile suggests that the mobility cars provide is of great value to many Americans. Of course, another way to interpret these statistics is to argue that the overwhelming majority of Americans have little choice when it comes to getting around: Americans drive not because they *choose* to, but because they *need* to.

To accommodate the automobile, we have been required to widen roads, add additional lanes, and narrow sidewalks. We have been required to divert scarce urban land away from what are arguably more productive uses, limiting the development of housing, businesses, and public spaces in order to balance the demand for ample free parking that they generate (Shoup 2005). The cumulative effect of all these measures has been to inflate the scale of the city to such an extent that it makes walking unpleasant, transit impractical, and taxis too expensive, thus leaving residents with few alternatives except to drive. This induces even greater demand for the automobile in a vicious cycle commonly referred to as automobile dependency.

B. THE POLITICAL PROBLEM

What are the costs of auto dependency, of this lack of choice? The private costs to American families, in terms of vehicle expenses, fuel costs, parking, accidents, travel time, and health are clear (Litman 2002; American Automobile Association 2012). The social costs, many would argue, are even higher: Automobile dependency diverts scarce urban land and public funds away from what are arguably more productive uses, increases overall congestion costs, reduces consumers' transportation choices, contributes to air, noise, and water pollution, consumes enormous amounts of non-renewable resources, isolates people from their communities by reducing opportunities for social interaction, degrades urban and natural landscapes, threatens historic structures and traditional communities, reduces regional economic development

potential, and imposes significant long-term horizontal and vertical equity impacts (Litman 2002; Giuliano and Hanson 2004).

That these costs are social implies that they aren't borne by the individuals who generate them; they are borne by a collective other. And it is precisely because a significant portion of the costs of driving are not borne by the drivers themselves that automobile dependency persists (Giuliano and Hanson 2004; Pucher 2004; Litman 2002). Automobile travelers do not fully pay for the health and environmental damage resulting from auto emissions, for the congestion they cause, or for any of the multitude of social and environmental impacts discussed above. As a result, we as a society drive more than we should, and walk, bike, taxi, and take mass transit less than we could.

Framing automobile dependency as a problem of underpricing suggests an obvious solution: Correct the price discrepancies. Giuliano and Hanson (2004) made this point forcefully when they argued that any public policies that seek to invest in alternative modes—but which do nothing to correct for underpricing—are not just limited in their effectiveness, but in fact wasteful. And yet, they admitted that any attempts to broadly increase the costs of private automobile use are bound to fail, for the simple reason that the overwhelming majority of voters are themselves dependent on the car. Pucher (2004) argued that higher taxes and restrictions on auto ownership are probably the most direct ways of addressing automobile dependency, but recognized too that such measures, while successful at shifting many automobile trips to alternatives like walking, bicycling, and transit use in Europe and Canada, would be politically impossible to implement in the United States. In addition, he noted that solutions designed to reduce the mobility advantages of the car (auto-free zones, traffic calming, transit priority) have made little headway in the United States because most car drivers vehemently oppose giving up their privileges.

Thus, we seem to know—from a policy perspective—how to solve automobile dependency. The problem is that these solutions are politically impossible to implement: Few are likely to vote for them. There are no policy solutions to automobile dependency that can be implemented at this time, which don't require people to change their behavior—to *adapt* to a new vision of the future. This suggests that automobile dependency is not a *technical* challenge, but an *adaptive* one: How do we get people to support change?

C. PLEASE STAND BY

In his book *Leadership Without Easy Answers*, Ronald Heifetz (1998), founder of the Center for Public Leadership at the Harvard Kennedy School of Government, argued that people need two things to support change: First, they need a clear and compelling vision that helps situate short-term costs within the context of long-term benefits. Second, they need a "holding environment" that allows them to internalize that vision, learn what it means to them, and then begin to take incremental steps towards an uncertain future (i.e. a bridge between present reality and future vision). This holding environment requires the active presence of committed leaders who not only lead by example, but who also leverage their authority to create tools and processes that help shepherd people down the path towards change.

In America, the vision of a less automobile dependent future clearly exists; the holding vessel, however, is incomplete. No incremental step can fully bridge the gulf in quality of life that currently separates those with access to a car from those without. This gulf exists because the primary "tools" politicians have offered up in the interim are conventional mass transit systems (bus and rail) that are inherently incompatible with our auto-oriented built form. These transit systems, as Pucher (2004) pointed out, operate "most efficiently in dense, high-volume corridors focused radially on a central downtown area" (203). And yet, most Americans today live in

sprawling, low-density suburbs, and furthermore, commute primarily from suburb to suburb (Pisarski 2006).

Thus, even if people were moved by a compelling vision of a less auto-dependent future, there is little they can do now to start moving towards that future today: They would be giving up too much. Because the gulf separating present reality from future vision remains vast, few but the most dedicated and radical are able to make the leap away from automobile dependency. These individuals join a political constituency that persists largely at the margins of society, unable to expand towards the center.

Thus is Heifetz's holding vessel incomplete. And so long as this holding vessel remains incomplete, the vision of a less automobile dependent future will remain too far removed from the reality of our present situation to motivate enough people to support change. At best, change creeps along at an attenuated pace; at worst, the political hegemony of automobile owners reinforces the status quo, or worse yet—expands it.

D. THE TAXI AS A BRIDGE

The automobile plays an important role in urban mobility. And it isn't going anywhere. But—and this is the key to completing the holding vessel—one can travel by automobile without having to be an automobile owner. Distinguishing the *means* of automobile travel from the *state* of automobile ownership suggests a clear solution to the political dimension of automobile dependency: taxis.

The taxi makes it possible to travel by automobile, without having to be an automobile owner. As the number and variety of trips that can effectively be served by taxis expands, so too does quality of life improve for those who don't own automobiles, thus narrowing the gulf that separates present reality from future vision. As the gulf narrows, more people are able to forego automobile ownership, joining the ranks of a growing constituency that expands the realm of

what is politically possible. This constituency helps transform the once intractable problem of automobile dependency into something much more manageable: a matter of simply building the right kind of housing, dismantling bad incentives, widening sidewalks, prioritizing people and transit over cars, charging the right price for parking, and so on.

The inertia of sunk costs means that this change—this shift away from automobile dependency—will largely begin at the margins, where patterns are unstable. Those who make the leap will be those undergoing changes or breaks in life: moving away to college, starting a new job, or downsizing for retirement. It is in the midst of events like these, where people are reconfiguring their daily lives and mobility patterns, that inertia can be overcome and innovative new mobility patterns have the best chance for adoption (Huwer 2004).

These windows of opportunity appear much more frequently than one might expect: Americans move surprisingly often, and millions of young adults leave for or graduate from college every year. Shoup (1996) examined property rolls for over twenty-five thousand assessed properties in Burbank, California and found that over a seven-year period, 56 percent of all properties were sold at least once. Using data from the 1990 Census, he estimated further that half of all owner-occupied housing units in the United States were sold at least once within the previous ten years. According to the 2010 U.S. Census, roughly 10 percent of the American population are either leaving to college, in college, or graduating from college, and 13 percent are entering retirement age.

Of course, not all of these home sales will result in a drastic change in mobility patterns, nor will everybody entering or graduating from college or settling into retirement choose to forego an automobile purchase and reorganize their lives to be less dependent on the automobile. But, if the vision is compelling enough, and the tools and processes that make up a secure holding vessel are sufficiently robust, a not insignificant number will. The pace will be

slow, undoubtedly, but as Shoup (1996) would argue, city planning itself "is often slow to produce results, and some planning produces no results at all" (1996, 359).

Long-run benefits aside, expanding the number and variety of trips that can be served by taxis has short-term benefits in the here and now. As we wait for this world filled with more travel options to emerge—or even if it fails to emerge altogether—a more robust taxi industry can today expand mobility options for a non-trivial segment of the population who, because of age, income, or disability, are unable to own and drive cars.

E. UNMET POTENTIAL

Reframing automobile dependency as a political problem suggests expanding the role of taxis in urban mobility as a solution: By filling a gap in mobility that would otherwise be bridged through car ownership, the taxi helps build the political constituency needed to reshape urban transportation policy for the better. And yet, in spite of this potential, the role that the taxi plays in the contemporary American metropolis remains fairly limited. In this thesis, I explore reasons for why this might be the case. The next chapter sets the stage for the analysis by providing a brief overview of the taxi both as an industry, and as a mode of transportation.

CHAPTER III. DEFINING THE TAXI

Charon—franchised ferryman of the underworld—was arguably the first taxi operator; he plied his trade along the River Styx, ferrying eternal souls to the world of the dead at a low, flat rate. The taxi has come a long way since then, with an at times illustrious, but more often than not troubled history[1] spanning a variety of vehicle technologies, operating models, and regulatory schemes, and serving a wide range of travel needs.

Cooper et al. (2010) note that "the taxicab, in various incarnations, remains one of the oldest licensed and most recognizable forms of public transport still in use today" (1). This long history has given rise to a powerful and enduring image in the popular mind, an image which belies a complex legal and economic reality. So problematic is this disconnect between perception and reality that some scholars have called for taxi companies to drop the name "taxi" from their names altogether, in favor of names with less historical baggage, like "paratransit" or even, more simply—"transportation" (Gilbert 1978).

A primary goal of this thesis is to explore the image of the taxi as it exists in the mind of transportation planners, and compare it to a baseline reality. In this chapter, I construct such a reality, based on a broad interpretation of the taxi as a mode of transport offering personal carriage for an individual or small group, for hire and reward (Cooper et al. 2010). I explore the implications of this definition for the taxi as an industry (Part A: How taxis are organized and regulated), and for the taxi as a mode of transportation (Part B: How taxis fit into a broader system of urban mobility).

[1]Gilbert and Samuels (1982) describe the initial shame felt by early 17th century patrons of the hackney, contrasting it to the positive image hackney drivers enjoyed among the females of the 18th century, when "no self-respecting member of the profession was ever without at least one lady-love" (12). By the early 19th century, the hackney industry had fallen into disfavor, in large part due to the filthy condition of the carriages and the hostility and dishonesty of many drivers, provoking much public outcry for regulation of what came to be seen as nuisances. The taxicabs of Paris would earn a "special place in history as well as in the hearts of Frenchmen" thanks to their role in defending Paris against the German army during World War I, in what would come to be known as the "Miracle of the Marne" (37).

A. THE TAXI AS AN INDUSTRY

1. Service Offerings

On-demand versus Pre-arranged

The contemporary taxi generally spans two types of service offerings: on-demand and pre-arranged (Cooper et al. 2010). In the United States, it is on-demand service—taxis hailed on the street or engaged at a stand—that is commonly associated with the "taxi" moniker. These taxis are the most familiar and the most visible manifestation of taxi service, often featuring distinctive and vibrant color schemes (checkered or yellow), roof-lights indicating the current status of the vehicle (for hire, hired, off-duty), and until recently, a consistent vehicle type (Ford Crown Victorias, London Black Cabs, New York City Checker Cabs). Standard rates of fares, typically based on distance and time traveled, are typically set by municipal ordinance; the number of on-demand vehicles allowed to operate within a municipality is often fixed by ordinance as well, and rarely changed.

On-demand service also includes a variety of shared-ride modes in the form of jitneys, shared-ride taxis, and taxibuses. Whereas the expectation with traditional taxi service is that a vehicle is hired for the exclusive use of a single individual or group of individuals, with shared-ride taxis, the operator provides door-to-door service or plies a flexible route, picking up additional passengers along the way. Developed countries have generally avoided permitting these operations, in part due to the logistics of determining multiple fares (Cooper et al. 2010), but also—in the case of the United States—due to the historical legacy of anti-jitney legislation pushed through in the late 1910s by powerful streetcar operators seeking to stamp out competition (Gilbert and Samuels 1982). Where shared-ride taxis do operate—New York City

Dollar-Vans, Camionetas in Southern California—they are often informal and unregulated (Valenzuela et al. 2005; Lueck 2006).

The pre-arranged market, on the other hand, spans operations that are not traditionally associated with taxis. These operations fit under many names, the most common of which are livery service, limousine service, black car service, for-hire vehicles (FHVs), dispatch service, and sometimes—simply "car service" (Cooper et al. 2010). Pre-arranged service, as the name suggests, is arranged in advance. The degree to which service is arranged in advance ranges from a few minutes in the case of some telephone-dispatch service, to days or even weeks in the case of limousine service. Unlike on-demand service, fares are typically not set by ordinance, and the number of vehicles allowed to operate in these markets is not restricted. This is because unlike on-demand service, where market failures (discussed further in Part A: Section 3) disadvantage customers in the exchange, pre-arranged service is considered contractual in nature: "The average consumer can and should do their own research as to the quality of service, comparable rates, and dependability" prior to arranging for service (Cooper et al. 2010, 26).

There is much overlap between pre-arranged and on-demand markets in practice: Many on-demand operators provide pre-arranged service, and many pre-arranged operators also provide on-demand service. The former is typical of taxi operations in most major American cities, where the same operators who cruise the streets for fares also have radio dispatch equipment installed in their vehicles that allow them to respond to telephone-dispatch requests. The latter—pre-arranged operators who also provide on-demand service—is also prevalent in urban cores, where a black car or limousine operator cruises a central business district during peak hours for street-hails, often in violation of municipal regulations.

The legal distinction between the pre-arranged and on-demand markets, furthermore, often does not mirror economic reality. For example, while taxis dispatched by telephone are

technically pre-arranged, regulatory authorities generally view them as providing on-demand service, and thus subject them to the same restrictions on fare and entry (Darbera 2007). To maintain this legal distinction, which has no economic basis, regulators often require pre-arranged operators to either 1) book service a fixed amount of time in advance, usually one hour but even as much as 24 hours, or 2) to establish minimum hourly rates or a minimum one- or two hour contract (Cooper et al. 2010). Otherwise, these operators are considered to provide on-demand service, and thus come under the jurisdiction of municipal regulators.

Because the legal distinction is arbitrary and not grounded in economic reality, enforcement is difficult. Many municipalities struggle with a gray area of "bandit" or "gypsy" operators who are legally registered to provide pre-arranged transportation services, but violate municipal regulations when they dispatch a vehicle immediately in response to a customer request for service. Blasi and Leavitt (2006) pointed to the case of Valley Cab Company in Los Angeles as an example:

> …when Valley Cab Company lost its franchise in Los Angeles in 2001, the company secured a limousine license from the [California] Public Utilities Commission to operate as Valley Transportation, and used the same dispatch system, drivers and cars to operate a "limousine company" in precisely the same area, continuing to advertise in the taxi section of the phone directory (73).

A research team from the University of California, Los Angeles (including the author) interviewed several "bandit" taxi operators in Koreatown in 2010, and found that many were in fact licensed with the California Public Utilities Commission to provide pre-arranged transportation services, but were considered "bandits" because they served telephone-dispatch orders in what is considered by regulators to be an "on-demand" way.

Darbera (2007) has argued for legal definitions of taxi service to reflect economic reality. Regulators, in other words, should clearly recognize the economic distinction between the on-

demand and pre-arranged markets, and segregate them accordingly, as regulators in New York City and London do. This issue will be treated more fully in Chapter 4.

Relative Size of Markets

The majority of taxis today are pre-arranged by telephone, which by some estimates accounts for 70-80 percent of overall demand (Darbera 2007; Dempsey 1996; Williams 1980). The on-demand taxi plays a relatively small role in the overall market for taxis today, although the spatial concentration of this role at airports, hotels, and within the historic cores of major metropolitan areas, where many people continue to work and play, means that it remains highly visible, and thus heavily influences popular conceptions of the taxi. This spatial concentration is most evident in the urban core of New York City (i.e. Manhattan), where 25% of all trips by public transit are made in a taxi, 90% of which are hailed on the street (Darbera 2010; Schaller 2006).

The dominance of the pre-arranged market in the United States is a relatively recent phenomenon in the history of the taxicab, which has long been defined by on-demand service; post-war development patterns played a crucial role in this transition. Gilbert and Samuels (1982) noted that between 1948 and 1952, the industry experienced a 23 percent drop in ridership, reflecting the growing dominance of the automobile and the inability of traditional transit services to service a rapidly suburbanizing population. Accompanying this decline in service was a dramatic shift in the way remaining customers interfaced with the taxi: Where the post-war population went, the street-hail and taxi stand cabs could not follow, as these areas were too large and demand too weak to support street-hail or taxi stand service. Williams (1980) noted that cab service in these areas would be limited to cabs cruising out of the area after delivering passengers, unless “some other device is utilized for transmitting information” (106).

The two-way radio was such a device: It revolutionized telephone-dispatch by allowing customer requests for service to be dispatched to the entire fleet as requests came in. This dramatically reduced customer wait times and thus preserved the main competitive advantage taxis held over other forms of transportation: time savings. This allowed telephone-dispatch to not only erode the market for street-hail and taxi stand service, but also capture additional market share in the suburban markets where the street-hail and taxi stand could not venture. A study of the taxicab industry in Wisconsin found that as early as 1974, 84% of all pickups were contracted by telephone (Zachar and Beimborn 1974). Dempsey (1996) estimated that in most cities today, the telephone order market accounts for 70 to 80 percent of overall demand for taxi service. With widespread adoption of mobile phone technology in the last decades, this figure is likely to be even higher today (Cooper et al. 2010).

The Space-Time Dimension

Clearly, there is a spatial dimension to taxi service: Hail cabs play a small but highly visible role in dense, compact areas, but are eclipsed by the telephone and cab stand markets almost everywhere else. What explains this? In short: time.

Gallick and Sisk (1987) argue that time—more precisely, time savings—is the primary competitive advantage taxis have over walking, public transit, and cycling. In a survey of taxi riders across 7 European capital cities, Darbera (2010) found time savings to be the most frequently cited reason for choosing a taxi over another mode; Schaller's (2000) survey of taxi riders in New York yielded similar results. Taxis also offer advantages over the private automobile in dense urban environments, where the time cost associated with the search for free or underpriced on-street parking can be avoided either by paying for what is often expensive off-street parking, or by using a taxi. Clearly, people choose taxis for trips that are highly time sensitive—and they pay a premium to do this. It follows that the value of this premium is rapidly eroded by time spent waiting for a cab to arrive.

In the compact, densely developed, mixed-use urban areas often found in the historic cores of our metropolitan regions, the close proximity of retail, housing, and employment to each other creates high demand for taxis across a large, contiguous area. This distribution allows cabs to profitably cruise the streets for fares, rather than queue at a taxi stand. These cruising cabs, in turn, free potential riders from having to walk to a taxi stand and wait in line, thus minimizing their wait time. The value of a taxi, in terms of on-demand flexibility and time savings, is thus maximized by a robust street-hail market.

On the other extreme are the sprawling, less densely developed, functionally segregated urban areas that have come to dominate the modern American metropolis. In these areas, a robust street-hail market cannot exist, as the cost of providing an adequate level of service (i.e. reasonable wait times) to potential customers would be too high. As Williams (1980) explains:

> …large areas of low demand would never be served by cruising cabs because of the low probability of a vacant cab passing a customer within a reasonable time, and because the passenger/cab ratio would be such that fares must be exorbitant to provide a low waiting time (106).

Indeed, as metropolitan regions, particularly in the United States, expanded outward and suburbanization of the populations accelerated in the latter half of the 20th century, their ability to support a hail cab market declined significantly. There are two reasons for this: First, automobile-oriented sprawl was fueled by automobile ownership, and the immediate effect of greater automobile ownership was to reduce demand for all other forms of transportation, including the taxi. Second, as population densities declined, so too did the probability of finding a customer on the street. The combined effects of lower overall demand for taxi service, and the diffusion, or de-concentration, of this demand across space made it too costly for cabs to cruise for passengers. Today, as a result, the majority of taxis today are either hailed at a taxi stand—typically at an airport—or dispatched by telephone.

Rapid adoption of mobile phone technology in recent years has made it even easier for customers to phone in a request for service, and thus decreased the onerous wait times associated with telephone-dispatch. Whereas before, customers outside their homes needed to not only locate a telephone, but also pay connection fees, mobile phones now allow customers to easily phone in a request from virtually anywhere at a negligible marginal cost. The opening of Global Positioning Satellite (GPS) technology to the civilian sector at the beginning of the new millennium, furthermore, has made it easier for central dispatchers to track the location of all affiliated vehicles in real-time, and thus better match customer dispatch requests to the nearest vacant cab. More often than not, this dispatch is performed rapidly and automatically by computers. These two innovations have improved the speed and efficiency of matching and decreased wait time even further, to the point that some scholars have argued that what remains of the street-hail cab may soon become a relic of the past (Darbera 2007; Seymour 2011).

2. Organizational Form

Mundy (2007), based on a city-by-city analysis of U.S. taxi operators, categorized taxi operations into a variety of organizational forms that range from the total taxi firm, which directly employs a fleet of operators, to the permit-only lessor—an individual permit-owner who leases out the right to operate to another individual. A continuum of forms exists between these two extremes, each of which will be discussed here briefly in turn.

Total Taxi Firms

The total taxi firm describes an organizational form where all capital assets and rights to operate are retained by a central corporate entity. The firm employs drivers directly, who provide taxi service to the public under the firm's corporate aegis. Insurance, central dispatching, marketing,

and service agreements with private and public partners are all coordinated through the firm. Gilbert and Samuels (1982) noted that the high labor costs associated with this organizational form have pushed firms to reorganize as lessee-lessor firms, which will be discussed in the following section. Consequently, total taxi firms are rarely seen today except in a handful of American cities, including Las Vegas and Reno (Cooper et al. 2010).

Lessee-Lessor Firms

Lessee-lessor firms operate in much the same way as total taxi firms, retaining control over all capital assets and providing centralized functions like insurance, dispatch, and maintenance. The key difference between these two forms lies in the nature of the relationship between firm and driver: Whereas total taxi firms employ drivers directly, lessee-lessor firms lease their fleet of vehicles—and the right to operate such vehicles—to independent contractor drivers (Cooper et al. 2010).

This arrangement is preferred by taxi firms, as it shifts the financial risks of taxi operation onto drivers, and allows firms to avoid providing fringe benefits like health care and paid time off. In exchange, firms give up a significant degree of control over drivers (Cooper et al. 2010). This is because, as independent contractors, lessee drivers are free to operate as they see fit.

This arrangement has proven troublesome for some firms, whose reputation as a central dispatcher is damaged by poor customer service. In San Francisco, for example, a 2000 survey by the San Francisco Police Department's Taxi Detail found that, for passengers telephoning for a cab, there was only a 40 percent chance that it would actually arrive (Nelson Nygaard Consulting Associates 2001). These dismal response rates were the result of drivers abandoning telephone-dispatch customers—who often resided in outlying areas far from busy downtown areas—upon encountering potential customers hailing them on the street. As these

drivers are not employees of the taxi firm, the firms could take no punitive measures against them.

Authority and Call-Center Lessor

The authority and call-center lessor is a variation on the lessor-lessee firm. In this arrangement, firms only lease out the right to operate; the independent-contractor-drivers who lease these rights from the firm are required to bring their own vehicle (Cooper et al. 2010). The firm typically retains central dispatching functions and may provide group insurance, but will not maintain capital-intensive vehicles or provide centralized repair facilities. Many taxi cooperatives in the United States are organized in this fashion.

Because these firms have few capital assets, there is little financial incentive to increase returns on these assets. As Cooper et al. (2010) explain, "such a firm may not offer a genuine 24-hour radio service, nor have incentive to invest in advertising, computer-based zone dispatching, service contracts, or credit card or voucher support" (13).

Single Permit Owner/Operator

As the name suggests, the single permit owner/operator describes forms where permit holders operate their own individual vehicles as a sole proprietorship, usually independent of any firm or cooperative. As individuals, they typically do not invest in radio dispatch or have the necessary scale to enter into service contracts with government agencies, and so tend to concentrate in the on-demand segments of the market where barriers to entry are low: city stands, hotels, and airports (Cooper et al. 2010). The experience of 21 US cities with deregulation has demonstrated that, in the absence of regulations restricting entry and setting fares, these market segments become oversupplied by single permit owner/operator firms, leading to declining service quality and, ironically—higher prices (Dempsey 1996).

Permit-Only Lessor

Like the single permit owner/operator form, permit-only lessors describe a form where an individual—rather than a firm—owns the right to operate. Unlike the single permit owner/operator form, however, permit-only lessors do not themselves drive. Instead, they lease their permit to another individual, who must provide his or her own vehicle, insurance, and maintenance.

3. Regulation

Regulations have featured prominently in the history of the taxi, and so no description of the taxi would be complete without a discussion of why and how they are regulated. This section serves as a brief introduction to taxi regulations; a more in-depth analysis appears in the literature review.

It is important to note that most of these regulations apply only to the on-demand segments of the market. Most pre-arranged operators are typically unencumbered by such regulations, and are instead licensed by state authorities, such as a public utilities commission or a state department of transportation (Blasi and Leavitt 2006; Cooper et al. 2010).

Why do we regulate?

Rationales for regulation generally respond to perceived market failures, which must be corrected in order to maximize the economic efficiency of exchange. The most commonly cited market failures include the absence of a competitive market, externalities, and economies of scale and scope.

Absence of a competitive market: Schaller and Gilbert (1996) argue that imperfect information distorts the market for taxi service because customers do not comparison shop. Cabs are valued primarily for their speed of service, and comparison shopping by a customer

hailing a cab on the street undermines this value. If a customer passes up one cab, there is no guarantee that 1) he will be able to quickly find another cab, or 2) that even if another cab were available, that the price and quality of service would be any better. As such, there is no pressure on the industry to compete for customers by lowering prices or improving service quality. Imperfect information thus puts customers at a disadvantage: They are the mercy of a profit maximizing taxi industry that can overcharge and poorly serve with relative impunity. Regulation is therefore needed to correct this market failure. Customers need to be protected from price-gouging, and the industry must be held to minimum levels of service quality and public safety.

Externalities: Many scholars have noted both positive and negative externalities associated with taxi use. On one hand, taxis don't require parking, and thus reduce congestion and air pollution that Shoup (2005) has associated with cruising for parking in dense urban areas. The reduction in demand for parking also allows scarce, urban land to be shifted towards more productive uses. Verkuil (1970) noted that taxi use during peak hours helps to reduce peak-period demand on transit, which is relatively costly to serve and, as Lave (1984) and Cervero (1984) have pointed out, is responsible for a disproportionate share of mass transit's operating deficit. Combined mobility advocates have argued that taxis help fill a gap in urban mobility that would otherwise be bridged through the purchase of a private vehicle, and that filling this gap enhances the value of mass transit and boosts ridership (Huwer 2004; King et al. 2011; UITP 2011). Cooper et al. (2010) argued that taxis convey a "very strong image of a city" (16), and that this image is often cultivated by community leaders who "work hard to develop a positive image – one of clean, modern, and progressive community values" (16). Finally, there is the positive externality associated with mobility in general, the loss of which particularly affects urban areas where "social, cultural, and commercial activities depend to a large extent on the

wide utilization and interchange that only a high degree of mobility can support" (Verkuil 1970, 674).

On the other hand, many scholars have noted that taxis impose external costs, primarily through increased traffic congestion and air pollution (Shreiber 1970; Dempsey 1996). While taxis do not need to cruise for parking, they do need to stop to pick up and drop off passengers. Insofar as these actions disrupt the flow of traffic, they can exacerbate congestion and air pollution problems. King et al. (2010), furthermore, have noted the highly asymmetric nature of taxi travel in New York: Trip origins are heavily concentrated within the Manhattan core, whereas trip destinations are more spatially distributed across the metropolitan area. Insofar as these asymmetric travel patterns lead to higher rates of deadheading (non-revenue miles often associated with trips returning to the urban core from an outlying area), what congestion and emission savings are garnered by using mass transit for one leg of the trip can be offset by congestion and emission costs generated by a taxi "deadheading" back to the urban core.

Some scholars have countered the argument that taxis should be singled out for regulation because of the congestion and air pollution costs they generate. Coffman (1987), for example, argued that these externalities are not unique to the taxi industry, and that it is unfair to single out taxis for the external costs they impose while ignoring the private vehicle.

Economies of Scale and Scope: Dempsey (1996) noted that economies of scale and scope exist in the taxi industry. Large firms can share the fixed costs of marketing, advertising, dispatching, accounting, and cab maintenance facilities over a larger number of operators and thus passengers. Gilbert and Samuels (1982) have argued that scale is required if we are to see any sort of innovation or government partnerships, as it is difficult for individual operators to invest in new technology, and for government agencies to partner with individual mom-and-pop operators.

Economies of scope (lower average cost for a firm that produces two or more products) also exist, particularly in the radio-dispatch segment of the market. Dempsey (1996) noted that a firm that primarily serves the radio-dispatch market can easily stand idle capacity in front of hotels and airport queues.

How do we regulate?

In the United States, pre-arranged service is loosely regulated, typically at the state level, and often requires nothing more than a business license. In California, for example, pre-arranged operators simply apply for a "Transportation Charter Party Carrier of Passengers" (TCP) license with the California Public Utilities Commission, and other than being required to comply with a handful of very reasonable liability and drug-and-alcohol testing requirements, are otherwise free to operate laissez-faire (Blasi and Leavitt 2006). Annual vehicle safety inspections by the California Highway Patrol are only required when operating vehicles that seating 11 or more, including the driver (CPUC Website 2009).

By comparison, on-demand service is heavily regulated, typically at the local level. Regulations governing on-demand service generally fall into one of three categories: quantity restrictions on the numbers of vehicles licensed to operate (quantity control), required vehicle and operator standards (quality control), and fare restrictions (economic control). Cooper et al. (2010) refer to these collectively as QQE. While the specific form these regulations take vary from city to city, Dempsey (1996), who reviewed regulatory schemes across eight different U.S. cities, noted that "similarities are far more numerous than…differences" (78). These patterns are highlighted briefly below.

Quantity: Municipalities typically restrict the number of vehicles allowed to operate, the number of firms, or sometimes both. These restrictions are typically enforced via a medallion system where a fixed number of medallions are allowed to circulate, and are either transferred

through bureaucratic processes or traded on the open market. The number of medallions allowed to circulate is typically fixed at some arbitrary historic level or set in proportion to population—and is allowed to expand only if "public convenience and necessity" requires it (Gilbert and Samuels 1982; Dempsey 1996). This public convenience and necessity clause (PC&N) is common to many regulatory schemes, and in practice serves as a rigid barrier to entry. In some cases, PC&N clauses are omitted entirely, and instead numerical limits are explicitly written into regulations (Dempsey 1996). Boston is one notable example.

Quality: Municipalities also establish safety, insurance, and service standards. These include regulations governing driver appearance, vehicle condition, maintenance schedules, minimum levels of insurance coverage, restrictions on how many hours a day drivers can work, and prohibitions on refusing passengers, overcharging them, taking on additional passengers without the consent of the first, using abusive language, and driving recklessly (Gilbert and Samuels 1982; Dempsey 1996). Dempsey (1996) noted that in St. Louis, regulations stipulate how taxis enter and depart from queues at taxi stands in order to reduce potential conflicts between drivers. In New York City for many decades, drivers were required by regulation to reside in New York City to qualify for a license to operate in the city. Blasi and Leavitt (2006) noted that in Los Angeles:

> "…the City regulates the lives of drivers in minute detail, specifying what they can charge and even what they can wear. Not only must drivers be "neat and clean," they must also conform to the City's very specific dress code: white shirt, black tie, black shoes, black socks. Violations of the minutest sort – white dots on a black tie – can lead to significant economic penalties" (10).

Economics: Municipalities also set prices, usually on a mileage and time-spent-waiting basis. Fares are calculated by an electronic meter, and typically consist of four components: an initial flag-drop amount, a mileage-based amount, an amount based on time spent waiting at a stoplight or stuck in traffic, and miscellaneous surcharges for trips originating from special destinations (e.g. airports), baggage handling service, and sometimes—for telephone-dispatch.

Washington D.C. was one notable exception to mileage-based fares, where until recently, taxis operated on a zone-based fare system (Smith 2008). This zone-based system established flat rates of fares for travel within a pre-defined system of interconnected zones, with additional surcharges as a trip originating in one zone crossed into another. This form of fare regulation, unique in the U.S., was replaced in June 2008 with standard meter-based fares. To further protect visitors from potential price gouging, many municipalities also set flat rates of fare to and from airports. As with other regulated industries, fares are typically set to an amount that ideally would guarantee a reasonable rate of return on invested capital (Gilbert and Samuels 1982).

B. THE TAXI AS A MODE OF TRANSPORTATION

According to the 2009 Bureau of Transportation Statistics Omnibus Household Survey, roughly 3.5 percent of all American households use a taxi at least once a week. This would appear to be a relatively small contribution to urban mobility, compared to the proportion of households who use public transit at least once a week (10.4%), who bike for any purpose (18%), and of course, who either drive or are passengers in a private vehicle (95%). But frequency of use alone is an insufficient measure of the importance of taxi service. The value of the trips taken by taxi matters, as does the way this national average plays out across space and demographics.

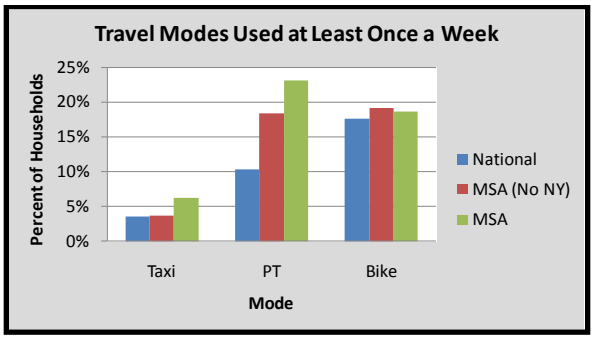

Figure 1: Travel modes used at least once a week, excluding driving. *(Source: 2009 BTS Omnibus Household Survey)*

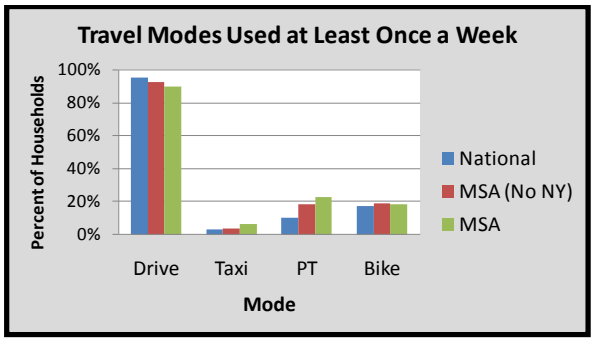

Figure 2: Travel modes used at least once a week, including driving. *(Source: 2009 BTS Omnibus Household Survey)*

1. The Value of Taxi Trips

A 2011 report by market research firm IBISWorld estimates the value of all taxi and limousine services in the United States at $9.4 billion (Kaczanowska 2011). Nearly 80 percent of this figure can be attributed to what is popularly understood to be taxi service: municipally-regulated vehicles hailed on the street, at a taxi stand, or dispatched by telephone. The remainder is divided between luxury and corporate sedan services (7.2%), stretch limousine services (5.8%), and others. By comparison, traditional public transit services generated about $38.1 billion in revenues in 2011—the majority of which came from federal, state, and local grants and taxes (Andrews 2011).

Taxi trips are infrequent, but fill an important gap in mobility. Very few people rely exclusively on taxis for travel—as substitutes for the private vehicle or for transit—but rather, use taxis as a complement. In New York, for example, only 6 percent of Manhattan residents "always" or "usually" use taxicabs for work trips, and only 20 percent "always" or "usually" take cabs for personal trips (Schaller 2002b). King et al. (2011), analyzing GPS-data to track taxi movements in New York, noted the asymmetric pattern of taxi travel, where transit users will take transit for one leg of the trip, and then use a taxi for return trips or other subsequent legs of their journey. They point to this asymmetry to illustrate how taxis are complementary to transit and "help expand the value of the transit system" (7).

People choose taxis over other modes of transportation for a variety of reasons, but the primary reason is because of the time savings it offers. Gallick and Sisk (1987) argue that time—more precisely, time savings—is the primary competitive advantage taxis have over walking, public transit, and cycling. In a survey of taxi riders across 7 European capital cities, Darbera (2010) found time savings to be the most frequently cited reason for choosing a taxi over another mode. Schaller's (2000) survey of taxi riders in New York yielded similar results. Clearly, people choose taxis for trips that are highly time sensitive—and they pay a premium to do this.

Other important roles that the taxi plays include: providing a reliable and safe mode of transportation at night when conventional public transit options are limited, or when alcohol consumption precludes driving; providing ground transportation to and from the airport; as a contractor to government agencies in the provision of specialist transport services (e.g. Americans With Disability Act requirements, substitute for transit in areas of low customer demand); and in a community and developmental role in transportation disadvantaged areas (Cooper et al. 2010; Koffman et al. 2012). The City of Los Angeles, for example, through its Cityride transportation assistance program, offers qualified disabled person and individuals over

the age of 65 subsidized travel scrips totaling $84 each year that can be applied toward the cost of Dial-A-Ride or taxi service (Los Angeles Department of Transportation 2010).

2. Variation Across Space and Demographics

An analysis of 2009 Bureau of Transportation Statistics Omnibus Household Survey data reveals, as might be expected, that households living in urban areas (downtown or otherwise) use taxis at higher rates than households living in suburban or rural areas. This pattern holds true even if we exclude households from the New York Metropolitan Area, which is an outlier in many respects—not in the least transportation. According to one estimate, the State of New York alone accounts for roughly one quarter (23.5%) of all taxi operators, and 20 percent of total industry revenues (Kaczanowska 2011).

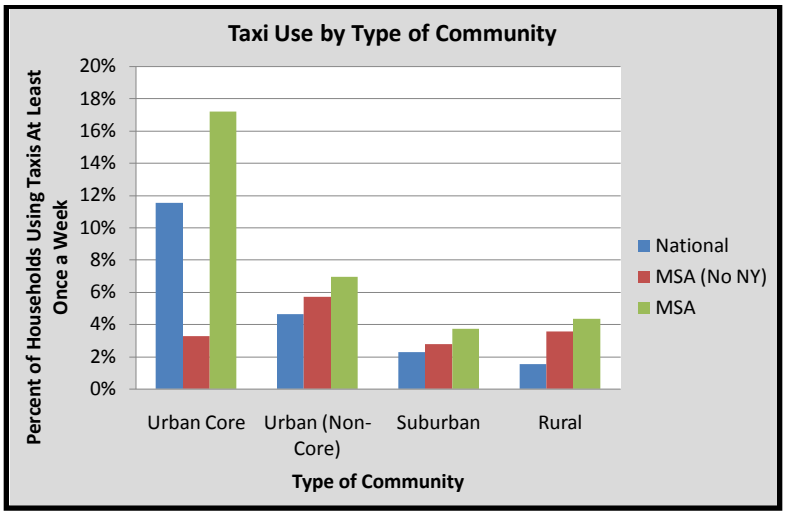

Figure 3: Taxi Use By Type of Community *(Source: 2009 BTS Omnibus Household Survey)*

Also notable is the important role that taxis play in rural areas, where it is often the only transportation alternative to the private automobile. As **Figure 3** shows, the proportions of households who use taxis at least once a week in rural communities are roughly similar to the proportion of households who use taxis at least once a week in suburban communities.

Taxi ridership, furthermore, is a sharp dichotomy of rich and poor. The poorest and the wealthiest households tend to use taxis much more frequently than middle income households. Again, based on an analysis of 2009 Bureau of Transportation Statistics Omnibus Household Survey data, roughly 8 percent of households making less than $15k a year reported using a taxi at least one a week, and a roughly similar proportion of households making more than $125k reported doing the same. The proportion of households who use the taxi at least once a week falls precipitously as income rises towards the middle income brackets. The proportion then begins to rise slowly before jumping sharply again toward the high end of the income range.

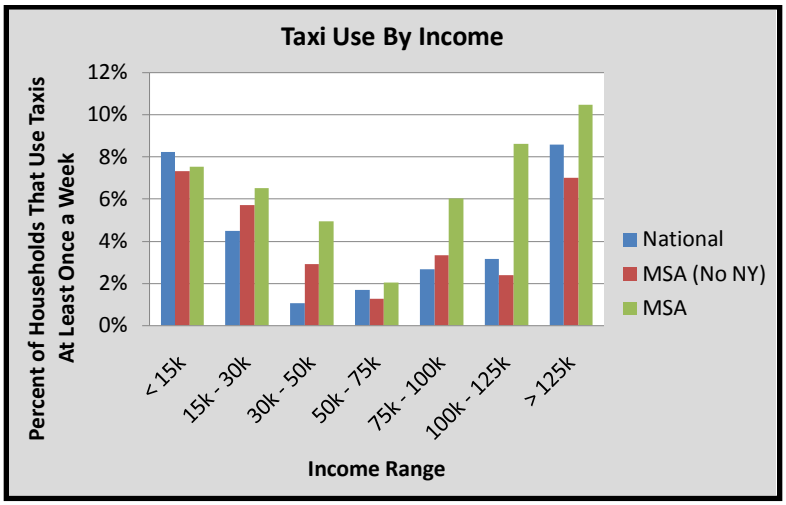

Figure 4: Taxi Use By Income (*Source: 2009 BTS Omnibus Household Survey)*

Given this sharp dichotomy in taxi ridership between rich and poor, it is important to note the significant role that unregulated taxicabs play in the market for taxi services. In one of the earliest studies of unregulated or "vernacular" taxis, Suzuki (1985) noted that "vernaculars are an important adjunct form of transportation to the standard, regulated taxis in many cities" (129). In his review of unregulated taxis across 7 U.S. cities, he found that unregulated cabs operated primarily in lower-income, minority neighborhoods, often filling a gap in mobility left by licensed cabs that refused to venture into these areas, which they perceived to be dangerous. Suzuki

(1985) noted four types of unregulated taxi service: 1) storefront or “social” vernaculars, who organized informally to serve businesses that often doubled as the cultural and social anchors of their African American neighborhoods; 2) Ad-hoc vernaculars, who in contrast to their storefront cousins, had no ties to a specific storefront; 3) supermarket vernaculars, who wait for passengers in front of supermarkets or other retail centers, often in poorer neighborhoods or areas where there are high concentrations of the elderly; and finally 4) general vernaculars, who in sharp contrast to the first three types of vernaculars (social, ad-hoc, and supermarket), openly compete with existing regulated cab companies, often by painting their vehicles to match familiar color schemes.

C. A COMPLEX REALITY

As this chapter has demonstrated, the reality of the taxi—as a mode of transport offering personal carriage for an individual or small group, for hire and reward—is highly complex. Beyond the enduring image of a bright yellow Ford Crown Victoria cruising the central business district for customers, the taxi in reality spans two economically distinct service models—pre-arranged and on-demand—and often encompasses two legally distinct regulatory schemes. Customers rich and poor turn to the taxi not as a substitute for private vehicles or public transit, but as a complement, primarily for highly time-sensitive trips, but also late at night when transit alternatives are limited or perceived to be less safe, or alcohol precludes driving. Taxis also play important roles in the provision of ground transportation to and from airports, and in the mobility of individuals who, for physical or economic reasons, lack the mobility options available to the vast majority of Americans.

The next two chapters look beyond this reality. Chapter 4 highlights the largely unexplored potential of the taxi as an urban mobility partner. Chapter 5 then explores different reasons for why this potential has remained largely unmet.

CHAPTER IV. FILLING A GAP

Compared to the long history of the taxi as a mode of transportation, the history of the taxi as an object of academic study is comparatively brief, emerging in the early 1970s within the context of a blossoming environmental movement, the supplanting of Keynesian economic theory by more neoliberal schools of thought, and an oil crisis which challenged the long-held assumption of limitless, cheap oil. This chapter briefly summarizes the different opportunities scholars have proposed for the taxi within the system of urban mobility, beginning with the "Paratransit Dream" of the 1970s, and then closing with a discussion of its role within the more contemporary "Combined Mobility" literature.

A. THE PARATRANSIT DREAM

A series of studies published in the early half of the 1970s laid the groundwork for what Gilbert and Samuels (1982) referred to as the " integrated transit-paratransit dream," which lumped the taxi into a continuum of modes that combined properties of both the private automobile and mass transit. These paratransit modes, which in addition to the taxi, included rental cars, jitneys, carpools, dial-a-ride, and subscription buses, were seen as a way of extending public transportation into the suburban fringe, where low-densities precluded conventional mass transit.

Many of these scholars, motivated by growing public-transit deficits, explored ways that the taxi could help improve the cost-effectiveness of conventional transit. Lave (1981) and Cervero (1984), for example, both argued for peak-period "load-shedding" to other service providers, including the taxi, as a way of reducing peak-period demand. Such peak-period demand, they pointed out, was responsible for a disproportionate share of transit operating deficits. Other scholars pointed to the potential for transit agencies to contract out evening,

weekend, and first- and last-mile feeder service to taxis in lieu of large buses (Barker and Beard 1978; Lave 1981; Kemp and Kirby 1985). Kemp and Kirby (1985) argued that, even if such services required subsidies, these subsidies would likely be much lower than what it would cost a centralized transit operator to operate such a service themselves. Barker and Beard (1978) noted that, under conditions of low passenger demand, taxi service on a per-mile and per-hour basis is not only generally less expensive than bus transit, but because of its demand responsive nature, could yield comparable or even higher levels of service.

Barker and Beard (1978) were careful to point out that low-passenger demand did not necessarily imply a low-density suburban geography. There are many subpopulations of individuals, such as the elderly or handicapped, who require specialized transportation services, but represent only a small percentage of the overall population. In these cases, taxis could also provide more cost effective solutions than conventional fixed-route transit.

Many scholars also looked to overseas examples of how taxi services, typically operating in a shared-ride mode, could play much larger roles in urban mobility. Rosenbloom (1970) pointed to the contribution jitneys make to urban mobility in many South American cities, where they "operate solely on the main boulevards and in radial patterns outward from terminals, railroad stations, and central plazas" (49). She noted that jitneys in Caracas carried 500,000 passengers out of an estimated 2,700,000 daily travelers. In Asia, Roth (1985) noted the existence of over 28,000 fourteen-seat "Jeepneys" competing fiercely for the right to provide unsubsidized transport in Manila, and minibus operators who thrive in competitive environments in Hong Kong and Kuala Lumpur. In West and Central Africa, vans referred as "Bush Taxis" operate a fixed route without a timetable, departing when full (Cooper et al. 2010). Cooper et al. (2010) noted that this method of operation is common in many African cities, and in particular is observed in suburban locations where conventional public transport options are limited. While these modes are often unlicensed and thus operate outside the reach of the law, in Hong Kong,

a network of privately operated taxibuses referred to as the “Public Light Buses” have always been legal (Cooper et al. 2010).

B. COMBINED MOBILITY

More recently, the potential of the taxi has been explored within the context of “combined mobility.” Combined mobility scholars argue that transportation modes other than the car can serve most mobility needs, but that a lack of integration between these modes leaves a mobility gap that can often only be bridged through car ownership (Huwer 2004; UITP 2011). The problem with car ownership as a solution to this mobility gap is that, once the significant upfront costs of car ownership are “sunk” into the purchase of a vehicle, the marginal costs of using the vehicle for any given trip are essentially negligible. As a result, driving becomes a relative bargain compared to alternatives like transit, bicycling, walking, or taxis; a car purchased to fill a 20 percent gap in urban mobility ends up—because of the economics of car ownership—serving the full complement of all trips. Huwer (2004), referring to this situation as a “mobility trap,” pointed to it as a key reason for why it is so difficult for mass transit to retain and attract riders (77).

Combined mobility focuses on closing the gap in the system of urban mobility, thus “[making] it possible to live and move around in the city without having to own a car” (UITP 2011, 3). Conventional fixed-route transit forms the backbone of the system, and should be able to serve the majority of motorized trips. For the minority of trips where fixed-route transit cannot meet the needs of the traveler, however, other seamlessly integrated options should be available, including bicycles, car-sharing, and taxis.

The combined mobility literature suggests that active integration of taxis with conventional fixed-route transit can help reduce the need for car ownership, and at the same time help fixed-route transit operate more efficiently, effectively, and attract more riders. Most of

the support for these arguments is based on experiences with car-sharing programs, which allow members to easily rent centrally-located vehicles for what is typically a few hours at a time (Huwer 2004; UITP, 2011). Huwer (2004), for example, interviewed 86 people testing a new car-sharing service being offered in two German cities and found that more than half had considering purchasing a car prior to joining the program. Of these, 53 percent stated that participating in the program allowed them to forego the purchase. Granted, many of these individuals lived in centrally located areas with good public transport accessibility, these findings still highlight the potential of combined mobility solutions to reduce the need for car ownership and thus help "rationalize" car use (UITP 2011, 2). More recently, King et al. (2011), analyzing GPS-data to track taxi movements in New York, noted the asymmetric pattern of taxi travel, where transit users will take transit for one leg of the trip, and then use a taxi for return trips or other legs of their journey. They point to this asymmetry to illustrate how taxis are complementary to transit and "help expand the value of the transit system" (7).

CHAPTER V. UNMET POTENTIAL

Paratransit and combined mobility scholars have identified many opportunities for the taxi to complement mass transit, address automobile dependency, and otherwise play a larger role in urban mobility. And yet, few of these opportunities appear to have been explored in practice; the role that the taxi plays in the contemporary American metropolis remains fairly limited.

In San Francisco, a study conducted in 2001 by Nelson Nygaard Consulting Associates found that one-third of San Franciscans use taxis "never" or "almost never," while roughly a quarter use taxis only a few times a year. Most residents perceive taxis as generally unavailable to- and unreliable for anyone except tourists interested in shuttling among San Francisco's many tourist destinations. San Francisco's 2004 Countywide Transportation Plan supports this perception, where the only paragraph in the 125-page document that addresses taxicabs describes them as "essential to San Francisco's hospitality and tourism industry" (San Francisco County Transportation Agency 2004, 37). The website of the San Francisco Municipal Transportation Authority, which is responsible for taxi policy, describes taxis as figuring "prominently in the modal mix" because "San Francisco's major industry is tourism." While facilitating tourism is indeed an important role for the taxi, it is clearly not the only role.

Koffman, Oettinger, and Johnson (2012) surveyed contacts from 26 state departments of transportation, 24 U.S. members of the International Association of Taxicab Regulators (IATR), and 8 taxi operators to determine the extent to which local and state governments have implemented partnerships with taxi companies. They identified eight kinds of partnerships: general public dial-a-ride, demand responsive service for seniors or people with disabilities, subsidized taxi rides for low mobility groups, wheelchair accessible taxi retrofit programs, non-emergency medical transportation, emergency (911) medical transportation, guaranteed ride home programs, and student transportation. They found that general public dial-a-ride

programs designed to complement conventional mass transit were rare. All other programs, furthermore, were designed to serve narrowly-targeted subsets of the populations with special transportation needs, such as seniors, people with disabilities, or low-income individuals.

While—undoubtedly—these programs make important contributions to both urban and rural mobility, they nevertheless represent only a small slice of what taxis can potentially offer. Rosenbloom (2003) would add that these contributions, specifically the ones related to people with disabilities, are severely limited in their reach. Many transit agencies partner with taxi operators to provide Americans with Disability Act (ADA) required substitutes for fixed-route transit. Rosenbloom (2003) noted that these substitutes are only available where there are regular transit services—"which are almost non-existent in rural areas and very limited in suburban areas, home to more than two-thirds of the elderly" (11). And even in urban areas, she continues, many of the transportation disadvantaged do not live close enough to existing transit lines to qualify for service. Finally, she points out that even if the transportation disadvantaged live near existing bus routes, the high cost of special transit services has forced "the overwhelming majority of metropolitan transit operators [to restrict] eligibility for those services" (9).

Clearly, the story of the taxi is a story of so much unmet potential. Why is this the case? Why is there such a wide gap separating what the taxi currently is—from what the taxi can be? A review of the literature generally points to two explanations: regulations, which suppress potential, and planners, who overlook it. The remainder of this chapter traces the evolution of these two explanations in greater detail.

A. OPPORTUNITIES ARE SUPPRESSED BY REGULATION

1. Early Regulation

Poor service quality has long been a defining characteristic of the taxi industry, with charges of price gouging, reckless driving, poor customer service, long waits, and filthy vehicles often leading the list of customer complaints. Officials have historically responded to these service quality issues by strictly regulating taxi operations. For example, under the London Hackney Carriage Acts of 1831 and 1843—generally seen as the historic predecessors of all modern day regulations—taxi operators were subjected to strict licensing procedures, restrictions on when they could work, and prohibitions on refusing passengers, overcharging them, taking on additional passengers without the consent of the first, using abusive language, blocking traffic, and driving recklessly (Gilbert and Samuels 1982).

These regulations would be revisited in the United States during the 1920s, when swelling urban populations and increasing levels of urban wealth combined with the growing ubiquity of the mass produced automobile to create an explosion in demand for intra-urban travel. As the number of taxis cruising city streets swelled to meet this demand, so too, unfortunately, did illegal activity associated with the cabs. According to Gilbert and Samuels (1982), cheating, hustling, false advertising, stealing, and extortion became common in the industry, spurred on by rate wars like the one that occurred in New York during the summer of 1924, where prices dropped to levels comparable to fares on the subway. Most cities responded by placing the industry under police control, limiting entry, and regulating fares. It was during this period that most of the restrictive legislation governing taxi operations today—and specifically the medallion system—were enacted (Rosenbloom 1970).

One notable addition to taxi regulations during this early period included the prohibition on taking on additional passengers without the consent of the first, also known as shared-riding.

This prohibition on shared-riding emerged in the late 1910s largely as a response to pressure from the streetcar industry to wipe out competition from jitneys, which were privately owned and operated automobiles that traveled streetcar routes ahead of the streetcars and picked up passengers for a five-cent (jitney) fare (Gilbert and Samuels 1982). Gilbert and Samuels (1982) noted that by 1916, roughly twenty-four thousand jitneys were in operation, nearly all of which were wiped out by 1920 as a result of anti-jitney ordinances.

2. Deregulation

Five decades later, these regulations would be revisited again, but this time by scholars arguing for their repeal. Verkuil (1970) and Rosenbloom (1970) among others argued that regulations imposed unnatural and artificial constraints on the supply of taxis in most metropolitan areas, and that these constraints were largely unjustified. As such, they advocated fiercely for deregulation—the elimination of price controls and entry restrictions—believing that it would unleash competitive free-market forces. These forces promised to improve customer service, lead to service innovations, expand service into poorly served neighborhoods, reduce fares, and reduce government spending by eliminating the need for a regulatory bureaucracy (Dempsey 1996).

These arguments emerged within the context of a broader ideological push for deregulation that "abhorred governmental pricing and entry control as manifestly causing waste and inefficiency, while denying consumers the range of price and service options they desire" (Dempsey 1996, 75). They were what Rosenbloom (1985) noted were ideologically driven arguments for deregulation that centered around the *costs* of regulation, but which largely ignored the *benefits* of or need for such regulation. Many of these arguments, for example, pointed to high taxi medallion prices as direct evidence of how government regulation was restricting supply and suppressing demand (Rosenbloom 1970; Verkuil 1970). But while high medallion values may indeed increase the cost of taxi service, the higher prices may be justified

if the regulations correct for market failures associated with the taxi industry, which as noted in Chapter 3, include negative externalities (congestion, air pollution) and the absence of a competitive market.

The literature on taxis as economic object expanded throughout the 70s, driven by scholars like Shreiber (1975; 1977) and Coffman (1977) who developed and refined an economic model of a taxi industry where cruising is the primary mode of operation. In Shreiber's model, taxis offer a premium form of transportation that largely serves highly time sensitive trips, and this premium is rapidly eroded by time spent waiting for a cab to arrive. Because of this fact, passengers are unlikely to "shop around" for taxis: In the interest of saving time, they will simply take the first cab that arrives. This situation means that taxi drivers have little incentive to compete with each other on the basis of price or quality of service, and as a result, service quality deteriorates and prices trend upward. Because of this dynamic, Shreiber argued, regulations were justified.

Williams (1980) countered that price competition in the taxi industry exists in the form of taxi stands, which create a fixed selling location and thus allow customers to choose among multiple taxis each competing with each other for fares. In Shreiber's (1981) rejoinder, he argued that while taxi stands in theory should allow for price competition, informal queuing rules preclude it in practice.

Williams (1980) also argued that price competition exists in the form of telephone-dispatch taxis, which are pre-arranged and thus correct many of the market imperfections that justify economic regulation of the street-hail and taxi stand markets. The telephone number required to operate in this market represents both a barrier to entry and exit, as it requires significant up-front investment (either directly by a firm or indirectly by affiliation) in central dispatching technology. This investment manifests itself as a telephone number—in essence a brand—which must be protected. The need to protect this investment and maximize returns

encourages drivers to compete with each other, putting downward pressure on price and upward pressure on service quality. It is, after all, easy for a mistreated customer to simply abandon one firm or operator for another: All they need do is dial another number. Drivers, furthermore, can potentially lure customers away from their competitors and thus increase their own profits by lowering prices.

Out of this dialogue emerged a more nuanced economic understanding of the taxi industry. On the one hand, there was a telephone-dispatch (pre-arranged) market, which engenders sunk costs and repeat business, and can thus regulate itself. On the other hand, there were the street-hail and taxi stand (on-demand) markets, with no natural barriers to entry or exit, and one-off relationships that begin at an origin and for the most part end at a destination. This latter industry needed to be strictly regulated.

Unfortunately, this nuance arrived a little too late to inform deregulation efforts in the taxi industry, which had begun in earnest in the late 1960s and continued through the 1970s (Dempsey 1996). The partial or complete deregulation of the taxi industry by 21 major U.S. cities during this period was undertaken without a thorough understanding of the economic nature of the taxi industry—with mixed results.

In his review of the empirical results of deregulation, Dempsey (1996) found that while the supply of taxis did in fact increase—rising an average of 23 percent across the many cities that deregulated—this increase was largely concentrated in the taxi stand, hotel, and airport markets; the telephone-dispatch market, which dominated service in most metropolitan areas, saw little new competition. He noted further that, because the taxi stand, hotel, and airport markets were already well served prior to deregulation, the additional entrants oversupplied the market, leading to rapid turnover, declining service quality, poor upkeep of vehicles, driver refusals of patron requests for short trips, and minor outbreaks of violence as frustrated drivers jockeyed for position in ever growing queues. History, it seemed, was repeating itself. Prices,

which were supposed to have been pushed down by competition, increased in almost every city that deregulated, with the most notable increases observed in the taxi stand markets. On the other hand, the telephone-dispatch markets were left largely untouched by deregulation, with the same or slightly poorer service as before (Dempsey 1996).

3. Reregulation

The problems with deregulation affected a relatively small but highly visible segment of the taxi market—airports and tourists; the telephone-dispatch markets serving the large majority of trips were largely unaffected by these problems. Nevertheless, precisely because the affected market was the most visible, and because policymakers still did not distinguish between the pre-arranged and on-demand markets, by 1991, of the 21 cities that had experimented with deregulation, all but four had re-regulated their industries, either in whole or in part—telephone-dispatch and all (Dempsey 1996).

Some scholars have argued that the empirical findings from the American experiment with deregulation are difficult to interpret because deregulation has only been partial (Moore and Balaker 2006; Rosenbloom 1985). Moore and Balaker (2006), for example, noted that although many cities—including Atlanta, San Diego, Seattle, and Indianapolis—permitted free entry, they did not fully deregulate fares and services. Shared-ride services, furthermore, generally remained forbidden (Moore and Balaker 2006).

Even so, Rosenbloom (1985) argued that whether or not complete deregulation or privatization of the taxi can potentially have substantial benefits in the future, it is unlikely that such "real" deregulation will occur, especially given the political capital wasted on partial deregulation. As such, she continued, "we would do better to assess new roles for the taxi within existing regulatory structures" (190). Generally, the medallion system that serves as the lynchpin of most regulatory schemes today engender such political and economic inertia that

“increasing or abolishing medallions in the near future is seductive as an ideal but totally unrealistic” (Suzuki 1995, 135).

Scholars who have studied the empirical results of deregulation generally agree that what is needed is not deregulation, but better regulation (Gilbert and Samuels 1982; Teal and Berglund 1987; Dempsey 1996). Dempsey (1996) argued that “better regulation” required better oversight by regulatory bodies to assure “the appropriate ratio of taxis to passengers to ensure prompt, safe, and reasonably priced service for the public, while allowing efficient and well managed firms to earn a reasonable return on investment” (117). Teal and Berglund (1987) had a more general recommendation:

> The market imperfections which exist even in a deregulated taxi industry, and the results of deregulation to date, argue for a more sophisticated view of this transport market (55).

Findings in the more contemporary literature suggest that this “more sophisticated view” should reflect a clear distinction between the pre-arranged (telephone-dispatch) and on-demand (street-hail and taxi stand) segments of the market (Darbera 2007; Schaller 2006). Such a regulatory distinction was unnecessary in the early days of the telephone-dispatch, because the gap in level of service between a street-hail taxi and a telephone-dispatch taxi meant that one could not be substituted for the other (Shreiber 1981). Stated another way, because it took so long for a pre-arranged taxi to arrive, and because the primary reason one takes a taxi is to save time, a clear dichotomy existed between pre-arranged and on-demand taxis. However, as logistics improved with the introduction of the two-way radio, and as telephones became standard household appliances, the line between these two services blurred, and their service offerings—from a customer’s perspective at least—began to converge.

This blurring could have arguably been good for the industry, had it been allowed to proceed through to its natural conclusion. Telephone-dispatch taxis could have expanded into outlying areas where demand for service was lower and street-hail cabs could not venture

(Williams 1981)—but entry restrictions stifled growth in these geographies. They could have competed with street-hail and stand taxis in central city areas by offering lower fares to offset the extra time it took to dispatch (Williams 1981)—but fare restrictions fixed prices.

This competition could have spurred further innovation in dispatch technology in a dynamic cycle of improved taxi service and decreasing costs. The operable territories of on-demand taxis would have been eroded by pre-arranged taxis, surviving only in the densest parts of the central core, or perhaps even supplanted entirely. Instead, politics got in the way.

Williams (1980) pointed to the stifling of competition from telephone-dispatch operators in Melbourne, Australia, who were not subject to regulation, by cruising taxi operators—who were. Bowing to political pressure from street-hail operators, the Melbourne City Council eventually extended regulations governing entry and fares of street-hail taxis to their telephone-dispatch brethren, effectively ending competition between the two market segments. Darbera (2007) noted how in New York, Paris, and London, taxi drivers responded to the threat of improving telephone-dispatch technology by lobbying regulators to stifle the growth of supply in the telephone-dispatch market.

Today, most regulatory systems conflate the on-demand and pre-arranged markets, even though the economic literature clearly recognizes a distinction between the two (Darbera 2007). Since regulations by their nature attenuate potential, this conflating of the two markets has hampered the full development of technology within the telephone-dispatch market. As a result, telephone-dispatch service in many cities in often unreliable, and wait times are long. In a 2000 survey by the San Francisco Police Department's Taxi Detail, investigators found that for any given passenger telephoning for a cab, there was only a 40 percent chance that it would arrive (Nelson Nygaard Consulting Associates 2001). Of the 588 test calls Taxi Detail made requesting a taxi, 170 (29%) were not even answered.

Enforcing these arbitrary regulations, furthermore, has been costly and largely ineffective. The City of Los Angeles, for example, has struggled to contain a shadow or "bandit" taxi industry, largely concentrated in ethnic enclaves like Koreatown and East Los Angeles, and consisting mostly of telephone-dispatch operators. Many of these bandit taxis operate in a gray area where they are legally registered to provide pre-arranged transportation services, but violate municipal regulations when they dispatch a vehicle immediately in response to a customer request for service. To pay for expanded enforcement efforts, the Los Angeles City Council in 2006 approved a $30 a month "bandit assessment fee," to be paid by all operators, and "a modest $0.20"surcharge per taxicab trip, to be paid by customers (Office of the City Clerk 2007).

And yet bandit operations continue to thrive in spite of these efforts. A research team from the University of California, Los Angeles (which included the author), based on interviews with five bandit taxi operators in Koreatown, estimated that there were anywhere from 200-300 firms (identified by a unique telephone number) operating in the 3 square mile neighborhood, the majority of which were small operations involving anywhere from 1-5 drivers coordinated through a central dispatcher. Assuming an average of 2.5 drivers per firm, this yields an estimated 500 - 750 bandit taxis operating in Koreatown, or anywhere from 4 to 6 taxis per 1,000 Koreatown residents. To put these figures in perspective, there are currently only about 2,300 taxis licensed to operate across the entire 500 square mile expanse that makes up the entire City of Los Angeles (Los Angeles Department of Transportation 2010). Distributing this figure across a municipal population of roughly 3.8 million yields roughly 0.6 taxis per 1,000 residents.

In cities where regulators explicitly recognize and separate the on-demand and pre-arranged markets, taxi service is generally more robust (Darbera 2007). New York and London, for example, maintain strict controls on their hail cab and taxi stand markets, but allow their telephone-dispatch markets to operate largely unhindered by regulation. In Paris, no such

distinction exists: Taxis serve all three markets, and competition from firms looking to focus on the telephone-dispatch market is actively suppressed. According to Darbera (2007), in New York and London, there are anywhere from two to three times more telephone-dispatch operators than street-hail and taxi-stand operators. When he compared taxi service between these three markets, he found that—compared to Paris—New York and London offered a more diverse supply, more value for users, greater accessibility in disadvantaged areas, and expanded employment opportunities within the industry.

Some economists, like Dempsey (1996), argue that separating the two markets decreases efficiency by curtailing economies of scope. While it is true that a taxi could function more efficiently by serving all three of the taxi stand, street-hail, and telephone-dispatch markets concurrently, the magnitude of these efficiency gains is likely to be relatively small, compared to the benefits described above of having a more robust system of taxis. This is because these three markets exhibit very little spatial overlap in the modern American metropolis: Street-hail taxis are limited to specific districts, typically in the urban core of many metropolitan areas, and the most important taxi stand markets today are at airports located far from where the majority of the population resides (Cooper et al. 2010).

As this review of the economic literature on taxis has demonstrated, regulations that were appropriate to a taxi industry dominated by the on-demand market continue to persist, even though, as discussed in the Chapter 3, these segments of the market have long since been eclipsed by pre-arranged service. These regulations—by attenuating the potential of the free-market to increase levels of service, improve efficiency, reduce costs, and spur innovation—have and continue to limit the taxi's role in urban mobility.

Still, regulations only partially explain the unmet potential of the taxi: The opening of new frontiers free of regulation does not in and of itself guarantee their exploration. This is especially the case given that so much of the taxi's potential depends on active partnerships with public

agencies, for whom the profit-motive is largely absent. The next section examines the role of these public agencies—and the transportation planners who staff them—in actively exploring this potential.

B. OPPORTUNITIES ARE OVERLOOKED BY PLANNERS

Lave (1981) has argued that unlocking the potential of the taxi is as much a matter of purpose as it is of regulation. The taxi industry needs champions, in other words, champions who see the taxi not as an isolated industry, but as a partner in a comprehensive system of urban mobility. He urged transit agencies dealing with looming deficits to take an active role in promoting paratransit by acting as a broker between paratransit operators and the public. Other scholars have similarly argued for planners to get more involved with their local taxi operators. Gilbert (1978) urged planners to pay operators a visit, and to look into reviewing and revising local taxi ordinances. Barker and Beard (1978) argued that a language barrier would have to be overcome between taxi operators and bureaucratic planners in order to facilitate cooperative planning, and that overcoming this barrier would require planners to develop a better understanding of regulations, issues, and opportunities.

Have planners heeded these calls? King, Peters, and Daus (2011) contrast the attention being paid by contemporary planners to car-sharing programs with the scant attention being paid to taxis. Car-sharing champions have touted its ability to decrease rates of auto-ownership, increase public transit ridership, and increase the efficiency and effectiveness of public transit (Huwer 2004; UITP 2011), and their efforts have led to the expansion of car-sharing programs in cities across the world. Notably absent from these discussions however, is the taxi, even though

taxis can provide many of the same mobility benefits of car-sharing, and often other secondary benefits to land-use and local economic development as well (King et al. 2011).

Regulation and governance of taxicabs, furthermore, continues to be dominated by enforcement concerns, rather than transportation concerns. In the City of Los Angeles, for example, the taxi industry is governed by a five member commission—three of whom are lawyers—and none of whom has any sort of transportation background (Los Angeles Department of Transportation 2007). The last major action taken by Los Angeles Department of Transportation (LADOT) taxicab administrator Tom Drischler was to hire the consulting firm Nelson Nygaard to conduct a comprehensive review of its taxicab regulatory program (Drischler 2010). The review was in response to Blasi and Leavitt's (2006) report detailing the harsh economic conditions endured by taxi drivers in Los Angeles, and as such, was focused on problems internal to the taxi industry, rather than on opportunities for the taxi as a tool for urban mobility.

In San Francisco, a 1998 voter-approved charter shifted policy and governing authority over the taxi industry away from the Police Commission, to a citizen board appointed by the Mayor (City and County of San Francisco 2009). In 2009, this citizen board was later merged with the San Francisco Municipal Transportation Agency, which today regulates and administers to the taxi industry via its Division of Taxis and Accessible Services. These mergers were completed, ostensibly, to better integrate taxis into the system of urban mobility. And yet, based on the author's own experiences as a summer intern with Taxi Services in 2010, little taxi planning takes place: The understaffed division remains focused on issues of regulation and enforcement.

A cursory review of recent transportation plans finds little mention of taxis.Taxis are largely overlooked in the City of Los Angeles' primary transportation planning document—the Transportation Element of the General Plan (Blasi and Leavitt 2006). A cursory review of

neighborhood level plans reveals that they are largely overlooked there as well. The "Transit Improvements" section of the *Los Angeles Wilshire Community Plan*, for example, states that "while it is anticipated that the private automobile will remain the primary mode of private transportation within the time frame of the Plan…opportunities exist within the Wilshire Community Plan Area to increase the use of public transit" (2001, 3-24). Notably lacking from these opportunities—which include bus service, community bus and van shuttles, and the Red Line subways—are taxis. Rather than explore opportunities to use taxis as feeders to public transit, the plan proposes the following:

> Continue to provide Smart Shuttles as "feeder" services for public transit among residential areas along Collector Streets and Local Streets; and provide convenient access to bus services, Subway Stations or activity centers, such as, Farmers Market, Beverly Center/Cedars-Sinai, Wilshire Center, the Miracle Mile, and Park La Brea. These Shuttles, with 20-passenger seating capacity, complement existing bus services in approximately 20-minute full-circle routes in areas not currently served by larger buses (2001, 3-25).

In the San Francisco County Transportation Authority's *2004 Countywide Transportation Plan*, which spans 125 pages, a tiny subsection of Chapter 2, Part C, Section 4 mentions taxis as "essential to San Francisco's hospitality and tourism industry" (35). In a section that discusses strategies for managing parking, no mention is made of the potential for taxis to help reduce parking demand. There is no mention of the taxi in the *2010 San Francisco Better Streets Plan* either, published by the City and County of San Francisco's planning department. One major goal of the plan, which establishes design guidelines for improving the pedestrian realm, is the integration of pedestrians with transit. They explore "transit rider amenities at key stops; safe, convenient pedestrian routes to transit; mutual features that benefit pedestrian safety and comfort and transit operations, such as bus bulb-outs and boarding islands" (1). Because their definition of "transit" ignores the taxi, the plan thus overlooks opportunities to enhance the pedestrian experience by considering how access and egress by taxis might be facilitated by better street design.

The intent of this section is not to trivialize regulatory and enforcement efforts, but merely to point out that interest in taxis remains narrowly focused on the taxi as almost a nuisance to be regulated, rather than a true partner in urban mobility. Scholars have long called for planners to study and research taxis, to actively integrate taxis into the transportation planning process—to be champions for the taxi industry. And yet these calls appear to have gone unheeded, at least in the cities examined here. Planners—and their plans—continue to champion public transit, cycling, walking, and car-sharing as solutions to our urban transportation ills, but largely overlook opportunities to partner with taxis. Why might this be the case?

C. FRAMING THE ANALYSIS

Many scholars have pointed to perceptions—internalized and unexamined assumptions about the taxi—to explain why planners might be overlooking the taxi. Gilbert and Samuels (1982), for example, argued the following:

> The taxi industry lacks the technological attraction of rapid transit, light rail, and other more futuristic modes. Nor does it receive the publicity that large-scale bus systems get as a result of their visibility. Finally, it exists in the private, rather than the public sector. These reasons have no doubt made planners, public officials, and students of urban transportation content to ignore taxi ordinances while they focused on such programs as area rapid-transit systems, authorities, and developmental technologies (4).

Teal (1978) pointed to the possibility that planners may be clinging to an overly narrow conception of public transit, noting in the opening chapter to the *Proceedings of the Conference on Taxis as Public Transit* that "juxtaposing [taxis and public transit] ten years ago would have been cause for some serious concern about one's transportation credentials" (3).

Gilbert (1978), reviewing examples of innovative taxi service implemented in a handful of cities across the United States, argued that poor public image was one barrier to innovation. "Few people realize the variety of services [taxis] provide, and in many cases this poor image

hampers them when competing for new markets" (78). He recommended that taxi operators remove the word "taxicab" from their names and rebrand themselves as "paratransit" or even "transportation" companies. More recently, King, Peters and Daus (2011) noted that taxi service is viewed too often as a luxury good for the wealthy, and that for this reason taxis remain largely understudied in the planning literature.

To my knowledge, there has been no comprehensive study undertaken to gauge the extent to which these perceptions exist. This thesis seeks to fill this gap in our understanding—to make explicit any internalized and unexamined assumptions that planners might hold about the taxi. It asks the question: *How do transportation planners perceive of the taxi industry?*

Internalized and unexamined assumptions about what the taxi is dictate and ultimately limit the role that the taxi can play in the transportation planning process. Planners interested in addressing urban inequality and transportation justice may ignore the taxi because they perceive it as a mobility option for the privileged and wealthy, when in reality the market for taxis is a dichotomy of rich and poor. Planners who see taxis as "just another private automobile" may ignore the potential that the taxi can play in reducing demand for parking, addressing urban congestion, reducing air pollution, and helping to build the political constituency needed to support deeper, more structural changes to our transportation system. Planners who advocate for public transit to play a larger role in urban mobility may seek to actively limit the role of taxis out of fear that taxis will compete with bus and rail systems for much needed customers, when in fact more taxis operating during peak hours can help mass transit operate more cost effectively.

The answer to the research question posed above regarding planners' perceptions of taxis is the key to understanding why the taxi industry remains largely invisible to transportation planners, and why the potential of the taxi industry to address some of our most intractable urban mobility problems remains largely untapped.

CHAPTER VI. HYPOTHESIS

This research seeks to identify the perceptions of those in a position to integrate the taxi more closely into the system of urban mobility: transportation planners. It will test the hypothesis that the role of taxis in urban mobility is shaped, and perhaps limited, by planners' perceptions of the taxi, many of which may depart substantially from empirical reality. The remainder of this section will lay out these perceptions, and examine their veracity in greater detail.

1. Taxis primarily serve the wealthy

Planners—many of whom are interested in addressing urban inequality and transportation justice—may ignore the taxi because they perceive it as primarily serving the wealthy (King et al. 2011).

Studies of taxi patronage, however, clearly contradict this notion. In her pioneering studies of taxi patronage in the 1970s, Rosenbloom (2001) found that the market for taxis was very bifurcated, made up of—in her words—"rich businessmen and poor people."

This bifurcated market appears to have persisted through the decades. Pucher and Renne (2003), examining data from the 2001 National Household Transportation Survey, found that taxi usage as a percentage of overall trips was much higher for the wealthiest and the poorest households. They also found that the percentage of total trips made by taxi was between five to ten times higher for zero or one car households than for those with two or more. My own analysis of 2009 Bureau of Transportation Statistics Omnibus Household Survey data, presented in Chapter III, revealed similar results. The fact that bandit taxis play such a large role in poor, immigrant communities in cities like Los Angeles, San Francisco, and New York is further evidence that taxis are an important mode of transportation for both rich and poor (Landsberg 2000; Sugerman 2012).

This bifurcated market for taxis is also observed outside the United States. Darbera (2010) analyzed National Travel Survey data in London from 1996 to 2003 and found that the poorest Londoners make use of taxis about as often as the wealthiest Londoners. He observed a similar pattern in Paris, France a well.

2. Taxis are too expensive

Planners—many of whom are interested in promoting public transit as a less costly alternative to the private automobile—may ignore the taxi because they believe it to be "too expensive."

But "expensive" is a relative term. Taxis are indeed expensive in out-of-pocket terms when compared to the automobile, but when we compare the total cost of driving a private automobile to the total cost of using a taxi on occasion in conjunction with other modes of transportation—as the combined mobility literature suggests—the taxi can often turn out to be quite a bargain. A comparison of the total costs of two modes in Southern California is illustrated in **Table 1** and **Figure 5** below.

Monthly Costs	Private Vehicle	Transit + Taxi	*Transit Pass*	*Taxi (8x3 mile)*	*Taxi (8x6 mile)*
Fixed	$528	$84	*$84*	*$0*	*$0*
Variable	$235	$235	*$0*	*$85*	*$150*
Total Monthly Cost	$763	$319	*$84*	*$85*	*$150*

Table 1: Total monthly costs of private automobility versus public transportation *(Based on data from: Automobile Club of Southern California (2010); Los Angeles County Metropolitan Transportation Authority; City of Los Angeles Department of Transportation)*

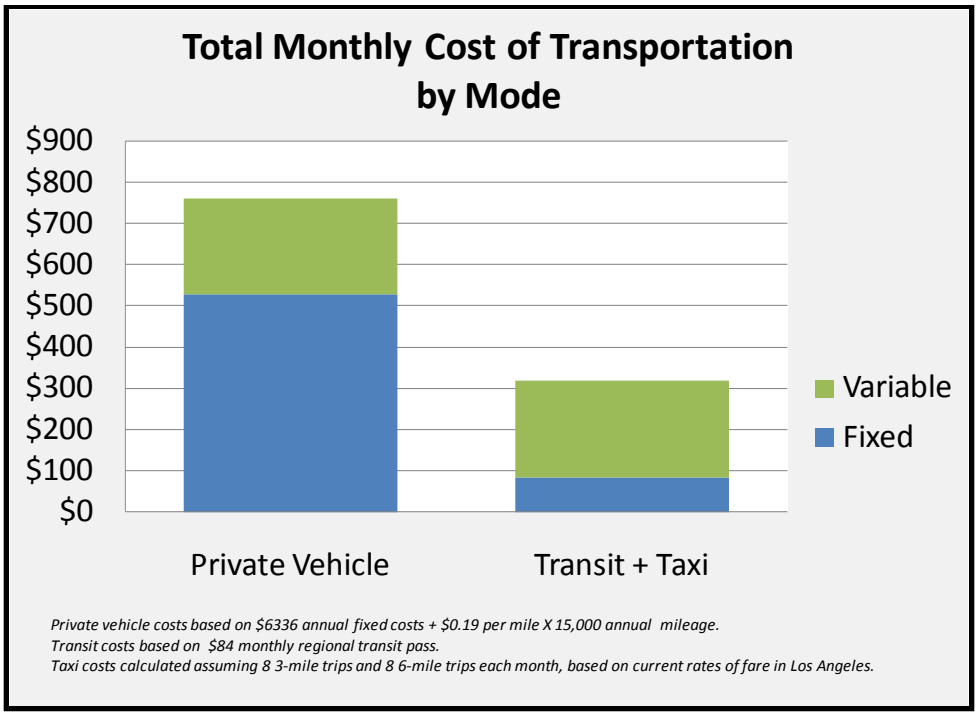

Figure 5: Total monthly cost of transportation by mode *(Based on data from: Automobile Club of Southern California (2010); Los Angeles County Metropolitan Transportation Authority; City of Los Angeles Department of Transportation)*

Taxis are also "too expensive" as a replacement for conventional fixed-route mass transit, but again, this is not their primary role. Taxis extend conventional mass transit by providing a premium form of transportation that serves door-to-door, time-sensitive trips in what is often an exclusive-ride manner. And this premium is reflected in the price of taxi service.

Taxis may also appear "too expensive" relative to fixed-route mass transit, but this is only because so much of the price of mass transit is heavily subsidized by government. The magnitude of these subsidies increases during peak hours, during evenings and weekends when demand is low, and in outlying suburban areas where riders are few and far between. These are precisely the situations where scholars have suggested taxis be introduced to help increase the cost-effectiveness of transit, improve service, and reduce operating deficits.

Thus, the reality is that taxis can be too expensive in certain situations, but very reasonably priced in others. And planners who dismiss the taxi outright as "too expensive" are

ignoring opportunities for the taxi to help fill a gap in urban mobility that conventional fixed-route transit alone cannot bridge.

3. Taxis only work in dense, urban environments

Planners—many of whom are struggling to extend public transit into what are increasingly sprawling, medium- to low density metropolitan areas—may ignore the taxi because they believe taxis only work in densely built, compact urban cores.

This perception may be driven in part by the largely outmoded association between taxis and cruising, a mode of operation which cannot be sustained outside of dense, urban cores. The reality, however, is that the majority of taxis today are either hailed at a taxi stand or dispatched by telephone (Darbera 2007; Dempsey 1996; Williams 1980). And both of these latter forms operate quite well in and out of dense, urban cores. Eckert (1970), for example, noted the importance of taxi stands to taxi operators in the City of Los Angeles, where low population densities and a relative absence of foot traffic meant that taxi operations would be uneconomic "unless rights to operate [were] accompanied by rights to wait for passengers at taxi stands" (409). Darbera (2010) noted that livery service prearranged by telephone accounts for a quarter of all taxi trips in New York, and primarily serves residents in the outer boroughs of The Bronx, Brooklyn, and Queens.

4. Taxis are nuisances to be regulated

Planners may be resistant to the idea of taxis playing a larger role in urban mobility simply because they perceive taxis to be nuisances. Gilbert and Samuels (1982) noted that "to many people taxicabs conjure up images of vices ranging from prostitution to illicit liquor; taxi drivers are viewed with suspicion; and driving a taxi is considered a job of last resort" (3). They argued that this perception leads planners to view taxi policy as largely a punitive concern—the jurisdiction of police departments—rather than a transportation concern, to be considered by

planners. Blasi and Leavitt (2006), who spoke to numerous taxi drivers, company officials, and city regulators as part of a study examining the livelihood of taxi drivers in Los Angeles, argued that the Los Angeles Department of Transportation doesn't view taxis as "meeting real transportation needs" (12).

Gilbert and Samuels (1982) noted that this perception is grounded largely in an early history where cruising was the dominant mode of operation, and a lack of regulations gave rise to price gouging, poor customer service, destructive competition, and rarely, criminal activity which was unfortunately sensationalized in the media.

The taxi industry of today is a very different industry, however. Cruising is no longer the primary mode of operation, and where it is, it is often carefully regulated. The pre-arranged (telephone-dispatch) market serves the overwhelming majority of taxi trips in most cities, and several scholars have argued that if this market were not stifled by unnecessary regulations, it could serve a greater proportion of all trips (Darbera 2007; Seymour 2011).

Gilbert and Samuels (1982) noted, furthermore, that negative perceptions of the taxi drivers themselves are largely unfounded, arguing that:

> …with few exceptions, taxi drivers are law-abiding citizens. Many have made their occupation a career, and a number have sent their children through college on their taxi earnings. A large percentage of taxi drivers are not employees but independent entrepreneurs who own or lease their vehicles (3).

The results of Blasi and Leavitt's (2006) study, which involved a survey of 302 taxi drivers in the City of Los Angeles, contradicts the widespread notion that driving a taxicab is a transitional job. Their study found that the median taxi driver in Los Angeles has been driving for 12 years, and that less than a quarter have been driving for three years or less.

5. Taxis are a threat to mass transit

Planners may resist the idea of taxis playing a larger role in urban mobility because they see taxis as a threat to mass transit. This perception is founded in a narrow conception of the taxi industry that ignores its potential as a complement to conventional public transit. Numerous examples from the paratransit literature clearly demonstrate the potential for taxis to help conventional fixed-route transit operate more cost-effectively while offering higher levels of service for particular travelers and trips. The combined mobility literature, furthermore, has demonstrated the ability of car-sharing programs to reduce car-ownership rates and increase transit ridership (King et al. 2011). Based on a customer survey carried out in 2009 by car-sharing firm Taxistop-Cambio in Brussels, Belgium, the International Association of Public Transport estimated that each car-sharing car replaces 8.6 private cars—a figure they found to be similar in other regions where car-sharing schemes are in operation (2011, 4). This suggests that expanding the role of the taxi, itself the most widespread (if often overlooked) form of car-sharing, can help shift trips away from the private automobile and thus boost transit ridership.

6. Taxis exacerbate congestion and air pollution problems

Planners may resist the idea of taxis playing a larger role in urban mobility because they see taxis as simply another automobile: environmental nuisances that exacerbate congestion problems and contribute to air pollution.

But insofar as developing the role of the taxi as a substitute for car ownership in a system of combined mobility can help shift trips away from the automobile and onto more environmentally sustainable modes—the taxi can help address congestion concerns and reduce air pollution.

Whether or not they serve as complements to public transit, taxis also help to address congestion and air pollution concerns by reducing demand for parking lots and structures to

store private vehicles, and the need to cruise for on-street parking spaces. Shoup (2007) reviewed sixteen parking studies conducted between 1927 and 2001 and found that on average 30 percent of cars in congested central-city traffic were cruising for parking. He estimated further that drivers cruising for parking in Los Angeles' Westwood Village contribute an extra one-million additional vehicle-miles-traveled to the tiny 15-block commercial district, exacerbating congestion and contributing to air pollution. These findings suggest that replacing a private vehicle trip with a taxi trip, which doesn't require cruising for parking, can help mitigate congestion and improve air quality.

It is much easier, furthermore, to improve the average fuel efficiency and emissions profile of a fleet of taxis than of a multitude of private vehicles. There are two reasons for this: First, regulating the behavior of an industry is much more politically acceptable than regulating the behavior of the 90% of American households (Pisarski 2006) who own at least one car. Second, taxi vehicles are replaced much more frequently than private vehicles. In Los Angeles, for example, regulations prohibit vehicles in excess of five years of age from being used as taxicabs (City of Los Angeles 2007). In San Francisco, as a result of a "Green Taxi" program initiated in 1997, 92% of the taxi fleet is today comprised of hybrid or compressed natural gas vehicles (City and County of San Francisco 2012).

7. Taxis are not public transit

Gilbert and Samuels (1982) have submitted that planners may be ignoring taxis for the simple reason that they exist in the private realm, whereas the traditional role of the planner has been focused on directing large-scale public investments. These investments, furthermore, are often capital in nature, whereas taxi service is largely operational in scope.

But public transit need not be publicly provisioned. And in fact, for most of its history, publicly accessible transportation was privately operated (Jones 1985). The public in public transit is a reference to its common-carrier status—not to ownership.

Taxis, furthermore, operate in public rights-of-way, and thus engender conflict over the allocation of not only scarce road and highway capacity, but in the case of taxi stands, over the allocation of valuable central city real estate as well. Attempts to allocate curb space to taxi stands, for example, are often met with hostility from businesses and residents, who view each new taxi stand as one less on-street parking space (Cooper et al. 2010). Such conflicts must be resolved within the context of larger transportation goals, goals which are often shaped through the planning process.

Perception versus Reality

Chapter 6 has highlighted and challenged a few of the possible misconceptions that transportation planners might have about the taxi, misconceptions that possibly limit the role that the taxi plays in urban mobility. These misconceptions are summarized in Table 2 below.

Common Perception	Hypothesized Reality
Taxis primarily serve the wealthy.	Taxis serve a bifurcated market of rich and poor.
Taxis are "too expensive."	Relative to the total cost of owning and operating a car, and relative to what conventional fixed-route mass transit prices would be were they not subsidized by government, the cost of a taxi—in many situations—appears quite reasonable.
Taxis only work in dense, urban environments.	The majority of taxis today are either hailed at a taxi stand or dispatched by telephone, and these modes of operation can be sustained in and out of dense, urban cores.
Taxis are nuisances to be regulated.	Taxis are not inherently criminal. These perceptions are grounded in an early history before regulations were commonplace. Taxi drivers are decent, law-abiding citizens, and many have been working in the industry for years.
Taxis are a threat to mass transit.	Taxis complement mass transit, and as part of an integrated system of combined mobility, can actually boost transit ridership.
Taxis exacerbate congestion and air pollution.	Taxis help to rationalize car use, and thus help shift many trips away from the automobile and onto more environmentally sustainable modes like walking, bicycling, and mass transit. Taxis can help address congestion and air pollution by reducing the need for both parking and cruising for parking. It is easier to improve the average fuel efficiency and emissions profile of a taxi fleet than it is to do the same for a multitude of private vehicles.
Taxis are not public transit.	Taxis are common-carriers and thus open to the public. Taxis operate in public right-of-ways and thus engender conflict. This conflict must be resolved within the context of larger transportation goals.

Table 2: Summary of hypotheses

CHAPTER VII. METHODOLOGY

This study uses traditional survey techniques to construct a picture of the taxi industry through the eyes of transportation planners. I chose the transportation planner as the unit of analysis because, according to the American Planning Association, it is these individuals who "[deal] with how transportation systems effectively and efficiently move people and goods, shape urban form, affect economic vitality, and impact quality of life" (American Planning Association 2008). As such, they are in the best position to help integrate the taxi more closely into the system of urban mobility.

A. IDENTIFYING PARTICIPANTS

I identified transportation planners through their affiliation with two national organizations: the Transportation Research Board (TRB), and the Transportation Professional Certification Board (TPCB).

TRB is one of the six major divisions of the National Research Council, with membership drawn from engineers, scientists, and other transportation researchers and practitioners from the public and private sectors and academia. The organization provided contact information for 811 individuals whose titles or affiliations included the term "planning" or "planner."

TPCB is an autonomous certification body affiliated with the Institute of Transportation Engineers. TPCB offers a unique "Professional Transportation Planner" certification program (requirements listed in **Figure 8** below) that specifically addresses the work performed by transportation planners. The TPCD website has a publicly available directory of individuals who have completed the certification program. I was able to obtain the contact information for 260 individuals through this directory.

Between the TRB and TPCB lists, net of invalid e-mail addresses, and 3 overlapping contacts, I was able to obtain contact information for 885 unique individuals.

Requirements

To be certified as a Professional Transportation Planner® you must meet all of the following requirements:

1. Have an accredited master's or Ph.D. degree in planning or transportation with three years of professional work experience in transportation planning, or have an accredited bachelor's degree in a transportation, or planning course of study and four years of professional work experience in transportation planning, or have an accredited bachelor's degree in a non-transportation, or non-planning course of study and five years of professional work experience in transportation planning;
2. Take and attain a passing score on the Professional Transportation Planning exam; and
3. Have paid the application/examination fee and the three-year certification fee.

Figure 6: "Professional Transportation Planner" certification program requirements

B. SURVEY DESIGN

The electronic survey was an appropriate tool for this study given 1) the need for a large sample size; 2) the need for direct comparison across individuals; and 3) the financial and temporal constraints associated with a master's thesis.

I designed the survey to test each of the perceptions discussed in the hypothesis. Respondents were asked to respond to a series of questions that probed their understanding of the taxi industry along various dimensions. Most questions asked respondents to indicate how strongly they agreed or disagreed with a series of statement, such as "taxis are a form of public transportation" or "transportation planners should promote more travel by taxi."

To analyze the results, I converted each response to an agree/disagree question into a scalar quantity ranging from -2 to +2, with +2 indicating "Strongly Agree" and -2 indicating "Strongly Disagree". Responses marked "Neither Agree nor Disagree" were coded with a 0.

Based on an average across all respondents, I made a determination as to whether respondents generally agreed (< 0) or disagreed (> 0) with the statement. I tested these conclusions for statistical significance at the 0.05 level.

I developed the survey, which can be found in the appendix, electronically using the website SurveyMonkey.com. I sent each potential respondent an electronic link to the survey in an email invitation describing the goals of the study and requesting their participation. I secured human subjects research approval through the North General Institutional Review Board (NGIRB) of the University of California, Los Angeles on February 28, 2012. I launched the survey on March 15, 2012 and closed it roughly six weeks later on April 30, 2012. No reminders were sent.

C. CAVEATS OF THE METHODS

The degree to which the results of this survey can be generalized to the broader population of transportation planners depends on the degree to which the sample is representative. Since personal contact information is sensitive information and therefore carefully guarded, my sample population was limited to individuals affiliated with either the Transportation Research Board or the Transportation Professional Certification Board.

Limiting my sample to these two organizations may introduce certain biases. For example, there may be a self-selection bias in TRB membership that leads to an overrepresentation of academic or research-oriented planners, given that the key mission of the organization is to “provide leadership in transportation innovation and progress through research and information exchange” (Transportation Research Board Website 2012). Similar selection biases might exist in the population of transportation planners who have been accredited by the TPCB. For example, because of their affiliation with the Institute of Transportation Engineers,

these planners may have a more technical orientation than the population at large, or may be drawn largely from the private sector.

A rough comparison of organizational affiliations between the two lists, based on an analysis of their email address domains, revealed that, indeed, transportation planners from the private sector made up a greater proportion of those with TPCB accreditation (68%), compared to those affiliated with TRB (33%). On the other hand, government affiliated individuals made up a greater proportion of the TRB affiliated sample (58%), compared to those from the TPCB sample (24%). The TRB sample also had a slightly higher proportion of individuals affiliated with an academic institution (3.3%) compared to the TPCB sample (1.5%). The results are illustrated in Figure 7 below. While these results suggest biases in the survey sample, there is little reason to believe that a more academic orientation, or a private versus public sector orientation, might skew the survey results.

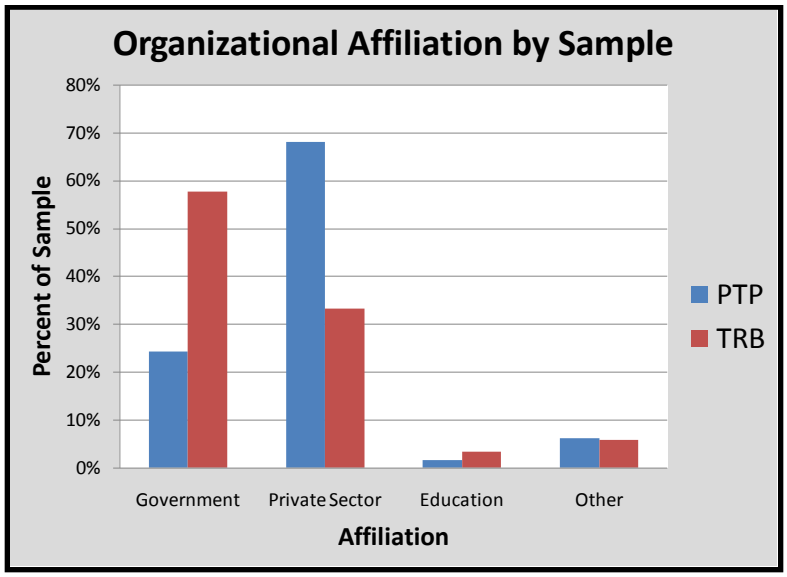

Figure 7: Organizational affiliation of sample population

The survey technique, furthermore, presents two limitations (SurveyMonkey 2008; SurveyMonkey 2009). First, survey respondents are sensitive to the wording of questions, and may interpret them quite differently than the researcher intended. To minimize the effect of this

first limitation of survey results, I reviewed the survey instrument with my three faculty advisers and tested the survey instrument on a group of five peers, making revisions to the language and wording of questions as necessary to minimize misinterpretation.

The second limitation inherent to survey techniques is that they may fail to provide representative data if response rates are skewed. As information about the sample demographic was largely limited to names and email addresses, and because I was unable to track non-respondents individually, I had to assume that the sample was representative, and that the responses were not skewed in any way.

CHAPTER VIII. FINDINGS

A. RESPONDENT SUMMARY

Of the 885 self-identified transportation planners invited, 147 (17%) responded. Of these, 133 (91%) completed the entire survey. Respondents ranged in age from 25 to 79 years, and had anywhere from 3 to 52 years of professional experience. The median respondent was 47 years old, with 19 years of professional experience.

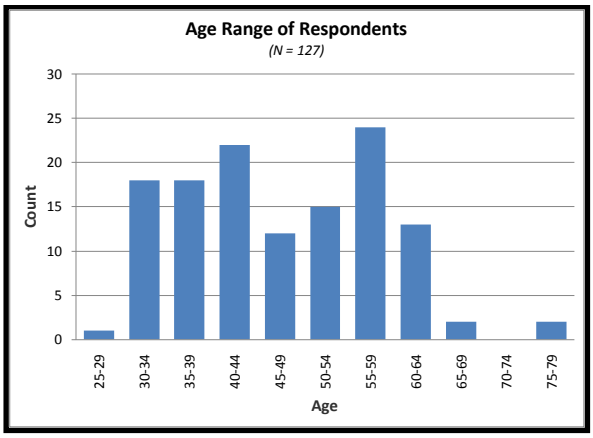

Figure 8: Age Range of Respondents

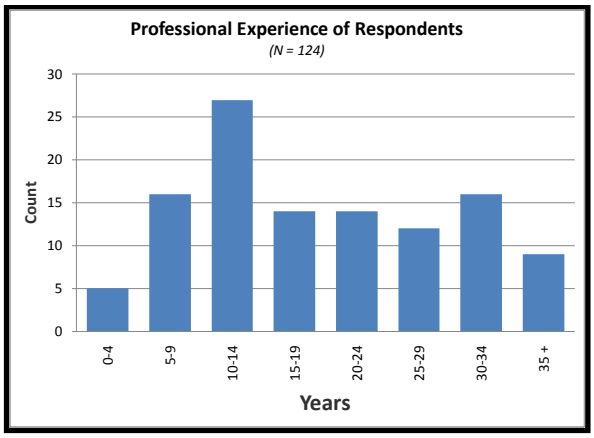

Figure 9: Professional Experience of Respondents

Respondents hailed from 65 different cities, representing 28 different states. Five states (plus Washington, D.C.) accounted for roughly half (53%) of all respondents: California (24, 19%), Virginia (12, 10%), New York (9, 7%), Massachusetts (7, 5.6%), Illinois (6, 4.8%), and Washington, D.C. (8, 6.4%). Washington, D.C. appears overrepresented in the sample size relative to its population, but this is likely explained by the concentration within the nation's capital of transportation planners working at the federal level.

As **Figure 10** below illustrates, the distribution of respondents generally mirrors the distribution of the United States population across the 124 combined statistical areas (CSA) that existed as of July 2009. These 124 CSAs, which the United States Office of Management and

Budget (OMB) defines by grouping together adjacent metropolitan and/or micropolitan statistical areas based on shared social and economic ties, accounted for roughly 64 percent of the population in 2009.

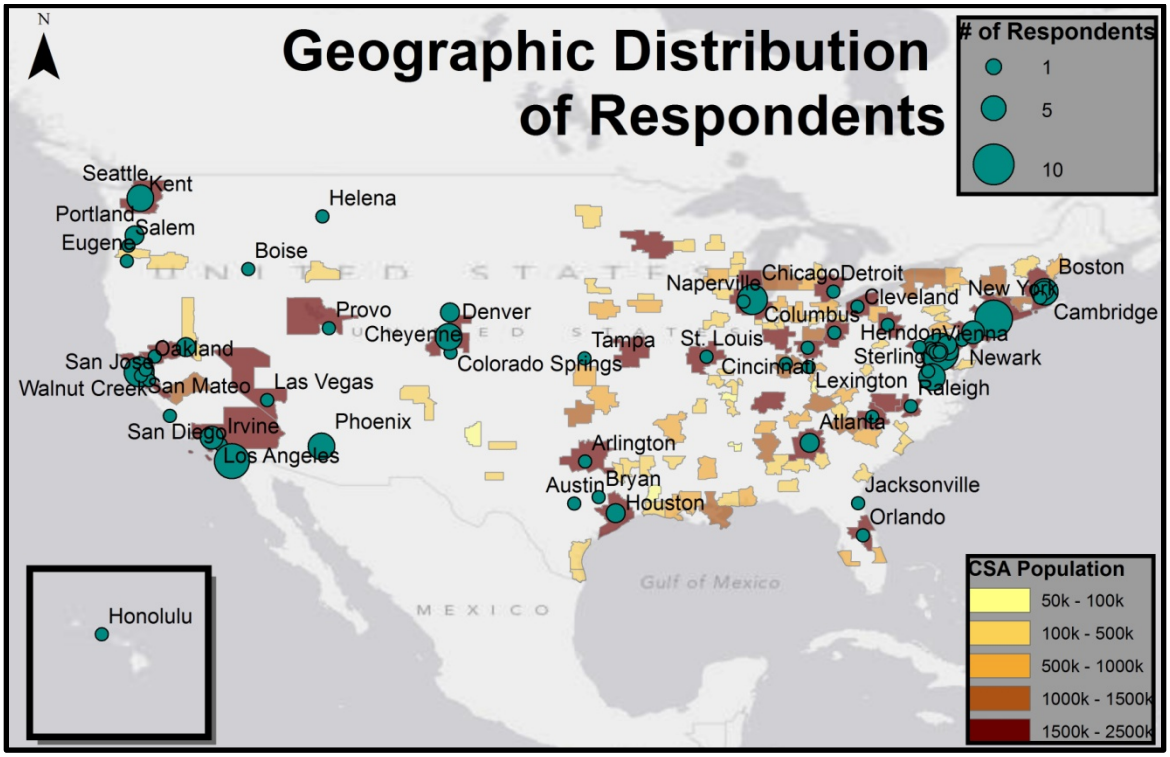

Figure 10: Geographic Distribution of Respondents (Data Source: 2010 U.S. Census)

B. SURVEY RESULTS

1. Should taxis play a larger role in urban transportation?

To establish a baseline, the survey asked respondents whether they believed taxis should play a larger role in urban transportation.

Respondents generally agreed that taxis should play a larger role in urban transportation. Roughly half of all respondents (52%) agreed with the statement, half of whom (25%) agreed strongly. Of the 19% of respondents who disagreed, almost all (17%) disagreed somewhat. Many (29%) had no opinion.

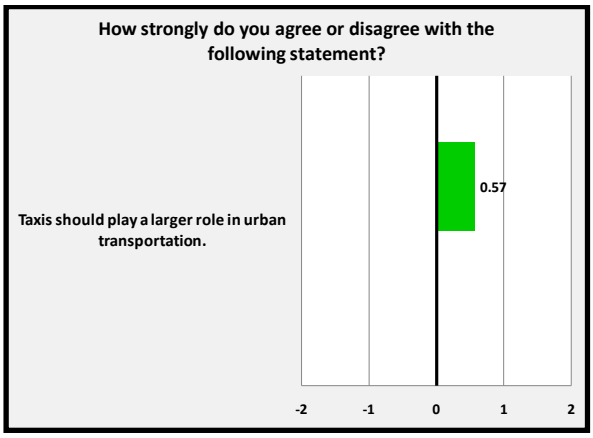

Figure 11: The taxis role in urban transport (avrg)

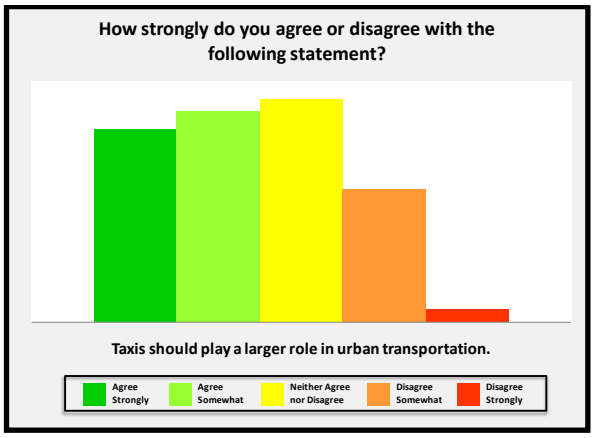

Figure 12: The taxis role in urban transport (distr)

Of course, agreeing that taxis should play a larger role in urban transportation says nothing about what that role should be. Should taxis be partners—actively integrated with other modes? Or should they be kept at arm's length—as nuisances to be regulated? To probe planners' perceptions of what this role should be, the survey asked respondents a series of questions to compare how they felt about promoting more travel by taxi, relative to how they felt about promoting more conventional modes like walking, bicycling, and mass transit.

As expected, respondents resoundingly agreed with the propositions that transportation planners should promote more travel by foot (88%), by bicycle (86%), and by mass transit

(92%), with most agreeing strongly. When it came to the taxi, however, respondents were more equivocal, although on the whole they agreed. Thirty-nine percent of respondents agreed that planners should promote more travel by taxi, with most (32%) only agreeing somewhat; 20 percent disagreed. The plurality (41%) neither agreed nor disagreed.

These results are in line with what we might expect based on the literature review. Planners overwhelmingly support mass transit, walking, and bicycling as modes of transport—and actively promote them—but are much more ambivalent towards the taxi. If the hypothesis is correct, this ambivalence is based on misconceptions about the taxi. Accordingly, the remainder of this section draws on results from the survey to explore the extent to which this hypothesis is true.

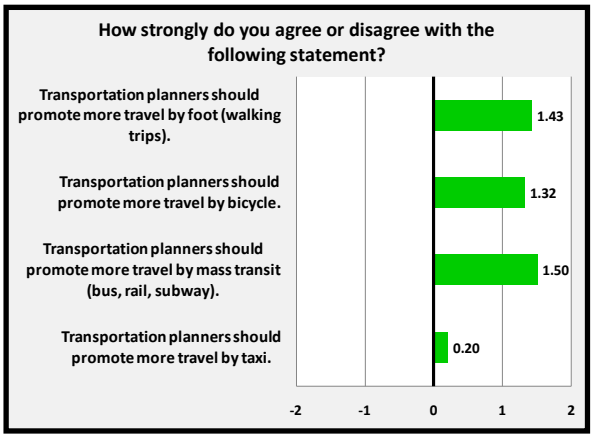

Figure 13: Attitudes toward the taxi relative to other modes of transport (avrg)

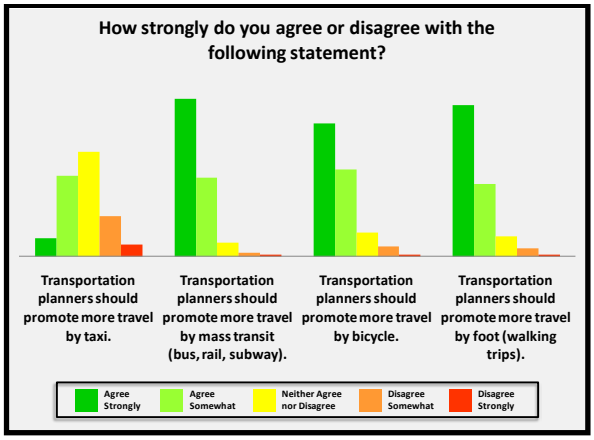

Figure 14: Attitudes toward the taxi relative to other modes of transport (distr)

2. Do taxis primarily serve the wealthy?

To probe planners' perceptions of who the taxi serves, the survey asked respondents to select the income ranges they believed best describe the industry's primary clientele: lower-, lower-middle-, middle-, upper-middle-, or upper-income individuals. They were allowed to check as many categories as they felt applied. If the hypothesis is correct and planners view the taxi as

primarily serving the wealthy, then we should expect a majority of respondents to have checked the “upper-middle and “upper” income categories, and few respondents to have checked the “lower” and “lower-middle” income categories.

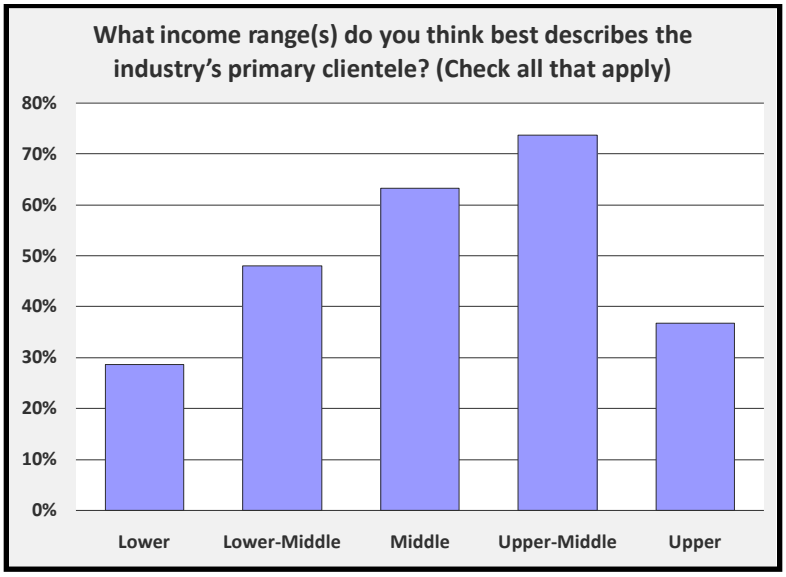

Figure 15: What income range best describes the industry’s primary clientele

The responses to this question were consistent with the hypothesis. Roughly three-quarters (74%) of respondents checked the upper-middle option, while only a small proportion (29%) checked the lower-income option. A large proportion of respondents (63%) also checked the middle-income option. The distribution of these responses, illustrated in **Figure 15**, exhibits a clear skew toward the upper-income ranges, which suggests that planners do perceive of the taxi as largely serving the wealthy.

3. Are taxis are “too expensive”?

To probe planners’ perceptions of the value of taxi service, the survey asked a series of questions to assess their perception of cost, and of value. To assess their perception of cost, the survey asked respondents to indicate how strongly they agreed or disagreed with the proposition that taxis are expensive. To assess their perception of value, the survey then asked respondents how strongly they agreed or disagreed with the proposition that, taxis are a poor

value for the money, and that taxis are a luxury item few can afford. If the hypothesis is correct and planners generally dismiss the taxi as being too expensive to be a viable part of any transportation solution, then we should expect the majority of respondents to agree that the taxi is expensive, and also agree with the latter two statements suggesting that the taxi is a poor value for the money.

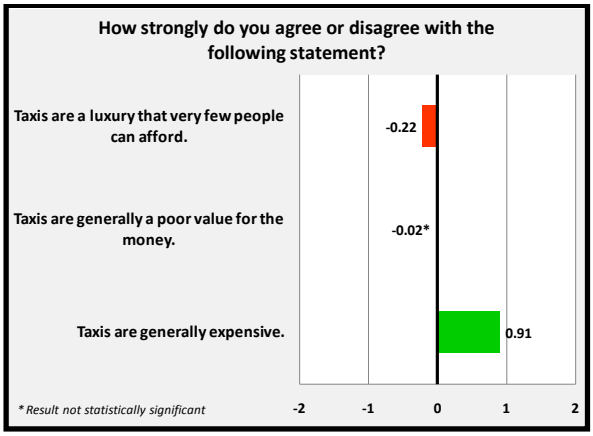

Figure 16: Are taxis too expensive? (avrg)

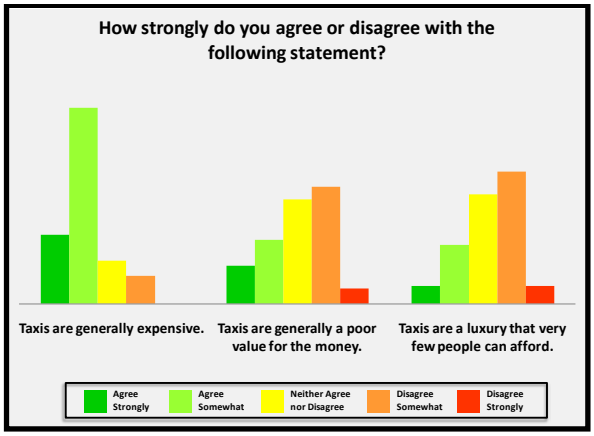

Figure 17: Are taxis too expensive? (distr)

The survey results appear to refute the hypothesis. While an overwhelming majority (79%) of respondents agreed—as we might expect—that the taxi is expensive, they were more equivocal over questions of value. While slightly more respondents (39%) disagreed than agreed (30%) with the statement that taxis are generally a poor value for the money, their responses were offset by a large proportion of respondents who agreed strongly (11%), and also by a large proportion of respondents (31%) who neither agreed nor disagreed with the statement. As a result, the outcome was not statistically significant. Respondents were similarly equivocal when asked to consider whether taxis are a luxury that few can afford, although on the whole they disagreed. This result *was* statistically significant.

Thus, while planners clearly agreed with the proposition that taxis are expensive, there was no clear consensus on questions of value. Most respondents only agreed or disagreed somewhat, which suggests that for many—the answer depends. This result contradicts the

hypothesis, suggesting that planners do not in fact dismiss the taxi outright as being "too expensive."

4. Do taxis only work in dense, urban areas?

To probe planners' perceptions of where the taxi can and cannot successfully operate, the survey asked respondents a series of questions to first, establish that planners do indeed believe taxis work best in dense, urban areas, and then second, to assess whether they felt similarly about taxis in sprawling, medium- to low-density urban areas. If the hypothesis is correct and planners generally ignore the taxi because they believe that it cannot be an important mode of transport outside of dense urban areas, then we should expect respondents to agree with the first statement, and disagree with the latter.

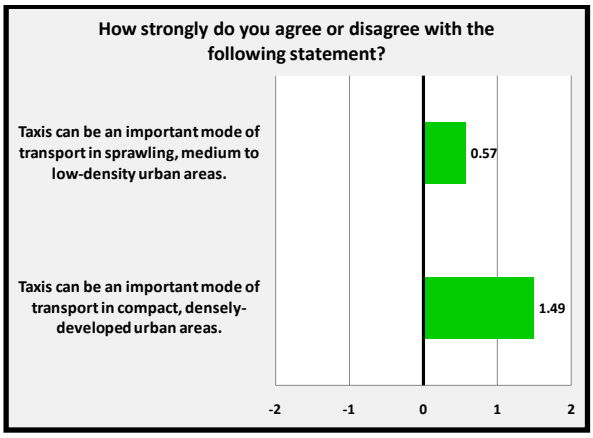

Figure 18: Where do taxis work best? (avrg)

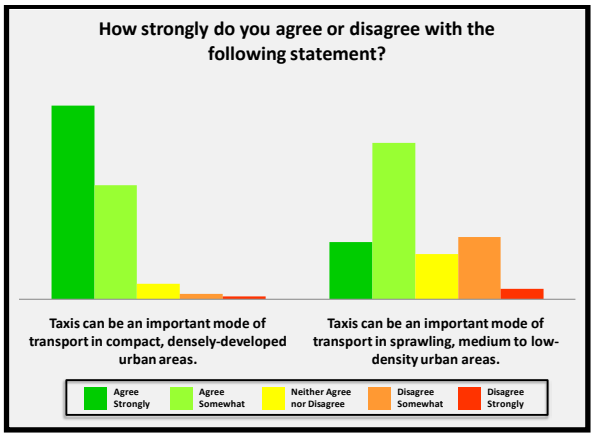

Figure 19: Where do taxis work best? (distr)

The survey results appear to refute the hypothesis. When asked whether taxis can be an important mode of transport in compact, densely-developed urban areas, the overwhelming majority of respondents (93%) agreed with the statement, with most (59%) agreeing strongly. This was expected. When asked to consider whether taxis can be an important mode in sprawling, medium- to low-density areas, however, the plurality (65%) also agreed.

These results generally contradict the hypothesis, suggesting that planners are not in fact overlooking taxis in the suburbs because they believe it to work only in dense, urban areas.

5. Are taxis nuisances to be regulated?

To probe whether planners perceive taxis to be nuisances to be regulated rather than as urban mobility partners, the survey asked respondents who they felt should be responsible for taxi policy: police departments or transportation planners. If the hypothesis is correct and planners resist the idea of expanded taxi service because they view taxis as a nuisance, then we should expect a majority of respondents to select law enforcement.

The survey results appear to refute this hypothesis. When asked who should have primary responsibility over taxi policy and regulations, nearly three-quarters (73%) pointed to transportation planners. Of course, there may be some bias here, as transportation planners might naturally favor expanding the scope of their jurisdiction.

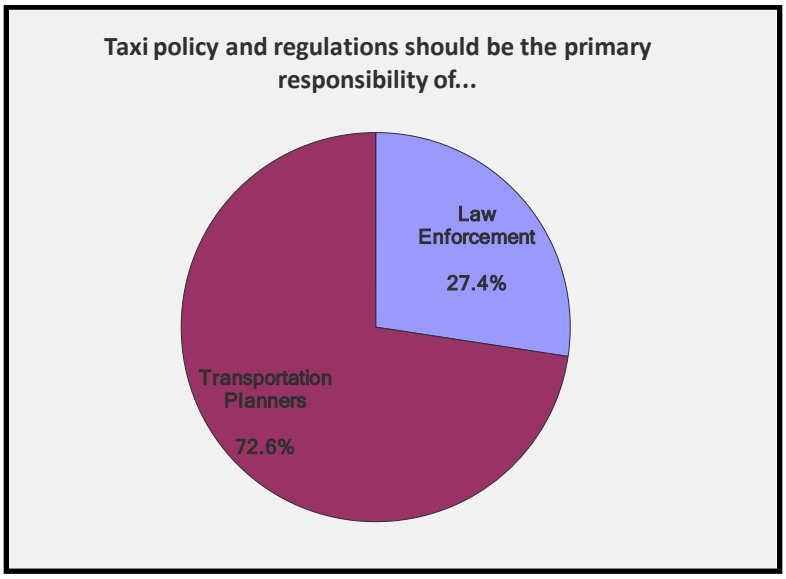

Figure 20: Are taxis nuisances to be regulated?

6. Are taxis a threat to mass transit?

To probe whether planners view taxis as threats to mass transit, the survey asked respondents a series of questions about the relationship between these two modes. First, it asked if expanding the taxi's role in urban transport could help improve the financial health of mass transit agencies. Second, it asked whether expanding the taxi's role in urban transport could help increase mass transit ridership. Third, it asked whether respondents felt that a more efficient and expansive mass transit system negates the need for taxis. If the hypothesis is correct and planners resist the idea of expanded taxi service because they view taxis as a threat to mass transit, then we should expect a majority of respondents to disagree with the first two statements, and agree with the third.

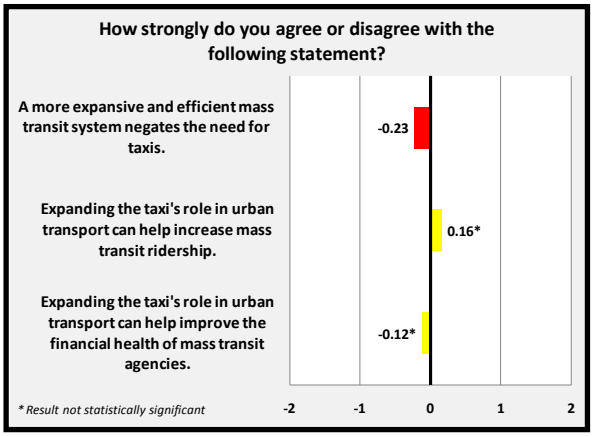

Figure 21: Are taxis a threat to mass transit? (avrg)

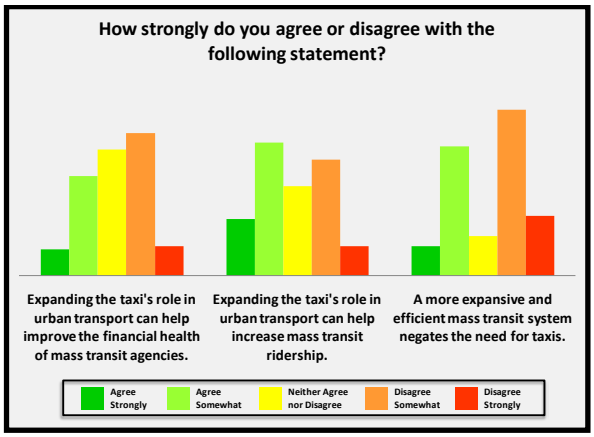

Figure 22: Are taxis a threat to mass transit? (distr)

The results of the survey were inconclusive. Respondents were ambivalent about the proposition that expanding the taxi's role in urban transport could help improve the financial health of mass transit agencies, with about 41 percent disagreeing and 30 percent agreeing. Respondents also equivocated over the proposition that expanding the taxi's role in urban transport could help increase mass transit ridership; 45 percent of respondents agreed, compared to 34 percent who disagreed. While respondents, on average, disagreed with the former statement and agreed with the latter, neither result was statistically significant.

Respondents generally disagreed with the proposition that a more efficient and expansive mass transit system negates the need for taxis. This was a very polarizing question: Respondents agreed or disagreed in roughly equal proportion, and less than 10 percent neither agreed nor disagreed. However, a little over one-third (38%) of respondents agreed with the statement that good public transit obviates the need for taxis, a surprisingly large number given the audacity of the statement.

7. Do taxis exacerbate congestion and air pollution problems?

To probe planners' perceptions of the environmental impacts of taxi service, the survey asked whether they agreed that expanding the taxi's role in urban transportation could first, help ease traffic congestion, and second, help reduce air pollution. If the hypothesis is correct and planners generally resist the idea of taxis playing a larger role in urban mobility because they believe that it can do nothing to help ease congestion or reduce air pollution, we would expect respondents to disagree with these statements.

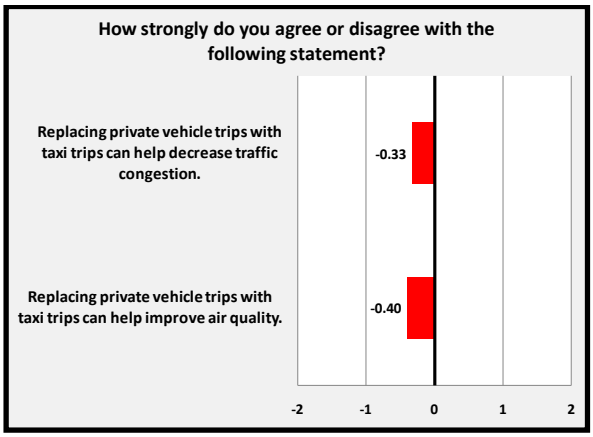

Figure 23: Taxis, congestion, and air pollution (avrg)

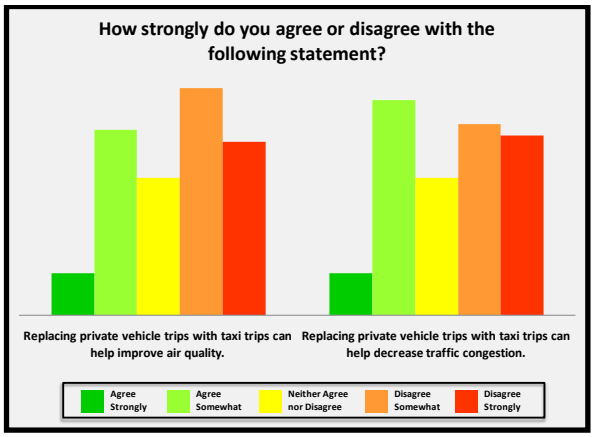

Figure 24: Taxis, congestion, and air pollution (distr)

The results of the survey support the hypothesis. Respondents generally disagreed (52%) with the proposition that replacing private vehicle trips with taxi trips could help improve air quality, with many (23%) disagreeing strongly. They also rejected the notion that taxis could

help ease traffic congestion, again with roughly half (48%) disagreeing, and many (23%) disagreeing strongly. Both results were statistically significant.

8. Are taxis public transit?

To probe whether planners may be overlooking taxis because they don't see them as public transit, the survey asked respondents directly if they view the taxi as public transit. The survey also tested this perception more indirectly. Since public transit is heavily associated with public subsidies, the survey tested to see if this association holds with taxis as well, asking respondents to indicate their support for the idea of supporting taxis financially through state and/or federal transportation programs. If the hypothesis is correct, respondents should generally reject both statements.

The survey results are again inconclusive. While survey respondents largely agreed with the proposition that taxis are a form of public transportation—a majority of respondents (68%) agreed, many (32%) of who agreed strongly—they were more equivocal about whether taxis should be eligible for financial assistance through state and/or federal transportation programs. About 40 percent of respondents disagreed, and disagreed strongly (25%). In contrast, of those who agreed (36%), most (24%) only somewhat agreed.

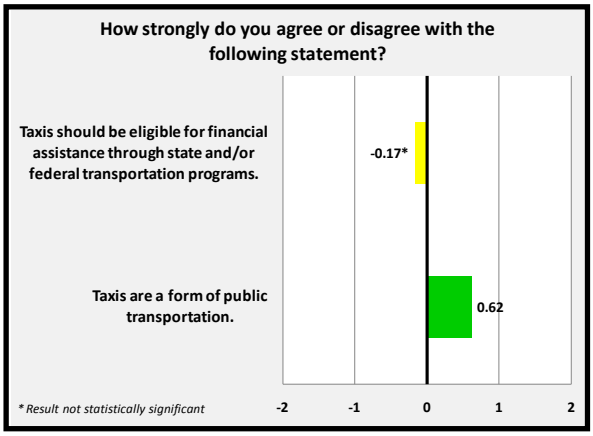

Figure 25: Are taxis public transit? (avrg)

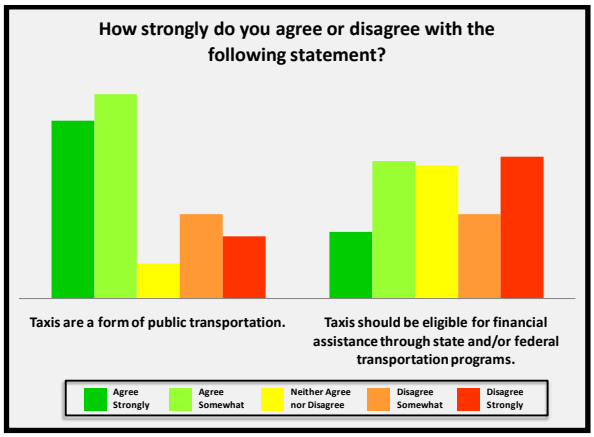

Figure 26: Are taxis public transit? (distr)

CHAPTER IX. CONCLUSION

The story of the taxi in the American system of urban mobility is a story of so much unmet potential. The literature review in Chapter IV pointed to two reasons for why this might be the case: regulations, which suppress potential, and planners, who overlook it. While regulations clearly continue to play a role in shaping, and perhaps limiting the role of taxis in most urban transportation systems, they are only one part of the answer. The opening of new frontiers via regulatory change does not in and of itself guarantee their exploration, and this is especially the case with taxis given that so much of the potential discussed in the literature depends on active partnerships with public agencies, for whom the profit-motive so central to a privately owned and operated taxi industry is largely absent.

Transportation planners have by and large overlooked the taxi in practice. But why? This thesis examined whether perceptions—internalized and unexamined assumptions about the taxi, largely false—are to blame. It set forth seven different perceptions that may be leading planners to overlook the taxi, and surveyed a sample of transportation planners to gauge the extent to which these perceptions were held to be true.

Of the seven perceptions tested, the findings from the survey confirmed two, refuted three, and were inconclusive on two. These results are summarized in **Table 3** below.

Perception	Hypothesis
Taxis primarily serve the wealthy.	Confirmed
Taxis are too expensive.	Refuted
Taxis only work in dense, urban environments.	Refuted
Taxis are nuisances to be regulated.	Refuted
Taxis are a threat to mass transit.	Inconclusive
Taxis exacerbate congestion and air pollution problems.	Confirmed
Taxis are not public transit.	Inconclusive

Table 3: Summary of findings

The results suggest that planners interested in addressing urban inequality and transportation justice may be overlooking the taxi because of widespread perceptions that they primarily serve the wealthy, and that planners may be resisting the idea of taxis playing a larger role in urban mobility because they see taxis as an environmental nuisance that does nothing to address congestion or air pollution problems. On the other hand, the results suggest that planners are at least open to accepting taxis as an important mode of transportation in what are increasingly sprawling, medium- to low-density metropolitan areas.

The results also suggest that planners recognize the value of taxis, even if that value isn't tied to its potential as a complement to conventional mass transit. Respondents rejected the propositions that taxis are generally "too expensive," and that taxis are nuisances to be regulated by police departments. I could not conclude either way whether planners see taxis as a threat to mass transit, or if taxis are largely absent from their conception of public transit; respondents on the whole seemed divided on these propositions. Taken together, these results suggest that even if planners do not see taxis as true partners in urban mobility, at minimum—they don't see taxis as nuisances. In other words: Taxis are seen as neither good nor bad—neither friend nor foe.

These findings at least partially confirm the hypothesis set forth in this thesis—that taxis are overlooked by planners because of their unfounded perceptions about the industry. Insofar as these perceptions manifest themselves as indifference towards the taxi, this is problematic.

As argued in the Chapter II, reframing automobile dependency as a political problem suggests that one solution is to expand the role that taxis play in urban mobility. By filling a gap in urban mobility that would otherwise be bridged through car ownership, the taxi helps build the political constituency needed to reshape urban transportation policy.

Expanding this role, however, is as much a matter of purpose as it is of regulation (Lave 1981). The taxi industry needs champions who see the taxi not as an isolated industry divorced

from transportation concerns, but as a partner in a comprehensive system of urban mobility. Lave and Mathias (2000) have argued that how quickly we can begin to realize the paratransit-transit dream of the 1970s depends on "how quickly agencies can move toward integrated planning" (7). This, in turn, requires a shift to a paradigm that sees paratransit modes—including the taxi—as essential components of a comprehensive transit system. Taxis, in other words, must come to be seen as our friends.

Creating Champions

At the forefront of this paradigm shift are advocacy organizations like the International Association of Public Transport (UITP), and the Taxi, Limousine and Paratransit Association (TLPA). The UITP in 2011 published an official position paper entitled "Becoming a real mobility provider" that pushed its members to "no longer consider [car-sharing, taxis, bicycles, car-pooling, demand-responsive transport, car-rentals, etc.] as competitive but rather as services that can be mutually beneficial" (1). The TLPA partnered with the Federal Transit Administration (FTA) in 2011 to publish "Engaging Private Transportation Operators in the Transportation Planning Process"— a guidebook to help transportation planners engage private transportation operators in their local, regional, or statewide transportation planning activities. In addition to a variety of suggestions to revisit current outreach efforts to private transportation operators, to consider subcommittees geared towards private transportation operators, and to disseminate easy-to-use information about the transportation planning process, the TLPA—interestingly enough—urged transportation planners to test for any unfounded stereotypes that might exist:

> It may also be the appropriate time to examine any stereotypes of private transportation operators—held either individually or by your agency. If your image of private transportation operators is one based on a fictional character from a television show or a movie, it may be time for you to interact with the owners and managers of private transportation companies in your community or visiting their dispatch and operations centers (2011, 6).

The efforts of UITP and TLPA aimed at reshaping perceptions and breaking down stereotypes can be aided by further research. King et al. (2011) noted that recent studies examining the personal benefits to taxi travel are few and far between, with the bulk of the research on taxis as a mode of transportation dating back to the 1970s. They argued that the availability of new GPS data on taxi movements "can certainly help transportation departments, regional planners, public transit agencies and other stakeholders better understand the intermodal usefulness of taxicabs and [identify areas for] further research" (2011, 15). Such data can provide critical new insight into the mobility patterns of the most transportation disadvantaged households in the nation, and help us better understand both the benefits (boosting transit ridership) and costs (air pollution and air congestion) of taxi usage.

Another notable area where research is lacking is in the nature and role that informal or "vernacular" taxicabs play in many communities. Broadly painting these operators as criminals or "bandits" masks a complex reality, and diminishes the important role that these operators play in expanding mobility options for what are often very low-income communities.

Still, we must recognize that patterns, once established, tend to persist over time. The word "taxi" evokes a long history that is difficult to ignore. Rather than fight this history, then, perhaps a better alternative might be to abandon this word altogether, in favor of terms with less historical baggage. Gilbert (1978) suggested "paratransit" as an alternative, but this term, too, has in its short history become narrowly associated with service for older persons and persons with disabilities. Another alternative may be to eschew specialized terms altogether, and instead call private providers of transportation exactly what they are—transportation companies.

APPENDIX

A. SURVEY

[UCLA Institute of Transportation Studies] Survey Invitation: Your Thoughts on the Taxi

Dear Transportation Planner,

Researchers with UCLA's Department of Urban Planning are conducting a study of the taxi industry. As part of this study, we are surveying transportation planners across the nation, such as yourself, to understand how those in a position to shape future mobility patterns view the taxi. More specifically, this survey asks for your opinion on the following:

- Characteristics of the taxi industry, including where it works, who it serves, and for how much
- The social, political, and economic impacts of the taxi industry
- Your personal history with taxis

The survey is brief, and should require no more than 5-10 minutes to complete. We value your opinion, and your privacy. Survey responses are confidential, and results will only be reported in the aggregate. The results of this study will improve future transportation planning efforts by highlighting any assumptions which may underlie the decision-making process. You are welcome to a copy of the final report, if desired.

Thank you in advance for your assistance in this research project.

Please click on the following link to complete the survey. (https://www.surveymonkey.com/s/9NL6FKF)

If you have questions regarding this survey, please contact Earl Kaing at (XXX) XXX - XXXX, or ekaing@ucla.edu. The faculty sponsors for this investigation are Dr. Martin Wachs (mwachs@publicaffairs.ucla.edu), Dr. Brian Taylor (btaylor@ucla.edu), and Dr. Vinit Mukhija.

Sincerely,

Earl Kaing
Graduate Student Researcher
Institute of Transportation Studies
UCLA Luskin School of Public Affairs

Your thoughts on the taxi.

Are you a transportation planner?

1. Do you consider yourself a transportation planner?

Transportation Planner: someone who deals with how transportation systems effectively and efficiently move people and goods, shape urban form, affect economic vitality, and impact quality of life (APA)

Transportation Planning: the discipline that examines and evaluates the potential of future actions to improve movement of people and goods by motor vehicle, public transportation, walking and cycling in accordance with a set of objectives (Transportation Professional Certification Board)

- ◯ Yes
- ◯ No

Characteristics of the Taxi Industry

For the purposes of this survey, the term "taxi" refers to any vehicle-for-hire authorized to to pick up passengers hailing them in the street, waiting at a taxi stand, or who prearranged a pick up via telephone or over the internet (including smartphone applications).

2. What income range(s) do you think best describes the industry's primary clientele? (Check all that apply)

- ☐ Lower
- ☐ Lower-Middle
- ☐ Middle
- ☐ Upper-Middle
- ☐ Upper

Your thoughts on the taxi.

3. How strongly do you agree or disagree with the following statements?

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Taxis are generally expensive.	○	○	○	○	○
Taxis are generally a poor value for the money.	○	○	○	○	○
Taxis are a luxury that very few people can afford.	○	○	○	○	○

Feel free to comment on your responses here (optional).

4. How strongly do you agree or disagree with the following statements?

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Taxis can be an important mode of transport in compact, densely-developed urban areas.	○	○	○	○	○
Taxis can be an important mode of transport in sprawling, medium to low-density urban areas.	○	○	○	○	○
Taxis can be an important mode of transport in small towns and rural areas.	○	○	○	○	○

Feel free to comment on your responses here (optional).

Social, Political, and Economic Impacts of the Taxi

Your thoughts on the taxi.

5. How strongly do you agree or disagree with the following statements?

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Taxis are a form of public transportation.	○	○	○	○	○
Taxis should play a larger role in urban transportation.	○	○	○	○	○
Taxis should be eligible for financial assistance through state and/or federal transportation programs.	○	○	○	○	○
Taxi policy can be a useful tool for achieving planning outcomes.	○	○	○	○	○

Feel free to comment on your responses here (optional).

6. How strongly do you agree or disagree with the following statements?

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Replacing private vehicle trips with taxi trips can help improve air quality.	○	○	○	○	○
Replacing private vehicle trips with taxi trips can help decrease traffic congestion.	○	○	○	○	○

Feel free to comment on your responses here (optional).

Your thoughts on the taxi.

7. How strongly do you agree or disagree with the following statements?

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
A more expansive and efficient mass transit system negates the need for taxis.	○	○	○	○	○
Expanding the taxi's role in urban transport can help increase mass transit ridership.	○	○	○	○	○
Expanding the taxi's role in urban transport can help promote local community economic development.	○	○	○	○	○
Expanding the taxi's role in urban transport can help improve the financial health of mass transit agencies.	○	○	○	○	○

Feel free to comment on your responses here (optional).

8. How strongly do you agree or disagree with the following statements?

	Strongly agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Strongly disagree
Transportation planners should promote more travel by foot (walking trips).	○	○	○	○	○
Transportation planners should promote more travel by mass transit (bus, rail, subway).	○	○	○	○	○
Transportation planners should promote more travel by taxi.	○	○	○	○	○
Transportation planners should promote more travel by bicycle.	○	○	○	○	○

Feel free to comment on your responses here (optional).

Your thoughts on the taxi.

9. Taxi policy and regulations should be the primary responsibility of...

- ◯ Transportation Planners
- ◯ Law Enforcement (Police Departments)

Feel free to comment on your responses here (optional).

The Taxi and You

10. Please rate your overall personal experience with taxis.

- ◯ Very poor
- ◯ Poor
- ◯ Neither poor nor good
- ◯ Good
- ◯ Very good
- ◯ I have never ridden a taxi.

11. How often do you ride taxis within the United States?

- ◯ A few times a day
- ◯ A few times a week
- ◯ A few times a month
- ◯ A few times a year
- ◯ Rarely or never

12. In which American cities have you had the most experience riding taxis? (List up to three)

1.
2.
3.

Your thoughts on the taxi.

13. Have you ever ridden in a taxi outside the United States?

- ◯ Yes, many times
- ◯ Yes, on occasion
- ◯ No
- ◯ Don't remember

14. Please list up to three cities outside of the United States where you have had the most experience with taxis.

1. [ ]
2. [ ]
3. [ ]

15. In what year were you born? (Please select from drop-down menu below)

[ ]

16. How many years have you been professionally active in the field of transportation? (Please select from drop-down menu below)

[ ]

17. Where do you currently practice?

City/Town: [ ]

State: [ ]

B. SURVEY RESULTS

How strongly do you agree or disagree with the following statements?							
Answer Options	1	2	0	-1	-2	Rating Average	Response Count
Taxis should play a larger role in urban transportation.	32	35	37	22	2	0.57	128
Transportation planners should promote more travel by taxi.	9	40	52	20	6	0.20	127
Transportation planners should promote more travel by mass transit (bus, rail, subway).	78	39	7	2	1	1.50	127
Transportation planners should promote more travel by bicycle.	66	43	12	5	1	1.32	127
Transportation planners should promote more travel by foot (walking trips).	75	36	10	4	1	1.43	126
Taxis are generally expensive.	27	77	17	11	0	0.91	132
Taxis are generally a poor value for the money.*	15	25	41	46	6	-0.02	133
Taxis are a luxury that very few people can afford.	7	23	43	52	7	-0.22	132
Taxis can be an important mode of transport in compact, densely-developed urban areas.	78	46	6	2	1	1.49	133
Taxis can be an important mode of transport in sprawling, medium to low-density urban areas.	23	63	18	25	4	0.57	133
Expanding the taxi's role in urban transport can help improve the financial health of mass transit agencies.*	8	30	38	43	9	-0.12	128

How strongly do you agree or disagree with the following statements?							
Answer Options	1	2	0	-1	-2	Rating Average	Response Count
Expanding the taxi's role in urban transport can help increase mass transit ridership.*	17	40	27	35	9	0.16	128
A more expansive and efficient mass transit system negates the need for taxis.	9	39	12	50	18	-0.23	128
Replacing private vehicle trips with taxi trips can help improve air quality.	7	31	23	38	29	-0.40	128
Replacing private vehicle trips with taxi trips can help decrease traffic congestion.	7	36	23	32	30	-0.33	128
Taxis are a form of public transportation.	40	46	8	19	14	0.62	127
Taxis should be eligible for financial assistance through state and/or federal transportation programs.*	15	31	30	19	32	-0.17	127

* Result not statistically significant

Statistical Analysis							
Question	Sigma	S.E.	Z-Score (a = 0.95)	MOE	Mean	Low	High
Taxis should play a larger role in urban transportation.	1.09	0.10	1.96	0.19	0.57	0.38	0.76
Transportation planners should promote more travel by taxi.	0.95	0.08	1.96	0.17	0.20	0.04	0.37
Transportation planners should promote more travel by mass transit (bus, rail, subway).	0.74	0.07	1.96	0.13	1.50	1.37	1.63
Transportation planners should promote more travel by bicycle.	0.86	0.08	1.96	0.15	1.32	1.17	1.47
Transportation planners should promote more travel by foot (walking trips).	0.83	0.07	1.96	0.15	1.43	1.28	1.57
Taxis are generally expensive.	0.81	0.07	1.96	0.14	0.91	0.77	1.05
Taxis are generally a poor value for the money.*	1.08	0.09	1.96	0.18	-0.02	-0.21	0.16
Taxis are a luxury that very few people can afford.	0.98	0.08	1.96	0.17	-0.22	-0.39	-0.05
Taxis can be an important mode of transport in compact, densely-developed urban areas.	0.72	0.06	1.96	0.12	1.49	1.37	1.61
Taxis can be an important mode of transport in sprawling, medium to low-density urban areas.	1.08	0.09	1.96	0.18	0.57	0.39	0.75
Expanding the taxi's role in urban transport can help improve the financial health of mass transit agencies.*	1.05	0.09	1.96	0.18	-0.12	-0.30	0.06
Expanding the taxi's role in urban transport can help increase mass transit ridership.*	1.18	0.10	1.96	0.20	0.16	-0.04	0.37
A more expansive and efficient mass transit system negates the need for taxis.	1.22	0.11	1.96	0.21	-0.23	-0.44	-0.01

Statistical Analysis							
Question	Sigma	S.E.	Z-Score (a = 0.95)	MOE	Mean	Low	High
Replacing private vehicle trips with taxi trips can help improve air quality.	1.23	0.11	1.96	0.21	-0.40	-0.61	-0.19
Replacing private vehicle trips with taxi trips can help decrease traffic congestion.	1.26	0.11	1.96	0.22	-0.33	-0.55	-0.11
Taxis are a form of public transportation.	1.36	0.12	1.96	0.24	0.62	0.39	0.86
Taxis should be eligible for financial assistance through state and/or federal transportation programs.*	1.36	0.12	1.96	0.24	-0.17	-0.41	0.06

* Result not statistically significant

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