UNIVERSITY OF CALIFORNIA

Los Angeles

Meter Payment Exemption for Disabled Placard Holders as a Barrier to Managing Curb Parking

A thesis submitted in partial satisfaction

of the requirements for the degree Master of Arts

in Urban Planning

by

Jonathan Andrew Williams

2010

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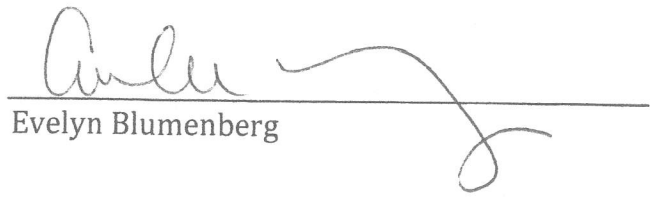

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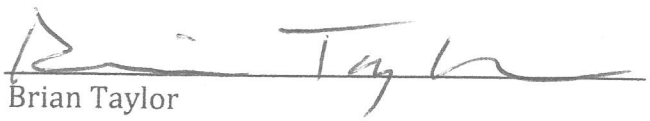

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2010

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Acknowledgements

I owe a debt of gratitude to Donald Shoup, my advisor and committee chair, for his guidance and enthusiasm. I would also like to thank Brian Taylor and Evelyn Blumenberg for their great deal of time and assistance in editing and reviewing this draft. Additionally, Mike Manville provided great feedback and helped to structure the research effort.

Finally, a special thanks is due to my UCLA colleagues who spent hours surveying meter parking. Their work enabled this thesis to have a comprehensive base of observations. They were Rye Baerg, Garrett Ballard-Rosa, Alex Beata, Matthew Bruno, Michelle Go, Linda Hui, Dante Oberneck, David Peterson, Alex Pudlin, Rusty Whisman, and Dan Wu.

ABSTRACT OF THE THESIS

Meter Payment Exemption for Disabled Placard Holders as a Barrier to Managing Curb Parking

by

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Master of Arts in Urban Planning

University of California, Los Angeles, 2010

Professor Donald Shoup, Chair

This thesis examines the subject of parking meter payment exemption for individuals displaying disabled tags or placards in California as a barrier to demand-based pricing for parking. Modern academic research on parking pricing shows that pricing can be an effective tool to manage parking demand and consumption, but this existing research assumes that price is levied consistently on all or most individuals. Motivated by the increased number of localities seeking to adopt demand-based meter pricing policies, this thesis evaluates the effects of a growing number of exempt parkers on such efforts. It examines the theory behind both parking pricing and meter payment exemptions, the history of California exemption policy, and current trends in parking placard issuance. Data for this analysis were

drawn from surveys of parking meter occupancies in Los Angeles, municipal interviews, and case studies of meter exemption policy changes in other cities. Combined, these results provide data on what the payment exemption means for regulating parking through pricing policies.

Pricing parking, like other consumer goods, can regulate its consumption. Increasing parking fees can decrease the number of vehicles traveling to an area (Willson 1992; Hess 2001). It can encourage drivers to carpool, seek alternative transportation methods, lower-priced parking options, change their trip time, or change their trip destination (Feeney 1989; Arnott, Depalma et al. 1991). Conversely, free or underpriced curb parking can lead to surprising levels of vehicle congestion and emissions as drivers circle blocks at low speeds looking for available parking that, due to its low price, has very few vacancies (Shoup 2006). Shoup refers to this phenomenon as "cruising for parking."

Several cities in California have made street parking rate increases based on (or at least justified by) the principles of encouraging parking space turnover and shifting drivers to use other modes. However, the basic theory of parking pricing assumes that all, or most, drivers are subject to payment requirements. In practice, there are currently four principal ways that the payment requirement is inapplicable or ineffective:

- Inadequate enforcement – represented by drivers otherwise subject to payment who park at expired meters without paying for some or all of their session;

- Failure of parking meters – many cities in California (including Los Angeles) allow drivers to legally park within posted time limits for free at nonfunctioning meters;

- Government vehicles – vehicles whose operators are engaged in official local civic business (fire, police, rescue, municipal services, and others); and

- Vehicles displaying disabled plates or placards – vehicles intended to be used in the direct transportation of individuals with disabilities

Combined, these four factors result in a very high proportion of vehicles parking for free. The first two factors can be reduced through deploying updated meters, improving meter maintenance, and increasing enforcement. The third can be addressed through local practices and policies (for example, charging government vehicles for parking, allowing free parking at meters only under specific conditions, etc.). In California, the last factor—disability placards—cannot be affected through any local efforts. In addition to entitling disabled placard holders to space preferences in off-street lots and access to designated on-street spaces reserved for the disabled, disabled placards or plates provide unlimited, unpaid parking at any municipal parking meter in the state of California.

Since 1972, drivers displaying disability plates or placards have been allowed to park for an unlimited amount of time without payment at municipal meters. This provision in California law was originally added to assist individuals who had lost, or lost the use of, both hands, and were physically unable to operate a meter. Since this change nearly four decades ago, the original intent of the law has been lost as

the definitions of "disability" have broadened considerably. Wide ranges of conditions now allow an individual to qualify for a disabled placard.

In 2009, 10 percent of licensed drivers in California had disabled parking placards (California Department of Motor Vehicles 2009). By actual number of placards, this represents an increase of 350 percent since 1990. In the City of Los Angeles, there were over 6 valid placards issued for each of the City's 40,000 meters in 2009. Statewide, the highest number of placards per capita is found in counties that have the highest percentage of residents 65 or older. Nationwide, this same age group is expected to more than double their percentage of the overall population by 2050 (Rosenbloom 2001).

While this thesis did not address the issue of placards being used fraudulently, this topic is widely reported in the popular media (Rouf, Morin et al. 1999; Gordon 2007; Grover and Goldberg 2010a; Grover and Goldberg 2010b). The basis for placard misuse (or overuse) at parking meters is in their economic value. In areas where demand for parking is highest, these placards provide the greatest benefit. These are the same areas where higher meter rates could be used to moderate demand, reduce cruising congestion, and increase parking turnover (Anderson and de Palma 2004).

Concurrent with this thesis research, the local Los Angeles (LA) NBC affiliate reported on placards being fraudulently used in one area of Downtown Los Angeles. They tracked 12 individuals over two months who regularly parked using placards, and found that 11 of them were using placards assigned to other people (Grover and

Goldberg 2010a). In interviewing one of these individuals using a placard fraudulently, the man responded that, "We think of it as saving $150 or $200 at the end of the month" (Ibid).

Private lots and garages are required to provide dedicated disabled spaces, but are free to charge a market rate to those who use them. This creates a sizeable price differential between on- and off-street parking for placard holders and likely encourages those with a placard to seek out municipal metered on-street parking. Several authors have researched the effects of an on- and off-street parking price difference. Calthrop and Proost (2006) develop a model where off-street parking is priced while on-street parking is only regulated via a time limit. The price differential, even with the parking time limited, is enough to induce excessive searching behavior. Arnott and Rowse (2009) build on the consequences of underpriced curb parking relative to off-street and show that on-street rate increases benefit all by reducing local congestion.

This study of parking meters in the City of Los Angeles employed two observational methods. First, on-street meter surveys recorded the "moment in time" payment and occupancy status of meters in a variety of meter zones. This provides for a large sample size to evaluate the percentage of vehicles that are parking without payment and the reasons for nonpayment. Second, detailed continuous all-day observations were made at two meter block faces in the highest meter rate area in LA. This method, while focused only in one general area, provides rich and full information on parking duration by type and payment.

Data from the moment-in-time meter surveys were collected during two periods of time. In spring of 2009, a survey of 1,000 high-demand spaces in Downtown Los Angeles revealed afternoon occupancies of over 90 percent, with 40 - 56 percent of the occupants displaying disability credentials. The second survey, in 2010, gathered 5,318 detailed observations in areas from West Los Angeles to Downtown. This survey found that only 60 percent of the spaces were occupied on average. Of the occupants, 55 percent of vehicles in the second surveys were recorded as unpaid.[1] These unpaid parking sessions are represented below in Figure 1A.

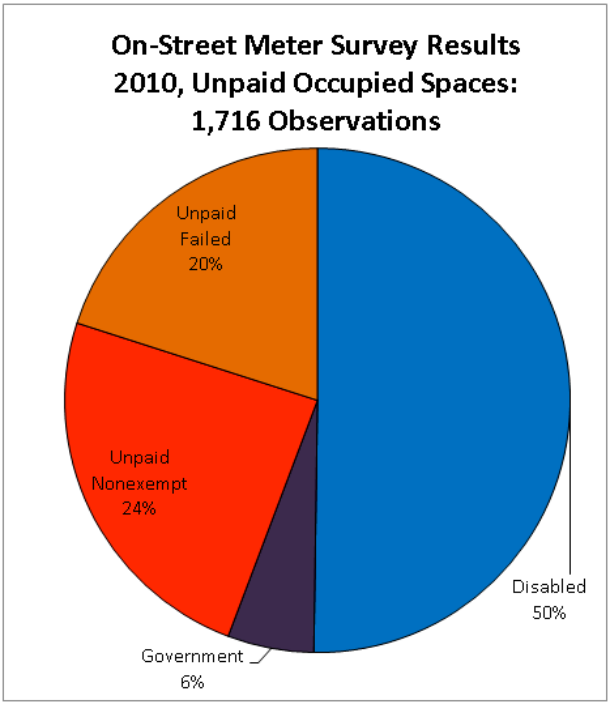


Figure 1A. Spring 2010 Unpaid Meter Observations by Type (Author 2010)

[1] These sessions may have been paid prior to the survey observation, but were expired and unpaid at the time the surveyor recorded the meter status.

As Figure 1A shows, fully 50 percent of the unpaid meter sessions were by drivers displaying disability credentials. This means that focused efforts to improve enforcement and meter operation will reach less than half of non-paying vehicles. Of the observed vehicles that were "Unpaid Nonexempt" and subject to citation, 6 percent were seen with parking citations.

Aggregating data from both on-street meter surveys revealed that almost 30 percent of all vehicles parked at meters were displaying disability credentials. This is three times the number of drivers with placards (10 percent) in the general population and implies that drivers with these placards are more likely to use meter parking. Thus, any increase in meter rates aimed at increasing vehicle turnover would not apply to almost one third of parkers. It is also conceivable that increasing rates would increase the percentage of drivers at meters with disabled placards due to decreased patronage and length of stay by drivers subject to payment.

The second survey method, continuous block face observations, was conducted in Downtown Los Angeles in March 2010. Two block faces were chosen that were located two blocks apart. The first, Flower Street between 7th and 8th Streets, contains 14 spaces controlled by multi-space pay stations. The second, Hope Street between 8th and 9th Streets, contains 11 spaces controlled by conventional single-space meters.

The first survey area was occupied principally by vehicles displaying disability credentials, with very few paying customers.

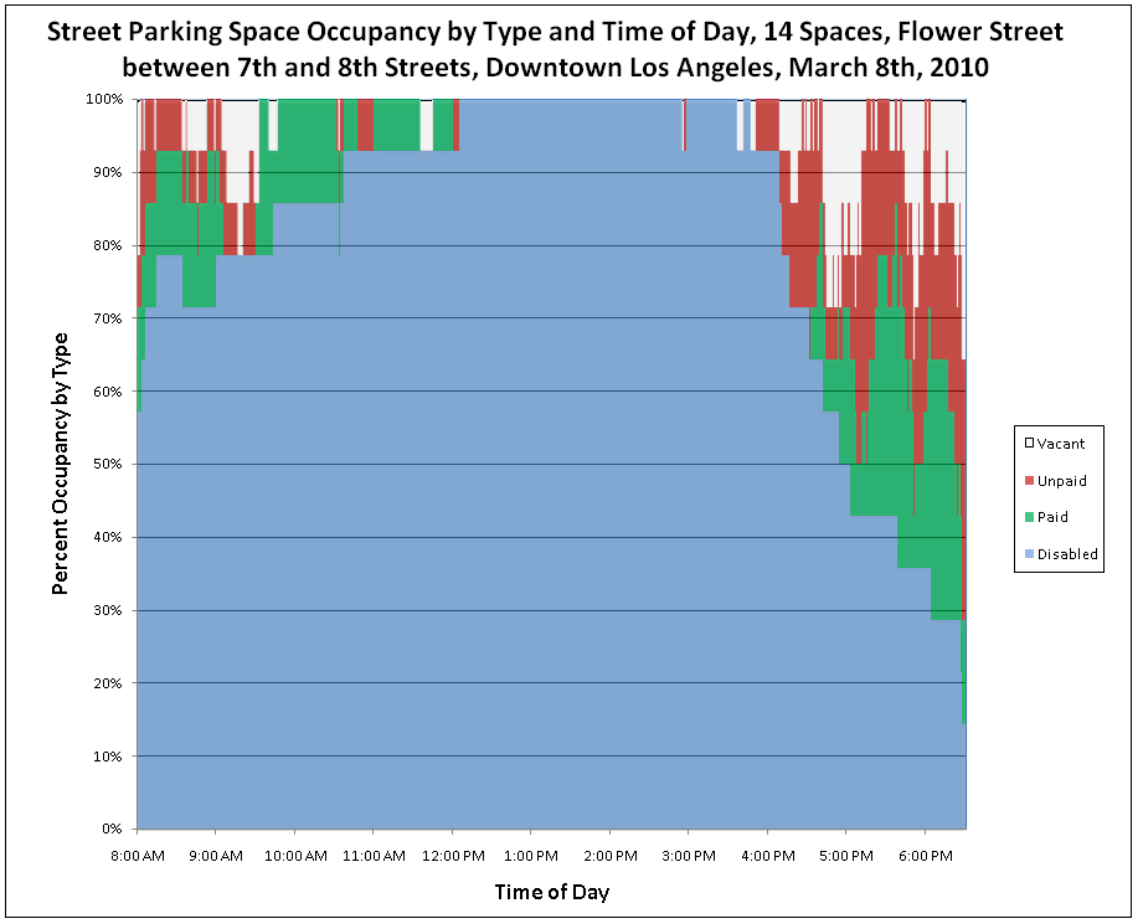


Figure 2A. Occupancy Type and Time of Day, Flower Street (Author 2010)

As Figure 2A indicates, from approximately 12:30 PM to 4:00PM, all of the spaces were occupied by vehicles displaying disability placards. This block face has the highest meter rate in LA, at $4 per hour. During this survey period the meters each collected on average only $0.32 per hour. The total possible revenue for all spaces was $588, but only $47 was actually collected. Drivers displaying disability credentials consumed $477 worth of meter time, or 81% of the potential meter revenue. If these observations represented a typical weekday, this amounts to

about $125,000 in lost revenue per year on just these 14 spaces in providing free meter parking to vehicles with disabled plates or placards.

A similar survey conducted on Hope Street showed a much higher rate of vacant spaces, but a similar parking duration length (the length of time that the same vehicle occupies the same space) by drivers with disability placards. Data on the length of parking sessions for all vehicles were combined for both areas in Table 1A.

Parking User Type	Average Parking Length (minutes)	Number of observations
Regular, Non-exempt	22	152
Disabled	317	28
Government	72	8

Table 1A. Parking Duration by User Type, March 2010 Surveys (Author 2010)

On average, drivers with disability placards remained in the same space for over 5 hours, while turnover was high, and durations short, among drivers subject to payment (regardless of the amount of time paid for).

Data on disabled placard trends in California indicate a steady increase in the number of valid placards issued annually. Survey results from this study indicate that placard holders are more likely to occupy metered parking spaces than drivers subject to meter payment. Only about 10 percent of drivers in California possess a valid disabled placard, but of all the vehicles observed occupying meter spaces, almost 30 percent displayed a disabled placard or plate. Drivers with disabled plates or placards are more likely to have longer (and often, much longer) parking

sessions. These factors call into question the ability of local governments to use prices to influence street parking in California.

In addition to the field surveys, parking managers from three LA area municipalities were contacted and asked a series of questions about parking management in their respective cities. All three indicated that the disabled payment exemption is a state law that they would like to see changed and/or that it was in their opinion a barrier to managing curb parking in their cities.

Changing a law that conveys benefits on what is widely perceived as a deserving group—the disabled—at no apparent cost to taxpayers is likely to be politically unpopular. Policies that support assistance for individuals with disabilities are widely supported (Applebaum 2001; Skitka and Tetlock 1992). Aside from good intentions however, it is not at all clear how the policy is providing a needed benefit. In contrast to policies requiring that spaces for the disabled be located near destinations, free parking at meters does not assure any proximal advantage. In high demand meter areas, vacancies are scarce. This forces all drivers, disabled and others alike, to circulate in search of available meter parking.

Charging for parking, especially at a level that affects demand, is considered income regressive. A case could be made that providing this parking without charge is beneficial in improving the livelihood of individuals with disabilities. In terms of equity however, the link between disability and income is highly complex. It is unlikely that the 30 percent of meter occupants witnessed displaying disabled plates or placards had a disability limiting their income. To truly address this

perceived equity imbalance, providing free meter parking to the lowest income individuals, irrespective of disability status, is a far more direct strategy.

The issue of drivers' physical ability to pay, which initially motivated the meter payment exemption, is still a concern, but there are ways to address this issue. Additionally, it is likely that this form of disability affects only a small percentage of those currently qualifying for disabled placards. In Arlington, VA, parking managers distribute in-car parking meters pre-loaded with $25 for those with demonstrated difficulties in using traditional meters. They also increased their number of designated disabled spaces (with meters) (Moreno 1998). The supply of these spaces has been in excess of demand, assuring curb availability to drivers with disabilities (O'Leary 2009). Philadelphia, PA grants one hour of expired parking time to placard holders. This allows individuals with disabilities to park for an hour for free or to overstay their paid time by an hour (Ditzen 2000a). After changing the policy in both areas to requiring payment from disabled drivers, meter revenues, meter vacancies, and parking turnover increased. After some initial resistance, reports indicate that there have been no lingering complaints or issues with the policy changes (Ditzen 2002; O'Leary 2009).

If municipalities are to manage their street parking effectively in the face of growing numbers of drivers with placards, the state legislature must consider ways to grant municipalities flexibility in managing their parking supply. Based on the survey results reported here, the biggest impact of the disability payment exemption is from users who park for very long times at curb spaces. These

sessions are better suited to off-street parking facilities. Simply changing the law to allow localities to set hourly limits to the amount of free curb parking would likely generate more parking turnover, revenue, and ensure greater availability of curb parking for all users.

I. Introduction

For decades, economists and academics have been advocating charging a market-rate (or demand-based) price for curb parking (Vickrey 1963; Roth 1965). This pricing system has the potential to decrease a number of urban ills such as congestion, excess vehicle trips, and parking seek-times. In certain cities, this approach is now getting serious consideration as a means to better manage parking resources (Lin 2008; Groves 2009; Shallit 2009). Taking this idea to its fullest potential, San Francisco and Los Angeles are both in the planning stages for federal demonstration projects that will attempt to regulate parking through dynamic pricing in the areas of highest demand (Richardson 2009; SFMTA 2009). These projects could mark a new shift in urban transportation planning. However, the well-researched model of controlling parking resources through price may fail if many parkers are exempt from having to pay.

In California, a state notorious for its love of the automobile (and thus, love of parking), drivers who display disabled tags or placards ("credentials") are able to park unpaid, for an unlimited time, at any municipal parking meter. The number of these permits is on the rise—increasing from about 1 million in 1996 to about 2.3 million in 2008 (California Department of Motor Vehicles 2009). This increase has resulted in about 10 percent of licensed drivers possessing placards in 2009. While 10 percent of drivers is still a relatively small amount, their impact in terms of street parking consumption can be substantial.

Media reports suggest a high level of fraud in the use of disability credentials (Rouf, Morin et al. 1999; Gordon 2007; Grover and Goldberg 2010a; Grover and Goldberg 2010b). It is possible that areas that could stand to benefit the most from implementing demand-based parking rates are instead largely filled with drivers who do not pay, and are thus outside the reach of any price adjustments. In fact, raising the rates may only make this trend worse by selectively discouraging paying drivers.

Most research into disabled parking addresses either the number of required spaces dedicated to disabled drivers or the inappropriate use of those dedicated spaces (Allred and Cope 1990). Outside of academic investigation, recent consultant surveys in Los Angeles and Seattle have documented disabled meter parking percentages and occupancy lengths, finding that drivers with disabled credentials usually have longer parking sessions (Desman Associates 2009; Heffron Transportation 2009). The regulations governing dedicated spaces to disabled drivers (both on- and off-street) are a requirement of the Americans with Disabilities Act, and discussing their use and regulation is not a goal of this paper.

The central question then is: does the payment exemption of drivers displaying handicapped credentials serve as a barrier to regulating parking through pricing? Basic microeconomic theory shows that rational individuals will work to minimize their exposure to costs (Buchanan 1969). More recent work, specifically on rent-seeking behavior, shows that individuals or firms will seek government intervention to further protect themselves from costs (Wagner 1991). While a large

body of work exists supporting market-based pricing for parking, no research has been made that examines the effects of an exempt group. The vast majority of research into payment exemption focuses on the merits of equity (Miller and Singer 2000).

The existing literature on parking pricing deals chiefly with how motorists respond to price differentials (Calthrop and Proost 2006; Shoup 2006). Motorists seek out underpriced parking. Based on this, we hypothesize that disabled placard usage will be readily apparent in the study observations and that it will indeed be a barrier to regulating demand for parking by pricing.

A. Thesis Layout

To put the research question in context, this thesis will review the literature on the value and potential of pricing parking as a means to efficiently regulate demand. Section II, parts A and B provide a literature review on the economic rationale for pricing parking, and its relation to congestion pricing. Section II, part C provides a summary of recent local government meter pricing changes or programs in California that are based on better managing pricing through meter parking pricing adjustments.

This thesis then examines the basis for exemptions to pricing. Section III examines the background on granting exemptions to payment in general with part B discussing the history of meter payment exemption in California for drivers with disabilities. Part C contains an analysis of the current trends on placards in

California. Part D evaluates how demand for parking will vary with price, given the presence of a large group of payment-exempt users. While the topic of payment exemption and its effects have not been explored in the literature, research on parking behavior related to price differences between on- and off-street parking is used as a close substitute. Given the economic advantage that the placards bestow, section E looks at current observations made by consulting firms of parking demand by disabled users in Seattle and LA, and reviews a recent LA news investigation into placard fraud.

To understand the current usage levels of placards in LA, Section IV parts A and B discuss the survey methods that will be employed to gather street level data. Section V, parts A and B present the data collected from the two survey methods. Part C of this section reviews the answers of a survey on placard usage at meters from three LA-area municipal transportation/parking professionals

Continuing the discussion of placard usage, Section VI, part A looks at historical and recent reactions from the California legislature on placard usage and fraud potential. Part C of this section evaluates why policy change will be so difficult.

Section VII parts A-D evaluate disabled meter parking policy changes that took place or are pending in four other United States' cities. This leads into the final discussion of findings and the conclusion in Section VIII. Part A of this section looks at policy options and Part B recommends future research areas to build on these findings.

I. Managing Parking Demand through Pricing

This section reviews the literature on parking pricing, the larger topic of congestion pricing, and parking pricing policies that are currently being implemented in various California cities. This review serves to establish the rationale for parking pricing, its potential, and its current status of municipal deployment.

A. Background

In order to understand the basis for parking pricing, and its potential benefits when applied correctly, one needs to understand the logic of parking pricing. The academic literature on parking pricing dates back to the 1950s and 1960s through work done by Roth and Vickery (Roth 1965; Vickrey 1994). Recently, a renewed interest in this topic has been explored largely through authors examining the negative effects generated by underpriced curb parking, namely cruising and excess local congestion (Anderson and de Palma 2004; Shoup 2006; Kelly and Clinch 2009). While a key part of this literature is in examining price differentials between on- and off-street parking, the literature largely assumes that pricing is applied equally to all or most parties (Deakin, Bechtel et al. 2004; Calthrop and Proost 2006; Shoup

2006). Cumulatively, this body of work establishes the social and economic rationale for pricing curb parking.

Curb parking spaces, in practical terms, exist in an odd state between private and public ownership. A standard vacant space on the street is open to the next driver who chooses it, but once chosen, the space is privately occupied until vacated. It could then be considered a temporary private good. Epstein (2002) provides a historical overview of property rights in the context of parking spaces, including a few *Seinfeld* references to the value of hard to find curb parking in urban settings. How the space is allocated is usually based on either a bottom-up (or first possession) system, or a top-down system where its occupancy is restricted to certain groups or individuals by policy or permit (Epstein 2002). Epstein (2002) supports bottom-up rights as they are cheap to administer and reduce dead time, as the spaces are open to all. Metering parking, or charging a user fee, regulates the right of first possession by acting to moderate the duration of personal "ownership" before the space must be returned to the market. Considering the payment as a user fee, it is only charged when the service (a parking space) is rendered and payment is tied to length of usage (parking duration). The user fee can be used to affect the behavior of the consumer. For example, a high rate strongly encourages more restricted usage, while free parking encourages long-term usage.

The research on paying for parking as it affects mode choice shows that increasing parking fees can reduce solo driving. One model for parking in downtown Los Angeles predicted that between 25 to 34 percent fewer cars would

be driven if payment was required for parking versus it being free (Willson 1992). Another model showed a 21 percent decline in the number of cars commuting to the central business district in Portland, OR, after the institution of a $6 charge for parking (Hess 2001). That said, the elasticity of demand can be highly variable based on trip purpose and other conditions, with motorists' value of parking being quite dynamic (Kelly and Clinch 2006; Kelly and Clinch 2009).

Since occupied parking has characteristics of a private good, economists have suggested that either a marginal cost or market price be applied to regulate its supply (Roth 1965; Vickrey 1994). The promise of this sort of regulation through pricing has the potential for reducing unnecessary congestion. Shoup (2006) found that the combined "cruising" by drivers seeking underpriced (relative to off-street) curb parking in one area of Los Angeles led to a staggering amount of excess driving. In an area with 470 parking meters, the combined driving by drivers seeking curb parking generated an excess of 3,500 vehicle miles traveled per day (Shoup 2006). These vehicles, traveling without any productive social purpose, moved at low speeds, increased congestion, wasted fuel, and created unnecessary local emissions. Shoup's suggestion is to price parking at a market level such that blocks are only about 85 percent occupied, thus assuring that drivers are quickly able to locate parking. Pricing parking at the appropriate market level for the immediate area can also result in better utilization of traditionally underused peripheral parking and space out trips that are made into the urban core of cities (Arnott, Depalma et al. 1991).

Charging variable rates for parking based on demand may seem like a new idea, but it was first suggested by Nobel Prize winning economist William Vickrey in 1954 (reprinted in 1994). He notes that, conceivably, a parking meter could be operated to allow less time per some payment at rush hour as opposed to off-peak times. The overruling idea was to get this pricing structure in line so that "in each neighborhood it almost never becomes very difficult to find a vacant parking place" (Vickrey 1994, p. 59). Roth (1965) expands upon this vision with a focus on pricing curb parking that largely echoes Vickrey. Roth also speaks of three general methods for controlling street parking; (1) first come, first served, (2) time limitation, and (3) pricing. He quickly discounts "first come, first served" as having "little value and no defenders" as it favors those who arrive early and never vacate their space (Roth 1965).

B. Relation to Congestion Pricing

This rationale behind using appropriate pricing to regulate parking is derived from earlier works that examined the functional benefits of pricing roads. The underlying principle is that congestion, and its corresponding externalities, could be best controlled by charging tolls in relation to the level of congestion on the road network. During periods of peak congestion, the tolls would be the highest to discourage discretionary trips. These tolls then are considered a "push" method as they directly move motorists off the road at peak period. Researchers have shown this method to generally be more cost-effective and timely for reducing congestion

versus "pull" methods such as funding alternative means of transportation (Priemus 1995). Based on a review of the literature, British economist Pigou (1920) deserves credit for first suggesting tolls on road space as a way to alleviate congestion and ration the road space (Lindsey 2006).

Driving produces many externalities. The benefits of driving accrue largely internally to the driver, while the costs accrue substantially to others. Vehicle emissions, urban fragmentation, noise pollution, accidents, and congestion are externalities of driving that are not fully reflected in the price of driving. Economic theory suggests that imposing a price on drivers equal to the marginal social cost of driving can increase economic efficiency (Verhoef, Nijkamp et al. 1995). The price of driving could be set to a level where many trips would be shifted from peak to nonpeak periods, reducing congestion and increasing the efficiency of the roadway. Likewise, proper pricing of parking demand could shift demand and consumption to areas with higher vacancies to improve overall utilization. In addition to his early work promoting market-based prices for parking, Vickrey published many articles that examined the potential of road pricing (Lindsey 2006). In a 1963 article, Vickrey called into question the status quo, comparing transportation to other consumer services:

> …in no other major area are pricing practices so irrational, so out of date, and so conducive to waste as in urban transportation. . . . In nearly all other operations characterized by peak-load problems, at least some attempt is made to differentiate between the rates charge for peak and for off-peak service (Vickrey 1963, p. 452).

Button (2006) notes that the development of Western society has leaned on a reliance of market principles and prices. Where there are real or perceived market failures, there is often government intervention in response (Button 2006). In effect, Button argues to let prices dictate how and where road space is used. Parking can likewise be controlled via either prices or other time/location controls. Faced with these controls, motorists face five possible responses: (1) change their parking location, (2) change the start time of their trip, (3) change the mode they use to travel, (4) change their trip destination, or (5) abandon the trip (Feeney 1989).

Unlike congestion charges or fees, motorists are generally accustomed to paying for parking today. Verhoef et al. (1995) states that, "Because virtually every car has to be parked at the end of a trip, parking policies may indeed offer a potentially strong instrument for influencing traffic flows" (p. 142). While parking charges cannot impact trips by route and distance, and are thus not a full substitute for congestion pricing, they do have a much stronger capability of political acceptance (Verhoef, Nijkamp et al. 1995). Furthermore, many academics have little hope of congestion pricing being implemented in its full form on any meaningful scale (Borins 1988; Giuliano 1992).

C. Practical Applications

Research on parking pricing and policies is starting to leave the academic world and has begun to influence urban policy. Multiple cities in California have

recently used the potential benefits of parking pricing to guide, or at least justify, policy changes. Due to these local policy decisions, it is important to understand if disabled placard usage is a barrier to theses cities' proposed goals.

When Los Angeles recently raised meter rates citywide, the spokesman for the Los Angeles Department of Transportation (LADOT) remarked that, "The underlying goal...is to get people out of their cars" (Lin 2008). Of course, the increase in overall revenue was also a big factor, but officials were able to portray the increase as having a larger societal benefit. More recently in Santa Monica, raising parking rates was invoked in the hopes "that some visitors will instead walk, take the bus, or park in more-distant garages" (Groves 2009). In a similar vein, Sacramento recently considered requiring meter payment into the evening hours (where it previously was free) and labeled it "an effort to curb congestion and pollution" as drivers would circle the block to look for free parking as opposed to paying for off-street parking (Shallit 2009).

In addition to the small changes listed above, San Francisco and Los Angeles are both in the planning stages for programs that embrace dynamic parking pricing in their highest-demand areas. Their programs, SFpark and *Express*Park, respectively, are receiving federal funds of around $40 million in total to improve meter operations and allow for adaptive rates (Richardson 2009; SFMTA 2009). Vehicle sensors will be placed on the streets in the project area to measure vehicle occupancies. Based on the sensor data, the system will suggest rate changes based

on demand. The rate changes will be made with the goal of achieving around 85 percent curb occupancy.

II. Equity and Exemptions from Payment

Transportation charges are often considered inequitable as they have a proportionately larger impact on low-income individuals. This section provides the background on payment exemptions. It traces the history of the meter payment exemption for drivers with disabilities in California and provides data on the current number of valid disabled placards issued. This section then identifies a gap in the academic literature in explaining how parking pricing works when faced with a group of motorists that are exempt from payment. It concludes with a review of consultant and news media surveys on disabled placard usage at parking meters in Los Angeles and Seattle.

A. Background

Charging for parking, especially to a level that affects demand, is often considered income regressive, and thus has a negative impact on vertical equity. As a percentage of income, lower-income individuals by default will bear a relatively larger burden for purchases of all sorts. But in absolute terms higher-income individuals tend to own more vehicles and take more vehicles trips (Litman 2006). Any change to the meter payment exemption for disabled drivers is likely to raise the argument that such an action will have an adverse effect on equity.

Button (2006) compares the equity of paying by time (in this case, longer seek times for underpriced parking) and paying by money. He concludes that such time versus money arguments "ignore the important external effects in terms of how people spend their time" (Button 2006, p. 471). He goes on to provide the historical context of the queue system in the failed Soviet Union (Ibid). Furthermore, Glaister (1981) argues the issue from the angle that claiming an unfairness of peak pricing implies that constant prices, ignoring everything else, are inherently fair (Glaister 1981).

Overall, the equity effects of pricing on transportation are difficult to completely judge. A recent literature review on the topic found that there are many dimensions of equity and no real consensus of which to use (Levinson 2010). For example, by making driving and parking more expensive, there is the potential to free road space and alleviate congestion for bus riders—a group that is likely low income. Richardson (1974) argues that if the equity impacts between efficiency gains and money charges are not clear, the argument should defer to the efficiency gains which benefit all in time savings (Richardson 1974).

Outside of potential economic barriers, another issue is that certain types of disability may prevent an individual from physically paying for parking at a meter. [1] In response there are a variety of ways to allow such people to park without physically paying. Officials in Arlington, Virginia distributed electronic in-car

[1] As noted later, the original intention of the California law exempting meter payment was to address disabilities where an individual lost, or lost the use of, both arms.

parking meters to disabled drivers (O'Leary 2009). Other cities allow individuals with disabled credentials to park free for a certain number of hours, but not for an unlimited time.

Many disabled drivers benefit from proximity to destinations when parking. In economic terms, a close-in spot has a higher value to them than to an able-bodied person. In the absence of differential prices, an able-bodied driver may take a close-in space that he or she values less than a disabled driver would. The Coase Theorem suggests that in a free market the drivers could trade among themselves to each have a mutual advantage (more money for the able-bodied person, and a better location for the disabled driver) (Miller and Singer 2000). Such trading would require no government involvement, but is unrealistic in practice. Absent such markets, and disabled placards are a way to allocate preferred parking locations to those who most need them (Ibid).

Social exclusion is another potential negative outcome of pricing parking for disabled individuals. Social exclusion can be an issue if a specific policy presents a barrier to individuals' participation in normal societal activities (Burchardt, Le Grand et al. 1999). In the case of exempting disabled drivers from paying, this could be seen in allowing them to more easily or cheaply travel to social and civic events as these drivers may have difficultly traveling by other modes.

B. History of Disabled Meter Payment Exemption in California

Federal law puts forth a minimum definition of disability and states the types of automobile permits and plates that can be issued. Beyond this, each state has its own laws that govern issuing disabled credentials and their benefits (Miller and Singer 2000). A broad set of conditions related to visual or physical disabilities qualifies Californians for permanent or temporary disabled parking credentials. Licensed physicians, surgeons, physician's assistants, nurse practitioners, optometrists, chiropractors, and certified nurse midwifes are able to certify individuals with impaired mobility or vision for disabled parking credentials (California Department of Motor Vehicles 2008).

The form to request placards or plates has very specific requirements for certain conditions, while other conditions are more open. For example, to qualify on the basis of a lung disease, the form requires that the patient have a condition "to the extent that forced expiratory volume for one second when measured by spirometry is less than one liter **or** arterial oxygen tension is less than 60 mm/Hg on room air while the person is at rest" (California Department of Motor Vehicles 2008). Mobility impairment, however, defers to the general federal definition of being able to walk 200 feet without stopping. Generally speaking, the following conditions qualify one for the permit:

- Impaired mobility, for any reason
- Heart or circulatory disease
- Lung disease
- Disease or disorder that limits the use of lower extremities

- Documented visual problems, including low-vision or partial-sightedness
- The loss, or loss of the use, of one or both lower extremities or both hands
  (California Department of Motor Vehicles 2009)

In California, the statewide policy is that vehicles with disabled plates or placards are allowed unlimited (in the absence of tow-away restrictions) unpaid parking at any municipal meter in California. Several other states and some cities also provide similar benefits. This is provided for by California Vehicle Code (CVC) §§22511.5 which states:

> (1) A disabled person or disabled veteran displaying special license plates issued under Section 5007 or a distinguishing placard issued under Section 22511.55 or 22511.59 is allowed to park for unlimited periods in any of the following zones:
> (A) In any restricted zone described in paragraph (5) of subdivision (a) of Section 21458 or on streets upon which preferential parking privileges and height limits have been given pursuant to Section 22507.
> (B) In any parking zone that is restricted as to the length of time parking is permitted as indicated by a sign erected pursuant to a local ordinance.
> (2) A disabled person or disabled veteran is allowed to park in any metered parking space without being required to pay parking meter fees.
> (3) This subdivision does not apply to a zone for which state law or ordinance absolutely prohibits stopping, parking, or standing of all vehicles, or which the law or ordinance reserves for special types of vehicles, or to the parking of a vehicle that is involved in the operation of a street vending business.

The existing California law enabling this exemption dates back to 1959. Section 22511.5 to the Vehicle Code was signed into law by the Governor Pat Brown on June 1, 1959, and went into effect on September 18, 1959. The original law read:

> 22511.5 Any person who has lost, or has lost the use of, both legs or is so severely disabled as to be unable to move without the aid of a wheelchair shall be allowed to park for unlimited periods in parking zones restricted as

> to the length of time parking is permitted. This section shall have no application to those zones in which the stopping, parking, or standing of all vehicles is prohibited or which are reserved for special types of vehicles. As a condition to this privilege the vehicles shall display a distinguishing license plate which shall be issued for a vehicle registered to the disabled person, without additional fees, by the Department of Motor Vehicles pursuant to regulations adopted by that department (California Legislature 1959)

The original law allowed parking privileges, but only under a narrow scope. To qualify, individuals had to have a serious mobility impairment and were only allowed to receive special tags for a vehicle registered to them.

Since 1959, the law has undergone many changes—both slight and drastic. The first change happened in 1961, which changed "wheelchair" to "mechanical device" (California Legislature 1961). No further changes were made until 1970 when "both legs" was changed to "one or more limbs" (California Legislature 1970).

In 1972, the law was changed to explicitly allow parking at meters without making any payments. California Assemblyman John Dunlap, a Democrat for District 5, introduced the proposed change under Assembly Bill 369. The bill went through several revisions before passing. The initial text, introduced on February 9, 1972, contained two revisions. One would have added the text allowing the meter payment exemption, and the other would have added to the qualifying parties an individual who "has lost, or has lost the use of, both hands or arms" (Office of Research 1972).

The legislative record does not contain recorded discussion or debate on the bill. However, the intent would appear to be to recognize and address the instance of disability where one had lost the use of both arms or hands and thus would have

a barrier to physically paying for metered parking. Dunlap, who served in the legislature from 1966 to 1974, was contacted and asked about the history or origin of this bill. He replied that, "As I recall, someone on my staff read an article which pointed out that people with no fingers or similar disabilities could not put coins in parking meters" (Dunlap 2010).

The bill went through a few committee changes before passing. Other than correcting language, the only substantial change was to grant any individual who was recognized as a disabled veteran to also not be subject to time limits or meter fees (Ibid). The bill passed unanimously in both the State Assembly and Senate and was signed by Governor Ronald Reagan on August 10, 1972 (California Legislature 1972).

Further changes broadened the scope of disabilities that met qualifications for receiving special plates (and placards) that afforded the parking exemptions. They also further refined the program into the state it exists today. In 1974, the law was changed to allow disabled plates to be issued for a vehicle not registered to the disabled individual by permitting them for vehicles used primarily in the transport of a disabled individual or individuals (California Legislature 1974).

Large changes took place in 1976. The disabled designation previously had been limited to those individuals with impairments to one or more limbs. With this change, the eligibility requirements were expanded to include individuals with breathing problems. The change also introduced the first requirement for a physician's certificate to certify this condition (California Legislature 1974).

Previous disabilities were visually identifiable by Department of Motor Vehicles (DMV) employees.

The 1976 revision also allowed individuals who qualified for plates to obtain placards from the DMV. These were defined as being blue in color, at least six by 12 inches, and were to be displayed on the driver's side dashboard. The DMV was authorized to charge a fee for issuance of this placard (Ibid). Building on these 1976 changes, in 1977 the definition of disability was expanded to be those who were blind or impaired by cardiovascular disease.

In 1978, a complete repeal of the code was made and it was re-issued with a number of changes. The most significant changes were to include as disabled those with a "diagnosed disease or disorder which substantially interferes with mobility" (California Legislature 1978). It also added the additional option for individuals to receive temporary placards.

Several updates have been made since 1978. Expiration dates were added to the placards in 1991. The certification process was formalized, and it clarified that only one placard could be issued per individual (Deering's 2010). In 1992, vehicles involved with the operation of a street vending business were specifically removed from any of the exemptions (Ibid).

C. Current California Placard Data

I submitted a request to the California DMV Public Affairs Department in October 2009 to obtain information on the number of disabled credentials issued in

the state. Subsequent to this request, the DMV provided data at the County level for all valid permanent and temporary placards that were currently issued at 12 intervals (usually annual or biennial) between 1994 and 2009. During documented state hearings in 1990, a DMV official reported the number of placards in current circulation at that time (California Legislature Senate Committee on Transportation 1990).

Data were unavailable for a comparable time period for disabled plates. In 2006 alone, the number of disabled plates statewide represented only about 12 percent of the total number of disability credentials (plates plus placards) (Haskins 2009). Qualifying individuals are able to obtain both a plate and a placard, and few are likely to only obtain a plate as it provide less flexibility in use. Evaluating only placards is thus conservative. Based on the 2006 figure provided, the actual number of legal disability credentials may be around 10 percent higher, not including placards that may have been reported stolen or missing.

The number of valid disability placards issued in California is steadily increasing. The number of valid placards for all available years was graphed as a number of placards annually per 100 California residents.

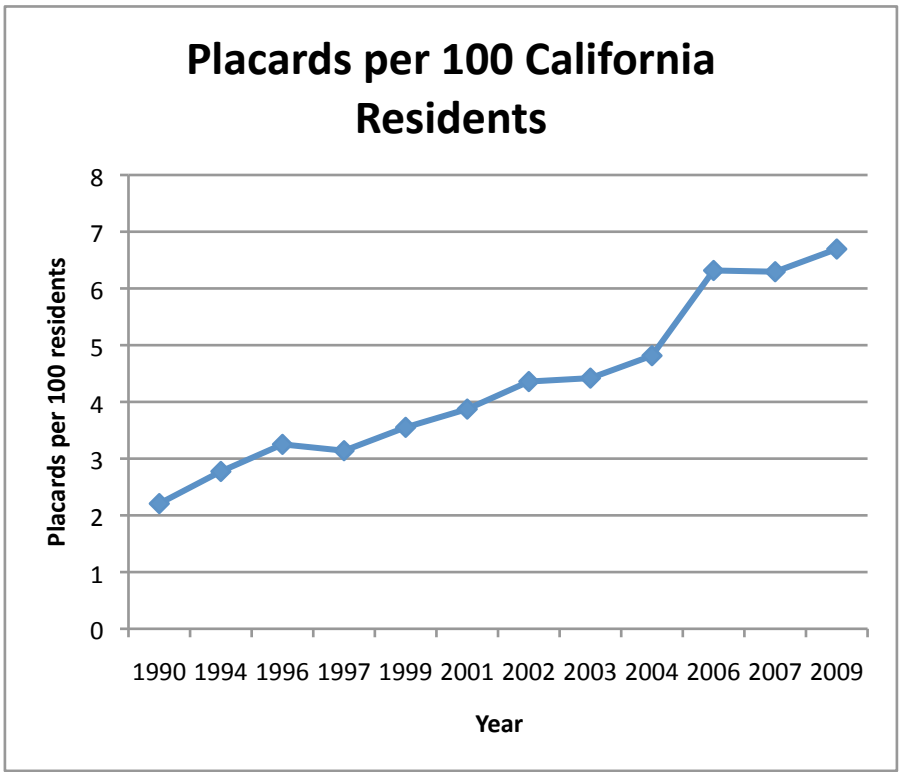


Figure 1. Placards per 100 residents, 1990-2009 (California Legislature Senate Committee on Transportation 1990; California Department of Motor Vehicles 2009).

In 1990 just over 2 percent of California residents were issued placards, while in 2009 the number is almost 7 percent. This is a 350 percent increase in just under 20 years.

The increase in placards was consistent across all counties in California. Data were compared for the number of placards per person for all of California's counties with 65,000 or more residents (the only data available for 2007) in 2000 and 2007. The average increase in the number of placards from 2000 to 2007 for these counties was 72 percent, with a minimum of a 43 percent increase in Riverside County, and a maximum increase of 118 percent in Mendocino County.

	2009 California Total	Percentage with Placard
Placards	2,474,545	N/A
Total Population	36,961,664	7 percent
Valid Drivers' Licenses	23,700,047	10 percent
Registered Personal Automobiles	21,898,286	11 percent

Table 1. 2009 California Placard Data (California Department of Motor Vehicles 2009; United States Census Bureau 2009).

Table 1, above, compares the most recent placard figure with other transportation statistics. It shows that the number of placards means that one out of every ten California drivers possessed a valid disabled placard in 2009. These data can also be evaluated in terms of the number of placards per parking meter at the local level. For example, the City of Los Angeles constitutes about 40 percent of the population of Los Angeles County. In 2009 Los Angeles County had about 650,000 valid temporary and permanent placards. If distributed evenly countywide, 40 percent of these placards would be for residents in LA, meaning that there would be more than 6 valid placards for each of the City's 40,000 parking meters.

For placard data from year 2000 at the County level, the number of placards per 100 residents in each County was calculated and is shown in Figure 2 below. These data were compared with population density and percent of population 65 and over. While the latter was expected to have some correlation, it was partly expected that areas with higher density would also see a higher per capita number of disabled parking permits. Dense areas are likely to have the most expensive and limited parking. Thus, the placard bestows a greater benefit in these areas.

The data showed that the County with the largest number of placards per capita in 2000 was Lake County, with 6.5 placards per 100 residents. The County

with the lowest number of placards per capita was rural Mono County, with only about 1.6 placards per 100 residents. These counties also had the highest and lowest percentages of population 65 and above, respectively. In 2000, the overall state average was about 4 placards per 100 residents. Los Angeles County had 3.7 placards per 100 residents in 2000.

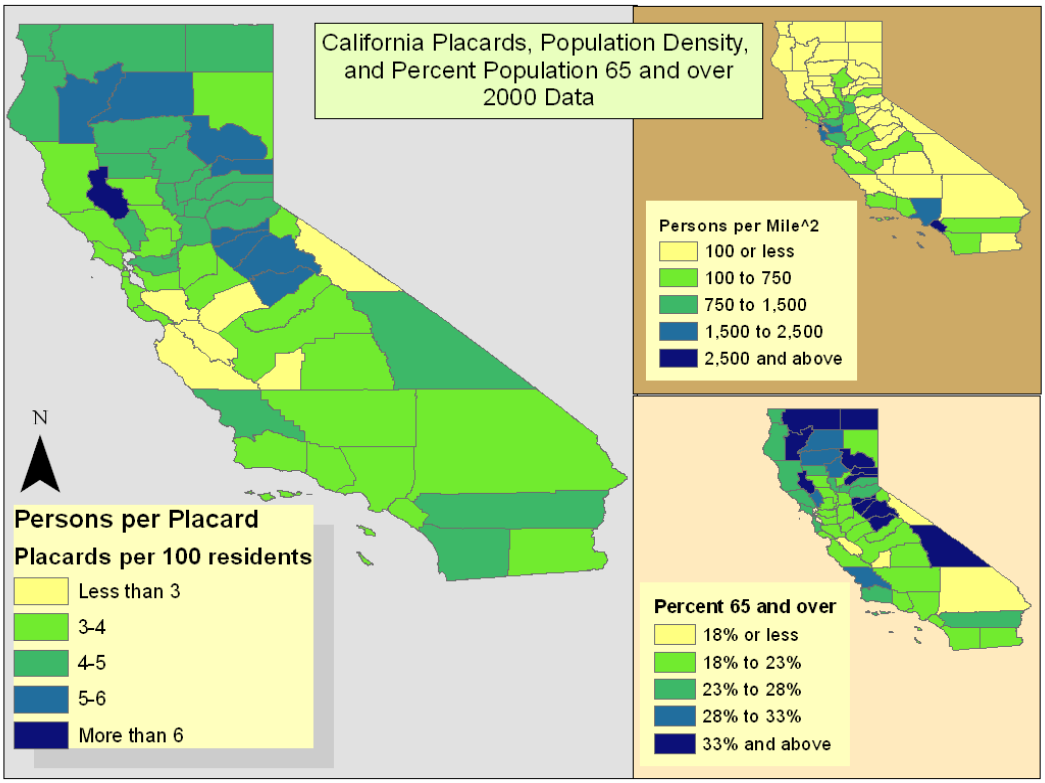


Figure 2. County-level Persons per Placard, Population Density, and Percent of Population 65 and Over (US Census Bureau 2000; California Department of Motor Vehicles 2008)

Figure 2 shows a small, negative, correlation between population density and placard density. This could be explained by fewer retirees living in the urban parts of the state, or that those who do rely on transit and have less need for parking

privileges. Unlike population density, the percent of population 65 and over appears highly correlated to placard density. This is not surprising, as many of the qualifiers for obtaining this permit correspond to age-related ailments that impair or limit mobility.

The 2000 County-level placard data were then compared to other countywide demographics, and the Pearson's product-moment of correlation was calculated. These factors are (1) the percentage of residents reporting one or more disabilities, (2) the County population density, (3) the percent of the population 65 and above, (4) median family income, and (5) the percent of residents below the poverty line. Using this metric, a coefficient of 1 indicates a perfect positive linear relationship, and -1 indicates a perfect negative linear relationship. The closer the coefficient is to either 1 or -1, the stronger the correlation between the variables.

		Placards per 100 Persons	Percent Reporting a Disability	Population Density	Percent of Population 65 and above	Median Family Income	Percent of Residents in Poverty
Placards per 100 Persons	Pearson Correlation	1	**.61****	-0.13	**.87****	-.29*	-0.02
Percent Reporting a Disability	Pearson Correlation	**.61****	1	-0.09	.47**	**-.71****	**.57****
Population Density	Pearson Correlation	-0.13	-0.09	1	-0.05	.29*	-0.17
Percent of Population 65 and above	Pearson Correlation	.87**	.47**	-0.05	1	-0.20	-0.12
Median Family Income	Pearson Correlation	-.29*	**-.71****	.29*	-0.20	1	**-.83****
Percent of Residents in Poverty	Pearson Correlation	-0.03	**.57****	-0.17	-0.12	**-.83****	1
	N	58	58	58	58	58	58

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 2. Pearson Correlation Coefficients for Select California County Demographics, 2000 (US Census Bureau 2000; California Department of Motor Vehicles 2009).

As Table 2 indicates, the strongest relationship of the selected variables with the number of placards per 100 residents was seen with the percent of the county population 65 and above. This relationship was even stronger than the percent of residents reporting one or more disabilities in the 2000 Census. County population density was not correlated with the number of placards.

The population percentage reporting any disability for all ages was about 20 percent. However, for residents 65 and over, the percentage was 41 percent (Census 2000). This is not unexpected as incidences of mobility and sensory impairment naturally increase with age.

These correlations show that using Census disability data as proxy for the expected number of disabled placards is less accurate than simply looking at the percentage of residents 65 years of age or older. The data also show that, at the County level, the percent reporting a disability has a negative correlation with median income. However, the relationship between this median income variable and percent of population 65 and above is not significant. In other words, the population over 65 percentages – the group most likely to have placards – are not linked to the low income group at a statistically significant level. If the policy of free parking for placard holders is related to vertical equity, the policy of free meter parking for individuals with disabilities is not addressing this concern. The group with the most placards, those 65 and above, is not necessarily the group with the lowest income.

It must be noted that County-level was the finest unit of resolution possible for evaluating the number of placards. Examining data at this level can be subject to the problems of the ecological fallacy, and can show stronger correlations compared to evaluating individual correlations. This effect is most pronounced when evaluating large, consolidated geographic areas (Robinson 1950). Our unit of analysis is the 58 diverse counties of California, and some of the results show very

high correlations. To further understand the demographics of placard holders, it would be beneficial to obtain placard numbers at the zip code level or a similar smaller scale.

D. Economics of Parking Payment Exemption

All individuals acting rationally will work to limit their exposure to economic expenditures. If necessary, they will result to quasi-legal activities to obtain special privileges that benefit them while harming society at large (Wagner 1991). The economic term for this is "rent seeking." Drivers with the placards must pay in most private, off-street parking facilities. Paid parking provides an extra incentive for these individuals to seek curb parking. Where parking is limited and expensive, the incentive is even larger.

While the effects of an exempt group on managing parking through pricing have not been examined in the literature, a close approximation has looked at the situation of price differentials between on- and off-street parking. This research provides a good substitute for looking at the effects of exemption due to the fact that curb parking is greatly underpriced relative to off-street parking for disabled placard holders, as on-street parking is free.

If parking is underpriced then the resource will be overused where it is most valuable (Anderson and de Palma 2004). This overuse of curb parking will inevitably lead to the wasteful exercise of cruising for parking. Calthrop and Proost (2006) note that, "The lower the relative price of on-street parking (relative to the

off-street market), the greater the number of drivers that invest in socially wasteful searching" (p. 30). Their research found that curb parking pricing at any level under that of the local cost of off-street parking (where off-street pricing has competitive tendencies) will lead to excessive parking searching (Ibid). Arnott and Rowse (2009) also evaluated price differentials between garages and on-street parking in urban environments. Their principal finding was that in areas where garage pricing is more expensive, the social benefits of raising curb pricing to reduce cruising may be several times greater than the additional meter revenue generated (Arnott and Rowse 2009). The key result of all these studies is that a price differential where on-street parking is much cheaper leads to high demand and cruising. Based on these studies, we would expect that drivers with disability credentials would selectively seek out meter parking, as they are likely subject to paying for private off-street parking. This selective use of meter parking is also likely to lead to cruising in high demand areas.

Shoup (2005) developed multiple models to show how pricing affects the demand for curb parking. Simply put, demand is influenced by price and raising price will increase vacancies. In areas of the highest demand, the highest price is needed to obtain vacant spaces and avoid cruising. Conversely in a situation with low demand, no price is needed to regulate curb parking.

In its most basic form, this model assumes that the price mechanism is equally applied to all vehicles in the scenario. In the case where a large share of the vehicles are exempt from paying, it is not possible to manage overall demand with

price. In fact, higher rates would likely mean more users who are exempt from the rate. An alternative model could then be used that shows a prediction of the number of paying customers as a function of the price. It is then also possible to predict the total municipal revenue for parking based on the price and expected number of paying customers.

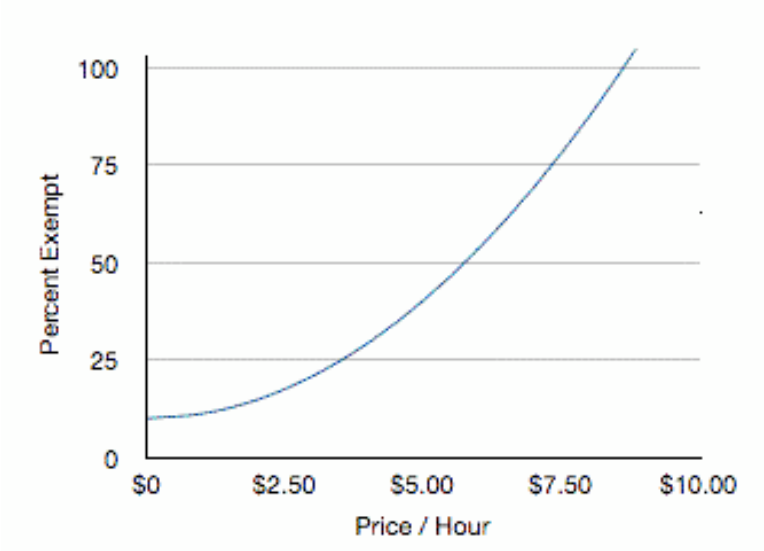


Figure 3. Example of Percentage of Payment-Exempt Parkers and Parking Price per Hour (Author, 2010)

Figure 3 shows the expectation of parking occupancy percentage by exempt drivers. Their cost (nothing) is the same at all levels, so some representation would be expected at all price levels. If all local curb parking is free and equally accessible, we would expect that the share of exempt (in this case, specifically those with disabled placards) parkers would be roughly equal to their proportion of the overall population. In 2009, data showed that 7 percent of the overall state population has

a valid placard (United States Census Bureau 2007; California Department of Motor Vehicles 2008).

However, in those areas where parking is in most demand, it is not free, and differences in occupancy readily become apparent. Price as a means to regulate demand is a basic economic theory, in this case applied to parking. As prices go up, demand goes down, but for exempt parkers the price is always zero. Therefore demand will decrease for those exposed to the higher rates, and their percentage of the overall parkers will decrease. This is exacerbated in areas with abundant private off-street parking; these off-street lots are not required to provide free parking for those with disabled permits. This provides an extra incentive for those with credentials to seek out available curb parking.

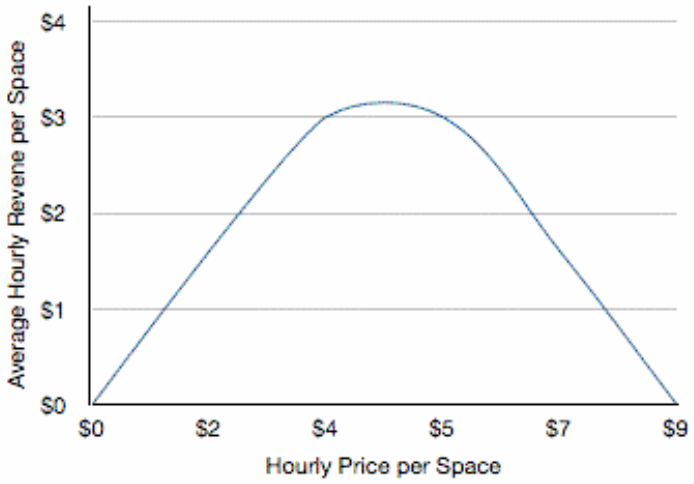


Figure 4. Average Revenue per Space and Hourly Price per Space (Author, 2010)

If fewer paying motorists are present at higher meter rates, it follows that local parking revenue will also decline at higher hourly rates. Raising rates will moderate demand by paying customers, and lead them to choose other alternatives for travel options or parking locations. Even without payment-exempt drivers, there is a price point to create such a response. However, for exempt drivers there is no price point. Thus, we would expect that as the rate for parking increases, a higher amount of the meter time will be used by vehicles that are not exposed to payment requirements.

E. Observed Implications of Current Exemption Policy

Discussions of fraud in the disabled parking system in California are widespread in the popular media. Fraud can occur in three main ways: (1) using a placard that is not assigned to the driver or any current vehicle occupant, (2) obtaining a counterfeit, or second-hand, placard through the black market, or (3) obtaining a placard undeservingly through legitimate channels. In the latter form, there was an infamous case at UCLA where 14 football players claimed to have all manner of illnesses to obtain the placards (Rouf, Morin et al. 1999). Issued by a doctor, these were legitimate placards, but were obtained fraudulently. In an unrelated incident, in 2006, the California DMV ran a check and invalidated over 25,000 placards that had been automatically renewing for deceased individuals (Gordon 2007). One author notes that, "as the value [of disabled parking] privilege increases, the incentives for cheating go up" (Miller and Singer 2000) .

Providing free, unlimited parking at meters in California for drivers with disabled credentials does not guarantee proximity, calling into question its justification on that basis. With an increasing number of drivers displaying these credentials, disabled drivers are forced like everyone else to circulate and hunt for available parking. For drivers who truly need a proximity advantage, placards do not always provide it in the current system.

While no academic research has looked directly at the effect of payment and time limit exemptions for vehicles displaying disability plates or placards at metered parking, two consulting firms recently conducted surveys and reported their findings on the topic. Studies were conducted in Los Angeles in June 2009 by Desman Associates and in Seattle in April 2009 by Heffron Transportation. The Los Angeles study looked primarily at revenue issues for municipal parking citywide. The Seattle study focused on key neighborhoods and specifically looked at meter parking by individuals displaying disabled placards near downtown hospitals.

The Los Angeles study relied on data from 380 on-street meters on 13 streets around the City—one in each City Council District. The City of Los Angeles has approximately 36,500 on-street metered spaces, so this study looked at just over 1 percent of all metered spaces total (Desman Associates 2009). Desman selected meter areas based on performance, with the chosen meters having high visibility and a large amount of activity and turnover, which could potentially bias the findings towards higher revenue expectations (Ibid). The study looked primarily at revenue factors and, surprisingly, did not report overall occupancy levels. However,

they did note that 15 percent of the parking meters observed had failed and these spaces were occupied during 72 percent of their observations.

At the meters surveyed, Desman (2009) found that only 5 percent of the spaces were occupied by drivers displaying disabled credentials, but that these 5 percent of drivers consumed 17.4 percent of the meter-occupied minutes at their survey sites (Ibid). In other words, these parkers were much more likely to have longer parking sessions. In terms of generating parking turnover through pricing, this is a key observation that disabled payment exemption is a potential barrier.

Unfortunately the Desman study did not fully explain their methodology or their survey method. The surveys all took place between Tuesday, June 9th and Thursday, June 11th, 2009, but the authors list just one time of day for their observations. Thus their data collection methods are not clear.

In Seattle a survey by Heffron Transportation examined a total of 455 spaces in three areas around the Virginia Mason Hospital, Swedish Hospital, and Harborview Medical Center (Heffron Transportation 2009). The consultants evaluated a variety of parking stall types, including three-minute loading zones, two-hour unmetered, two-hour metered, and a small number of unrestricted spaces. The surveyors looked specifically at parking durations for drivers displaying disability credentials. They visited all the spaces in the area detailed in Table 2, below, at 10:00 AM and then again at 2:00 PM on both April 21st and 28th, 2009. In reporting their findings, the survey combined the results from both days. During the first daily visit (at 10:00AM), those drivers with disability credentials were recorded

by license plate and/or placard number and space and matched to vehicles that remained in the same space during the second survey (at 2:00 PM)

Parking Area	10:00 AM Percent Vehicles with Disability Permit	2:00 PM Percent Vehicles with Disability Permit	Vehicles with Permit that Parked over 4 Hours	Total Number of Spaces	Percent of Spaces Controlled by Meters
Virginia Mason Hospital	41%	47%	54%	187	34%
Swedish Hospital	44%	52%	37%	164	24%
Harborview Medical Center	4%	9%	36%	107	0%
TOTAL	**30%**	**29%**	**44%**	**458**	**22%**

Table 3. Seattle Parking Study on Disability Placard Parking Occupancy Lengths (Heffron Transportation 2009)

The study did not separate how drivers with disability credentials behaved at metered versus unmetered spaces. However, based on their data, it was possible to calculate the percentage of spaces in each area that were controlled by meters. Like California, drivers with disability credentials in Washington State are currently afforded unlimited free parking at all parking space types.

While the Harborview area had low levels of placard occupancy, vehicles with placards in this area still had parking durations similar to those in the other survey areas. Harborview was also the only area with no spaces controlled by meters. The Seattle sample size was fairly small, but the results indicate that parking occupancy lengths are higher for drivers with disability credentials.

In addition to these surveys, the Los Angeles NBC affiliate presented an exposé on placard parking in one area of downtown Los Angeles. NBC's investigation was targeted specifically at fraud, and their results provide insight into how placards are potentially misused (Grover and Goldberg 2010a). NBC also had the resources to analyze DMV records to investigate fraud, and their actions spurred the DMV into conducting an enforcement operation to address the problems identified.

In January and February of 2010, NBC staffers conducted observations on meter parking usage by drivers with disabled placards in the Fashion District area of downtown Los Angeles. They deployed a team of surveyors who evaluated a 10-block area for two months, making regular observations on the number of vehicles parked that displayed disabled placards. Their surveys revealed that as many as 80 percent of vehicles parked at any given time were displaying these placards and parking for free (Grover 2010; Grover and Goldberg 2010a).

Based on their initial investigations, NBC focused on 12 individuals who they regularly witnessed parking in the area while displaying placards. They found that 11 of the 12 drivers were using placards issued to someone else (Grover and Goldberg 2010a). One local business owner admitted to using his father's placard to park for free in front of his business. He was quoted as saying that, "We think of it as saving $150 or $200 at the end of the month" (Ibid). After he was approached for an interview and notified that this was illegal, he moved his vehicle and said that he

would not use the placard to park at a meter again. However, the report notes that his vehicle was seen a short time later a block away displaying a placard (Ibid).

The reporters approached the DMV and LADOT with their findings. The Chief of the DMV, Vito Scattaglia, affirmed that their documentation of the abuse was "one of the most blatant examples of fraud" that he had seen (Grover and Goldberg 2010a). In response to this investigation, the DMV ran an enforcement operation and on one day wrote 46 citations for misused placards. Scattaglia called the operation "unbelievable in terms of the violations" (Grover and Goldberg 2010b). In approaching LADOT with their findings, the head of LA's parking enforcement, Jimmy Price, responded that he did not know the last time that his department had conducted targeted enforcement. He noted that his department has limited resources for such activities (Ibid).

As part of my thesis research I interviewed the lead NBC reporter, Joel Grover. In my interview, Grover told me that, due to space limitations, he did not report on one instance in which a business owner's mother had four placards issued to herself after reporting three stolen and receiving replacements. She had given the extra placards to her children to use (Grover 2010). The DMV provides such replacements free of charge on request. Grover also commented that he believed that the majority of placard users in the area were workers or business owners (Ibid).

IV. Data and Methods

The previous sections have established the basis and potential for parking pricing as a means of congestion pricing and evaluated the issues surrounding the exemptions for drivers with disabled credentials. In this case, what appears to be a well-intentioned law aimed at aiding those in need has the potential of creating a financial incentive for misuse or overuse. It is also likely to undermine California cities' attempts to move forward with demand-based pricing for parking, and it reduces parking meter revenue for municipalities. As the number of valid placards is steadily increasing, it is important to find out how often placards are used at parking meters currently.

To evaluate the central question of whether or not this exemption is a barrier to successful parking pricing, this thesis uses three principal research methods. Observational data were gathered in Los Angeles on the incidence of parkers displaying permits and how these drivers behave relative to other parkers. These methods are supplemented by feedback received from three municipal parking managers in the Los Angeles area. Finally, I present four case studies of other cities where the disabled payment exemption policy was changed or a change is pending.

These methods will in total assess placard usage on the street, municipal attitudes toward the policy, and policy changes in other cities. Cumulatively these data sources will contribute to the body of knowledge on this topic, which has not been evaluated on any large scale in the academic literature despite being a popular

topic in the news media. It also will provide a basis for future research and perhaps inform popular opinion on the subject.

A. Meter Surveys

To understand the prevalence of curb parking users displaying disabled plates or placards, this research employed two methods of surveying to evaluate parking at select areas in the City of Los Angeles. The first method was on-street meter surveys that evaluated the "moment in time" status of the metered space in select areas.[2] The second method, continuous observation surveys, consisted of all-day meter observations on individual block faces. Combined, the two surveys inform on how widespread placard/plate usage is and how drivers parking with the placards behave relative to other drivers.

These surveys are similar to methods employed by Desman in Los Angeles and Heffron Transportation in Seattle (and discussed prior). They are intended to be more comprehensive by including more data points in a larger geographic area. Additionally, they add the continuous observation method that determines how different parking users (for example, paying versus placard-holding) behave at curb parking meters at a higher level of resolution. Hourly interval observations (like those made in Seattle) can yield rough data, but can also ignore short parking sessions where curb parking is the most efficient option.

[2] The status of the meter space and the type of vehicle occupying the space was recorded at the time the surveyor reached the space.

Surveyors collected data for the on-street meter surveys in the spring of 2009 and the winter/spring of 2010. The author collected all of the data for the spring 2009 time period. A team of UCLA Urban Planning students collected the data for the winter and spring 2010 surveys.

The survey format consisted of one or more persons walking a designated survey route and recording the status of all meters. Surveys took place during meter hours of operation, and no surveys were made within 30 minutes before or after the enforcement of a tow-away, no stopping restriction, if applicable. Surveyors grouped their data into block faces, which allowed for analysis at both the local and larger aggregate levels. They identified spaces as vacant or occupied at the time the surveyor reached the space. Surveyors identified occupied spaces as paid or unpaid, and the reason for nonpayment was recorded. While other reasons for nonpayment (such as government vehicles, expired/unpaid meters, or meter failure where applicable) are outside the scope of this project, their collection did not add substantially to the workload and may inspire future research. Appendix A provides an example of the survey sheets.

The methodology was more refined for the second set of surveys, so the data are presented separately. The initial survey reported chiefly on occupancy and percent of occupants displaying placards. Additionally, in this survey single-space meters were not separated from multi-space meters.

For the latter survey, meter survey routes were clearly defined and every block face was assigned a unique identifier (see Appendix B). This allows for future

location-based analysis of the results using Geographic Information Systems software. Additionally, data were acquired under many different variables that will allow for more in-depth analysis in the future (see Appendix A).

Payment status is readily identifiable for the single-space meters. However, the multi-space meters allow for payment at any local pay station and by cellular phone; they only identify the payment status on the actual pay station where a payment was made. Surveyors obtained payment status by keying in the corresponding space number into the pay station(s) that the parker was most likely to have used (based on visibility and/or proximity). The correct payment status for most parking sessions was likely obtained, but the data on payment status should be considered less accurate than for the single space meters.

Vehicles that were unpaid at time of observation, but were actively involved in loading or unloading, were not recorded as unpaid. However, vehicles with drivers or passengers sitting in their vehicle at an expired meter were counted as not paying. Los Angeles Municipal Code 88.07 states that:

> When the operator of a vehicle parks such vehicle in a parking meter zone on a public street, the operator shall immediately make or cause to be made a lawful payment in the parking meter adjacent thereto, or if none, in an applicable parking meter in the vicinity after entering the assigned parking meter space number….
>
> (Title and Section Amended by Ord. No. 180,092, Eff. 9/7/08.)

Los Angeles Municipal Code 80.69(b) generally defers to California Vehicle Code section 463 to define "parking." This definition is:

"Park or parking" shall mean the standing of a vehicle, whether occupied or not, otherwise than temporarily for the purpose of and while actually engaged in loading or unloading merchandise or passengers.
Added Ch. 1608, Stats. 1961. Effective September 15, 1961.

The 2009 survey made 1,676 observations, mostly in downtown Los Angeles, but also in San Pedro. The 2010 survey locations are detailed below in Table 4. Survey locations were focused in the area roughly from downtown Los Angeles to the area around the University of California, Los Angeles (UCLA). This second survey looked at 3,207 unique spaces, or about 8.7 percent of all on-street meter spaces Los Angeles. There was a small degree of overlap in survey areas. In total, surveys covered about 6,500 meter observations.

Neighborhood	Parking Meter Zone	Survey Date Range	Total Spaces Surveyed	Unique Spaces Surveyed	Total Block Faces Surveyed	Unique Block Faces Surveyed	Average Number of Meter Spaces per Block Face
Westwood Village	533	01/25/10 - 02/01/10	855	428	106	53	8.1
Brentwood	539	01/28/10 - 02/02/10	328	167	29	15	11.3
Westwood Blvd.	536	02/10/10 - 03/24/10	970	485	124	62	7.8
Little Tokyo	555	02/19/10 - 03/26/10	795	402	97	49	8.2
Civic Center	553	02/27/10 - 03/24/10	211	211	33	33	6.4
Hollywood	546	03/12/10 - 03/30/10	881	617	108	75	8.2
Chinatown	554	3/26/2010	359	359	48	48	7.5
Sawtelle	525	03/23/10 - 03/26/10	919	538	156	94	5.9
TOTAL		**01/25/10 - 3/30/10**	**5318**	**3207**	**701**	**429**	**7.6**

Table 4. On-Street Meter Survey Locations, 2010

Continuous Observation Surveys

To understand parking duration, surveyors made all-day observations of metered parking on two block faces in downtown Los Angeles. In the survey area, there is a proposed program to update the meters and add sensors to regulate demand through pricing adjustments. Surveyors recorded the start and end time of every parking session. They also recorded the time and length of payment(s), and the apparent reason for nonpayment. Surveyors made every effort to blend in with the large number of other local pedestrians to avoid influencing behavior. They recorded payment length after the driver left the area. While these surveys yield the most valuable results, they involved a full day of observations. This thesis contains results from two such surveys. Data will be analyzed by overall occupancy throughout the day, meter payment totals, occupancy types, and parking duration by occupancy type.

Both survey areas are considered high demand areas and have an hourly rate of $4 per hour, the highest rate of any meters in the City of Los Angeles. Both areas had a maximum parking length of one hour.

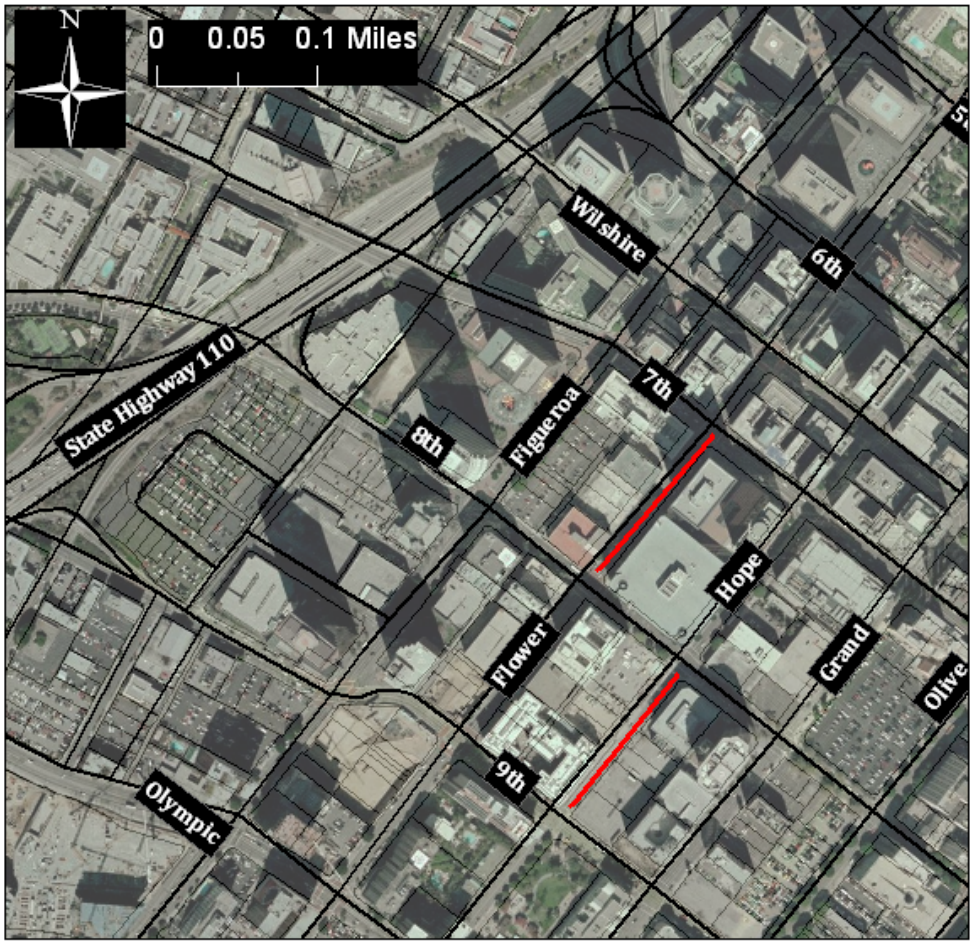


Figure 5. Meter Time Survey Locations (in red), Downtown Los Angeles

The surveyed locations are very close in proximity, but different in characteristics. The northern survey area, on the east side of Flower Street between 7th and 8th Streets, contains 14 parking spaces controlled by two multi-space pay stations manufactured by Duncan Solutions. Patrons pay by keying their parking space number into one of the centrally located pay stations. These pay stations accept payment by credit card, coin, or by cellular phone after registering for an account with mPARK. The second location, on the east side of Hope Street between

8th and 9th Streets, contained 11 parking spaces controlled by conventional single space meters. These meters accept only coins.

B. Municipal Interviews

State law supersedes any local laws and permits free, unlimited parking at public meters in all California municipalities, but municipalities are otherwise largely able to set their own rates and rules for parking meters. City Councils usually regulate the locations, enforcement hours, and rates of meters in their individual cities by ordinance. Local transportation officials often provide input, but the process still is guided, at least in part, by local politics. A national survey of municipal parking managers in 1996 showed that only about 12 percent of respondents had meter increases in the past year (International Parking Institute 1998). The vast majority (83 percent) of these respondents with an increase stated that the increase was based on "budget requirements," and about 80 percent of all respondents stated that political approval was needed for rate changes (Ibid).

Locally, in the Los Angeles region, the ability to regulate parking demand through pricing has been increasingly cited as a reason for raising rates. To collect data on local meter policies, I interviewed the parking managers of three LA-area municipalities that have areas of high-demand parking. The questions were:

- Approximately how many on- and off-street spaces does your department manage?
- Are there areas where parking occupancy rates at meters are near 100 percent at certain times?
- What are your current rates for on-street parking?

- When is that last time the city raised parking meter rates and/or is there a plan in the future to raise them further?
- What is the basis for rate increases?
- How did the public react to the last meter rate change?
- Do you see concentrations of vehicles parking at city meters displaying disabled tags or placards?
- Do you perceive their exemption from payment as being a barrier to your city's parking meter goals?

C. Policy Change Case Studies

The potential for abuse of disabled parking privileges is not unique or confined only to California. I reviewed a select number of state policies and laws relating to free curb parking for individuals with disabilities, and the policies vary by state. Some states (like California) mandate unlimited free parking at meters, some allow a certain time period of free parking, and some do not mention any specific guidelines. Furthermore the government code of some states allows local municipalities to enact ordinances allowing free parking (where state law does not provide), and still others allow municipalities to opt out of a statewide law providing free parking to drivers with disabilities.

One barrier to researching literature on these state laws and drawing any conclusions is that the laws tend to change over time. In 2001 a survey was completed by US and Canadian municipal parking operators that included a question on free disabled parking. Sixty-two municipalities responded. These municipalities varied in size, but each managed an average of 3,000 metered spaces. The respondents were asked if they provided a special policy for access to on-street

parking for drivers with disability credentials. Their responses are shown in Table 5, below.

Special Policy	Percent of Respondents
Free meters	60 percent
Dedicated meter parking	24 percent
Free dedicated spaces	33 percent
Free short-term with a fee for long-term	11 percent

Table 5. Municipal Responses to On-street Parking Policies for Drivers with Disabled Credentials (International Parking Institute 2001)

While Table 5 illustrates the variety in policies, the percentage responses indicate that some municipalities have multiple policies. Most cities in California, for example, are likely to offer both free meters and free dedicated spaces, with the latter meeting ADA requirements for new street parking or to meet a specific request.

This thesis reviews disabled parking payment policy changes in four cities, Arlington, VA, Philadelphia, Buffalo, and Seattle. The first three have made changes in their policies, and a change is pending in Seattle. For Arlington, I interviewed the County Treasurer, Frank O'Leary, who was instrumental in the policy change. Media reports supplement this interview and form the basis of analysis for the remaining cities.

V. Results

This section provides the results of both meter surveys and the municipal interviews. Meter survey result data are displayed below in a variety of graphs.

A. On-Street Meter Surveys

Drivers displaying disability credentials are not required to make a payment at municipal meters. Our data for the latter survey showed that about 4 percent of the parking sessions for these individuals were paid at the time of the survey (likely from the prior session) for both the single- and multi-space meters. The remainder of the parking sessions by vehicles displaying disabled credentials were unpaid, with 17 percent of the single-space disabled parking sessions occurring at failed meters.

During the 2010 survey, slightly fewer than half of all parked vehicles were seen with a valid payment. In addition to payment exemption for drivers displaying disability credentials, government vehicles (police, fire, municipal services, official government mileage vehicles, etc.) are also exempt from paying for parking at City meters. Vehicles parked at failed meters are also not required to make a payment. Outside of these vehicle types, all other vehicles not paying were potential vehicles for citation. It should be noted that curb parking is extremely dynamic and fluctuates with day of week, weather, time of day, and many other factors. The results varied greatly between blocks.

The spring 2009 data (Table 6, below) mainly focused on areas in downtown Los Angeles, but also included the San Pedro neighborhood. At downtown metered spaces, occupancy was generally very high, as was the percentage of occupants displaying disability credentials. Both of these numbers were substantially lower in

San Pedro, an area that also contains a large amount of free curb and off-street parking.

Neighborhood	Parking Meter Zone	Date	Spaces Evaluated	Time	Occupancy	percent Occupants Disabled	Rate per Hour ($)
Little Tokyo	555	4/1/2009	136	9:00 AM - 10:15 AM	66 %	52 %	$2
Little Tokyo	555	4/1/2009	137	2:30 PM - 3:45 PM	93 %	40 %	$2
Central Business	537	5/8/2009	231	9:00 AM - 11:30 AM	79 %	55 %	$3 - $4
Central Business	537	5/6/2009	156	1:15 PM - 2:30 PM	91 %	56 %	$3 - $4
Central Business (Fashion District)	537	5/22/2009	428	10:30 AM - 11:45 AM	95 %	45 %	$3
San Pedro	518	4/15/2009	588	9:30 AM - 1:30 PM	41 %	17 %	$1
TOTAL			**1,676**		**71 %**	**38 %**	

Table 6. On-Street Meter Survey Results by Neighborhood, Spring 2009

Table 7 below details the results for each neighborhood surveyed and the meter rate. Results are broken out between single- and multi-space meters, where appropriate. Occupancy levels and the percent of occupants displaying disability credentials were highly variable between neighborhoods and even between meter types (single- versus multi-space).

Neighborhood	Parking Meter Zone	Single Space percent Occupied	Multi Space percent Occupied	Single Space percent Occupants Disabled	Multi Space percent Occupants Disabled	Single Space percent Occupants Paid	Multi Space percent Occupants Paid	Rate per Hour ($)
Westwood Village	533	86 %	85 %	34 %	17 %	43 %	68 %	$2
Brentwood	539	67 %		31 %		58 %		$2
Westwood Blvd.	536	56 %	42 %	32 %	24 %	17 %	54 %	$1
Little Tokyo	555	55 %		19 %		60 %		$2
Civic Center	553	77 %	90 %	28 %	51 %	27 %	27 %	$3
Hollywood	546	49 %	63 %	28 %	17 %	45 %	44 %	$2
Chinatown	554	57 %		34 %		37 %		$2
Sawtelle	525	53 %		31 %		39 %		$1
TOTAL		**60 %**	**60 %**	**29 %**	**24 %**	**44 %**	**55 %**	

Table 7. On-Street Meter Survey Results, 2010

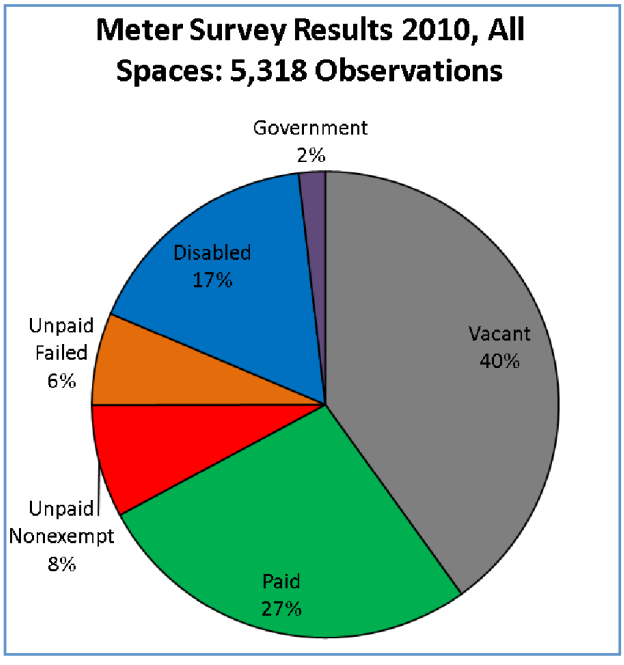


Figure 6. Combined On-Street Meter Survey Results, 2010

Figure 6 combines all the observations from Table 7 and provides data on all the spaces surveyed in 2010. The overall occupancy level of 60 percent implies that some of the survey areas are overpriced. Figure 6, below displays occupancy levels at the block face level, defined as all the meters on one side of the street between two intersections. This represents what a driver would see if he or she were searching for parking in the area. About 13 percent of block faces were completely empty, and about 24 percent were completely occupied. While Shoup (2006) suggests pricing curb parking to reach around 85% occupancy, almost 70 percent of the surveyed block faces had lower occupancy levels.

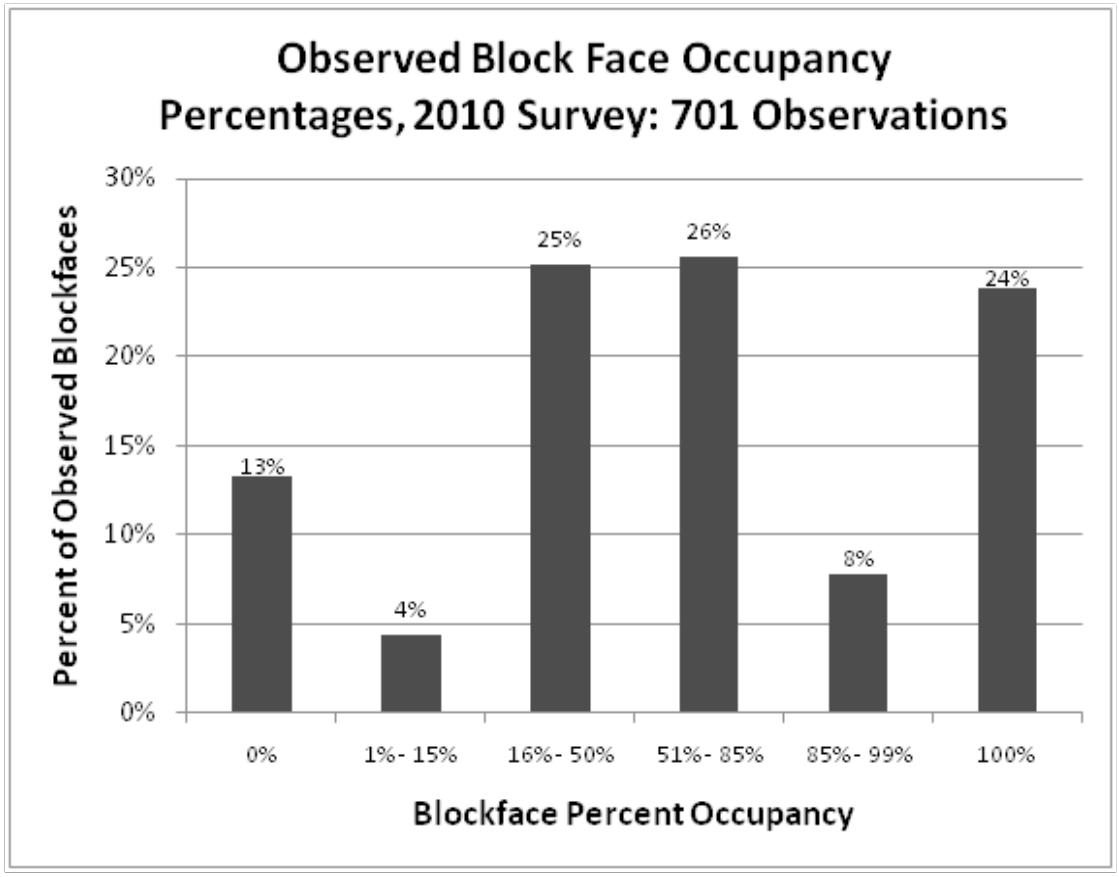


Figure 7. Occupancy Levels by Block Face, 2010 Survey

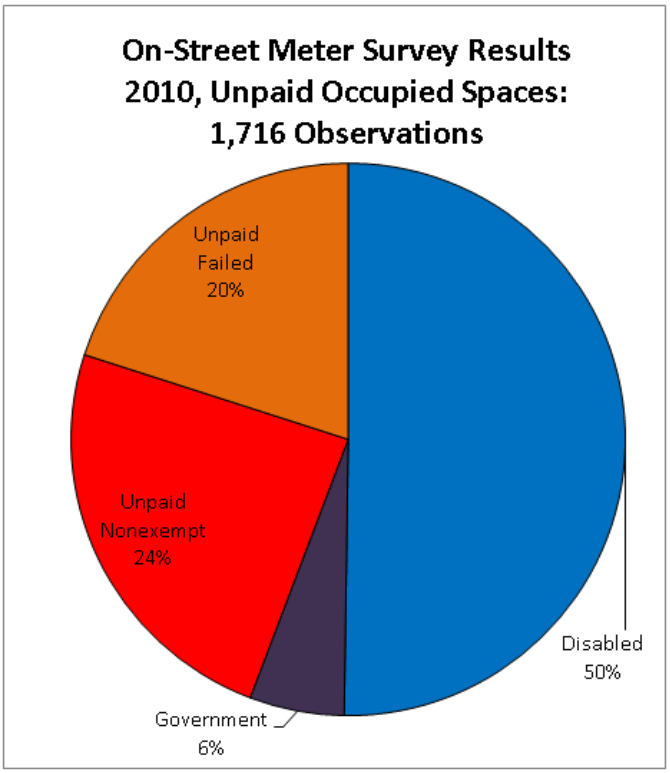


Figure 8. Unpaid Meter Occupants by Type, 2010 Survey

Figure 8 outlines the percentage of each category of nonpaying vehicle. The survey results showed that about 50 percent of the unpaid vehicles were displaying disabilty credentials with another 6 percent being exempt government vehicles. Twenty percent of the vehicles that would otherwise have required payment were parked at failed meters. These results show that increasing enforcement and maintenance efforts would only affect about 44 percent of the instances of nonpayment.

The unpaid nonexempt vehicles were all potential citations. During our survey we recorded 25 vehicles with citations. This corresponds to 6 percent of the unpaid nonexempt vehicles observed in the survey. This figure is similar to the

citation rate reported in the Desman Study, which was that 10 percent of vehicles expired 15 minutes or longer were cited (Desman Associates 2009).

Combining the data from both 2009 and 2010 surveys, about 30 percent of all vehicles surveyed parking at meters displayed disability credentials. Neighborhood percentages ranged from 17 percent to 56 percent. As noted previously, in 2009 about 7 percent of all individuals and 10 percent of licensed drivers possessed disabled placards in California. Our survey results indicate that these drivers are more likely than drivers without disability credentials to use meter parking. This is intuitive, as they are afforded free, unlimited parking at these meters.

Data at the individual block level on the percentage of occupants displaying disability credentials were too variable to see any direct correlations between either meter rate or overall occupancy percentage. The data were then aggregated and evaluated by the neighborhood groupings as shown in Tables 6 and 7.

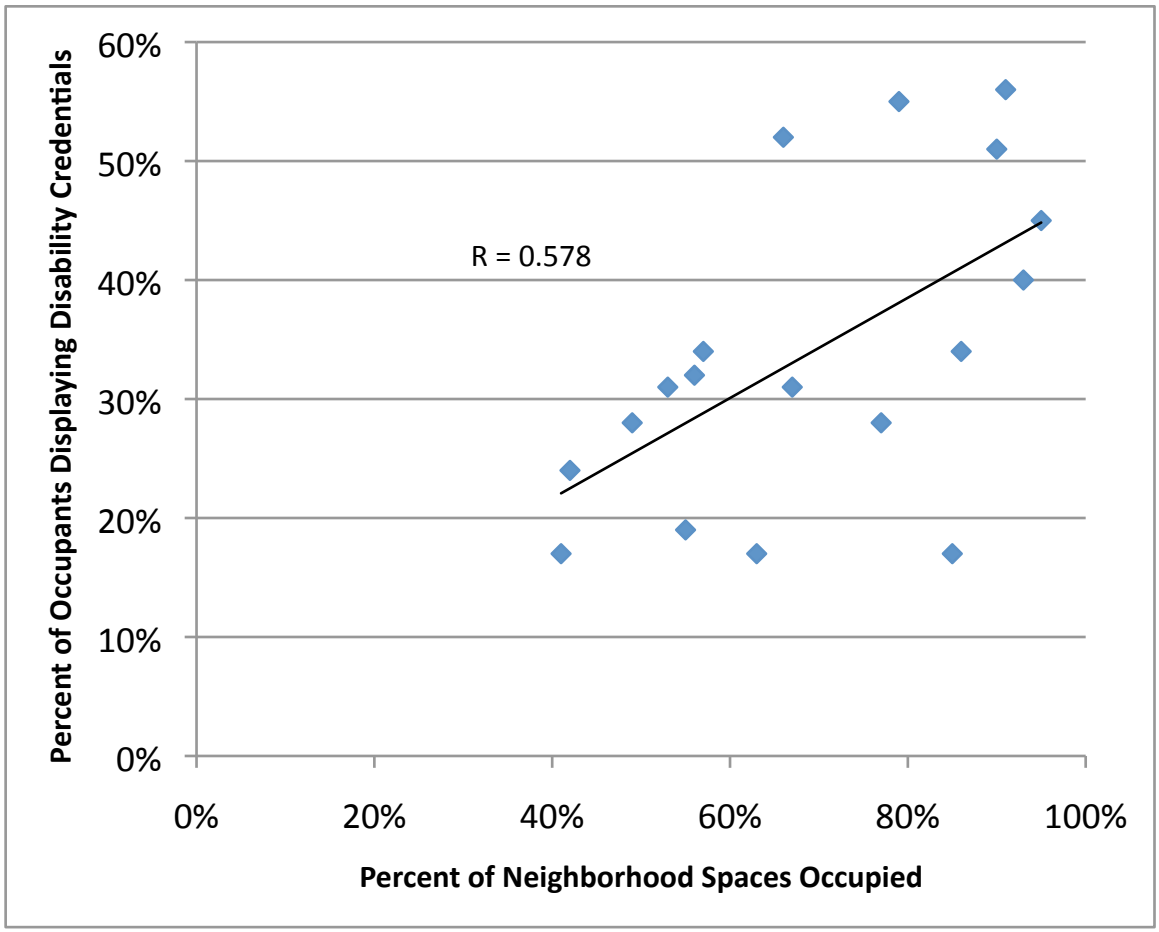


Figure 9. Neighborhood Parking Occupancy Levels and Percent of Occupants Displaying Disability Credentials

Though the sample number of neighborhoods is small, it would appear that there is a relationship between high demand for parking and a high number of parkers displaying disability credentials. This relationship implies that the highest demand areas, where pricing could be most used to decrease excess demand, are also areas with the highest number of parkers exempt from paying due to displaying disabled plates or placards.

B. Continuous Observation Surveys

Parking sessions consume both parking space and parking time. The "moment in time," or on-street surveys, provided a large sample of data, but did not provide any insight on parking duration for the various types of parking users. To obtain a sample of parking duration information, constant monitoring of parking meter activity was recorded on weekdays for two block faces in downtown Los Angeles for 10.5 and 10 hours, respectively. These blocks are in the highest demand area of the City and are priced at $4 per hour, with a one hour parking max.

The literature establishes that if parking is underpriced then the resource will be overused where it is most valuable (Anderson and de Palma 2004). For drivers with disability credentials, the parking is greatly underpriced (free). Ten hours of meter time would cost an average driver $40, but is free for drivers with placards and the one hour time limit is not in effect. Based on this, we expected drivers with disability credentials to have above average parking lengths.

Flower Street

The survey area was the east side of Flower Street (which is one-way heading south) between 7th and 8th Streets in downtown Los Angeles. The area is adjacent to a small mall with a food court, numerous other shops, and high-rise office towers. It is across 7th Street from an entrance to the underground 7th Street

Metro Center. This station is where the light rail Blue Line from Long Beach meets the heavy rail Red and Purple Lines. Because of the density of shops and restaurants, one would expect there to be a large number of short-term parking sessions. It is posted with a one hour parking limit.

A preliminary survey of the block face took place on February 11, 2010. At 11:30 AM, drivers displaying disabled credentials occupied 86 percent (or 12) of the 14 spaces. Returning at 2:30 PM, drivers displaying disability credentials occupied 71 percent of the spaces. Of the initial 12 vehicles noted at 11:30 AM, seven were still parked in the same spaces.

Building on this initial survey, surveyors made meter observations from 8:00 AM to 6:30 PM on Monday, March 8, 2010. Figure 10 below shows each observed parking session by length. The parking sessions that were subject to payment generally all were short sessions of one hour or less. However, 13 vehicles that displayed disability credentials parked for longer than five hours.

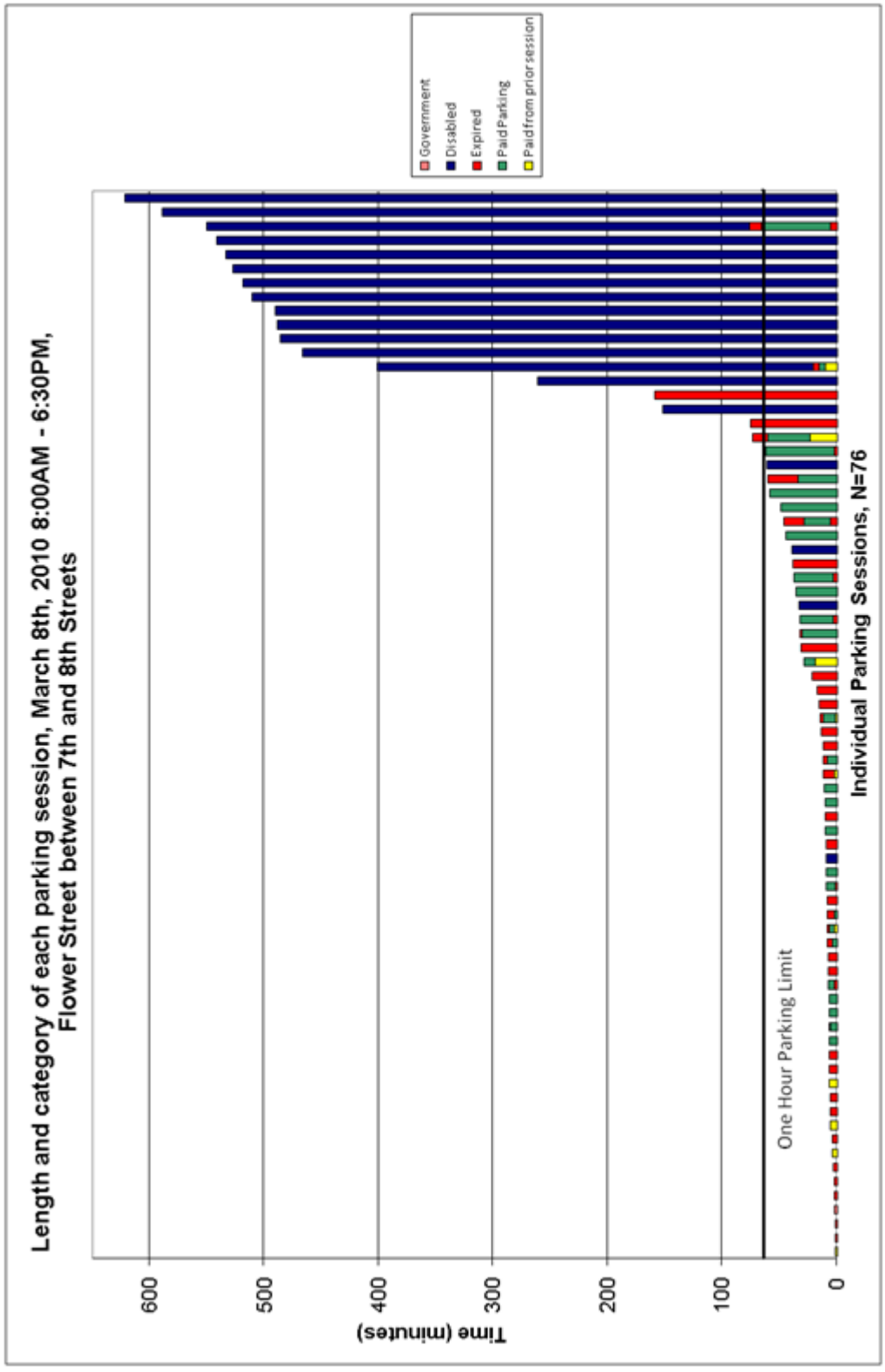


Figure 10. Parking Session Length and Type, Flower Street Survey

Two of the longer parking sessions were vehicles where the occupant initially paid (for 15 minutes and 1 hour, respectively), and later returned and displayed a placard. We witnessed a steady presence of parking enforcement until 3:00 PM, and then did not see any more enforcement officers. No citations were issued during the observation period.

Due to the length of the parking sessions of the vehicles displaying disability credentials, they dominated the overall occupancy on the block. To further understand the aggregate observations for all spaces by time of day, I combined data for all spaces to evaluate the minute-by-minute occupancy percentages. This is displayed in Figure 11 below.

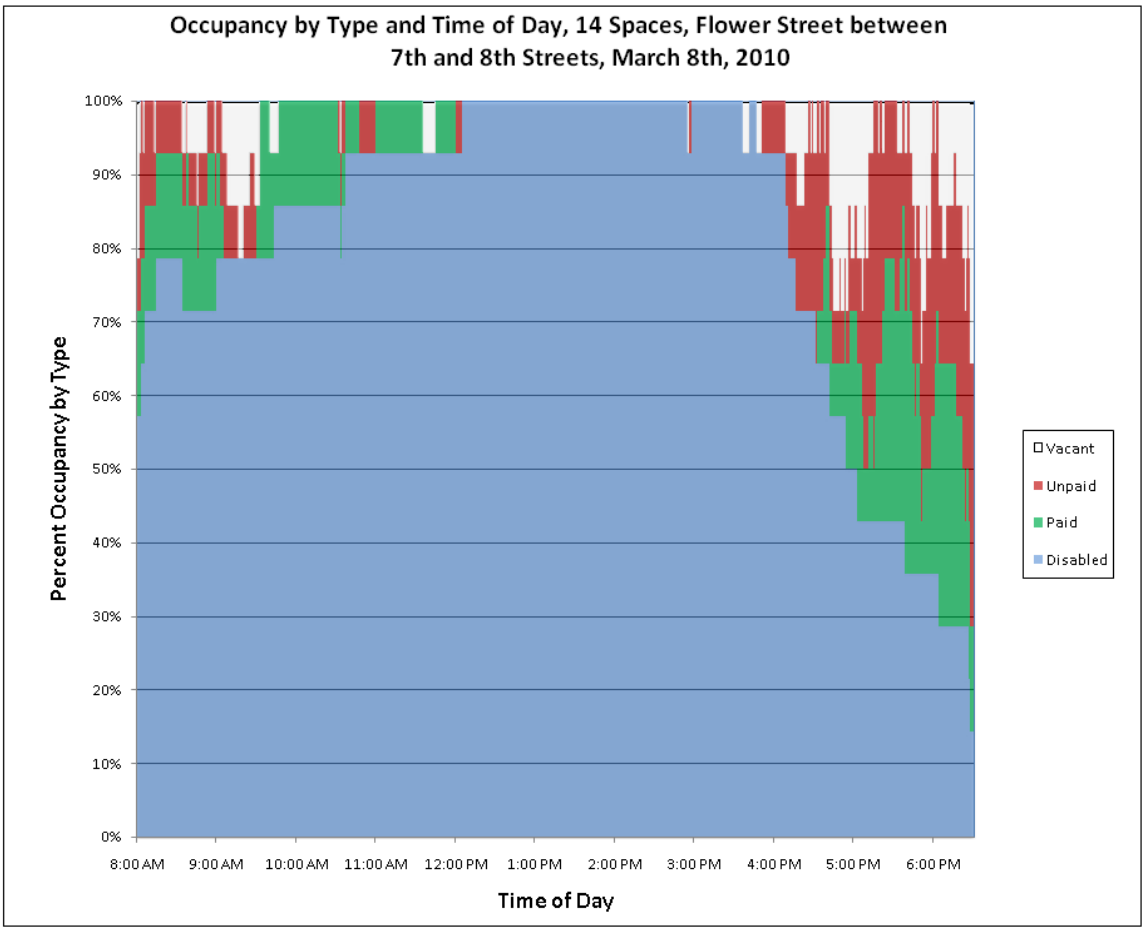


Figure 11. Occupancy by Type and Time of Day, Flower Street Survey, March 8, 2010.

As Figure 11 indicates, except for one short vacancy, all 14 spaces were occupied by vehicles displaying disability credentials from approximately 12:30 PM to 4:00 PM. It appeared from the observations that most of the vehicles displaying placards were using them for parking from 8:00 AM to 4:00 PM. This implies that they worked in nearby offices and used the metered parking instead of off-street parking.

Despite having the highest parking meter rate in Los Angeles, revenues were very low during the observation periods. The meters had potential revenue during

the survey period of $4/hour ($588 total). Including vacant time that was paid from a prior session and all paid occupied time; the actual revenue was only $0.32/hour ($47.44 total) or 8 percent of the total potential. This is displayed below in Figure 12.

The meters are enforced 8:00 AM to 8:00 PM, six days a week. If our payment total represents average revenue, then the meters on this block side would only earn just under $17,000 per year. The potential revenue (assuming full occupancy by paying vehicles) is over $200,000.

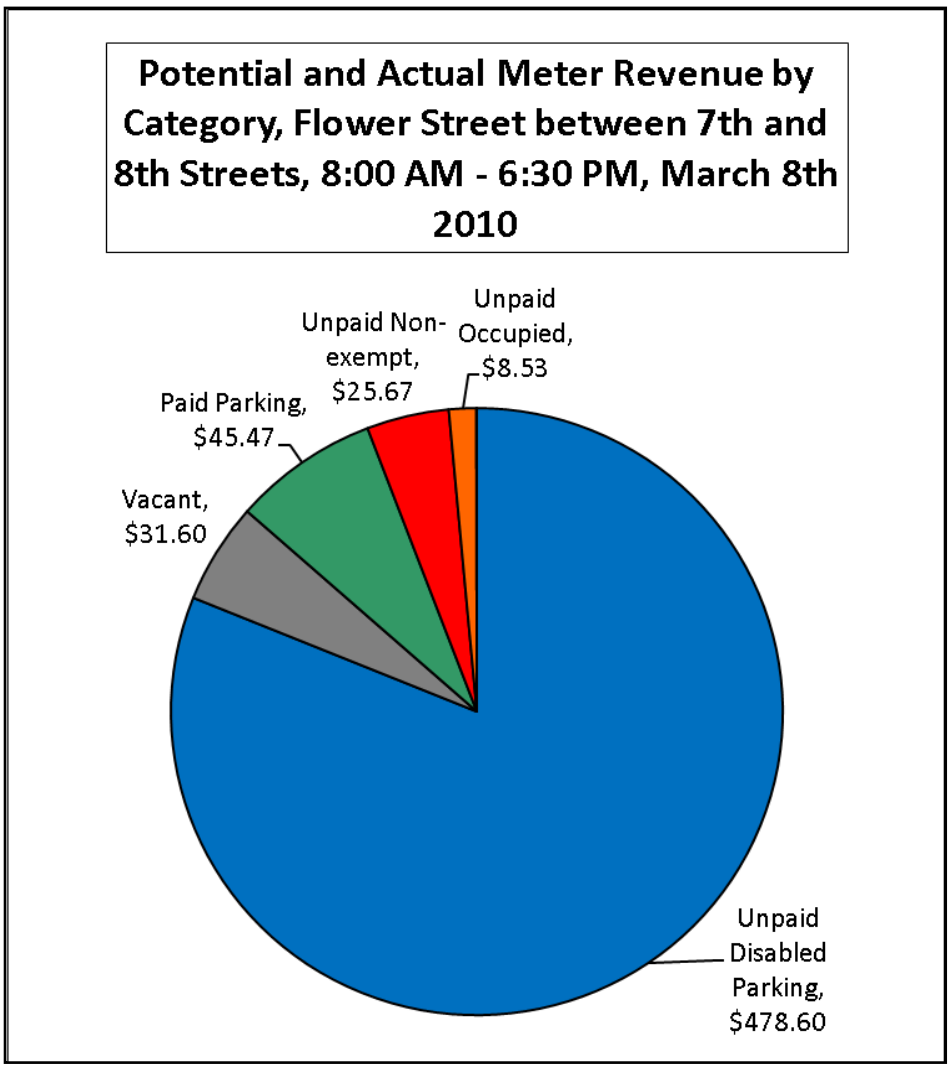


Figure 12. Potential and Actual Revenue by Category

Hope Street

Another survey using the same method evaluated parking at metered spaces on the east side of Hope Street between 8th and 9th Streets. The block face contained an office building and a private off-street parking lot that was a flat $6 for the day. The opposite side of the street also contained metered spaces, but they were

controlled by pay stations. The building opposite our survey side contained residential and small commercial units, with a large grocery store facing 9th Street.

On the day of the survey, only three of the 11 meters were functioning. The survey was planned to take place one block north between 7th and 8th, but only one meter on that block side was in operation. These meters require a payment of 16 quarters or 40 dimes for one hour, and many meters had change visibly lodged in the payment slots. While this is a high rate of failure, it is not abnormally high for the conventional single-space meters, as noted below.

During the larger 2010 on-street meter survey, 9 percent of the block faces with conventional single-space meters surveyed had 70 percent or more failed meters. Fifty-seven percent of all of the conventional single-space meter block faces contained at least one failed meter. These failed meters represent another potential barrier to effective pricing, but these meters can be replaced and the City of Los Angeles has begun replacing many of these older meters.

Figure 13, below, shows the number of parking durations by session for this block face during our survey. Observations are separated to show data for the eight failed meters and the three operating meters. Two citations were issued during our observations and are noted on Figure 13. The longest unpaid session was a food vendor who was issued on citation for staying approximately 3 hours without payment.

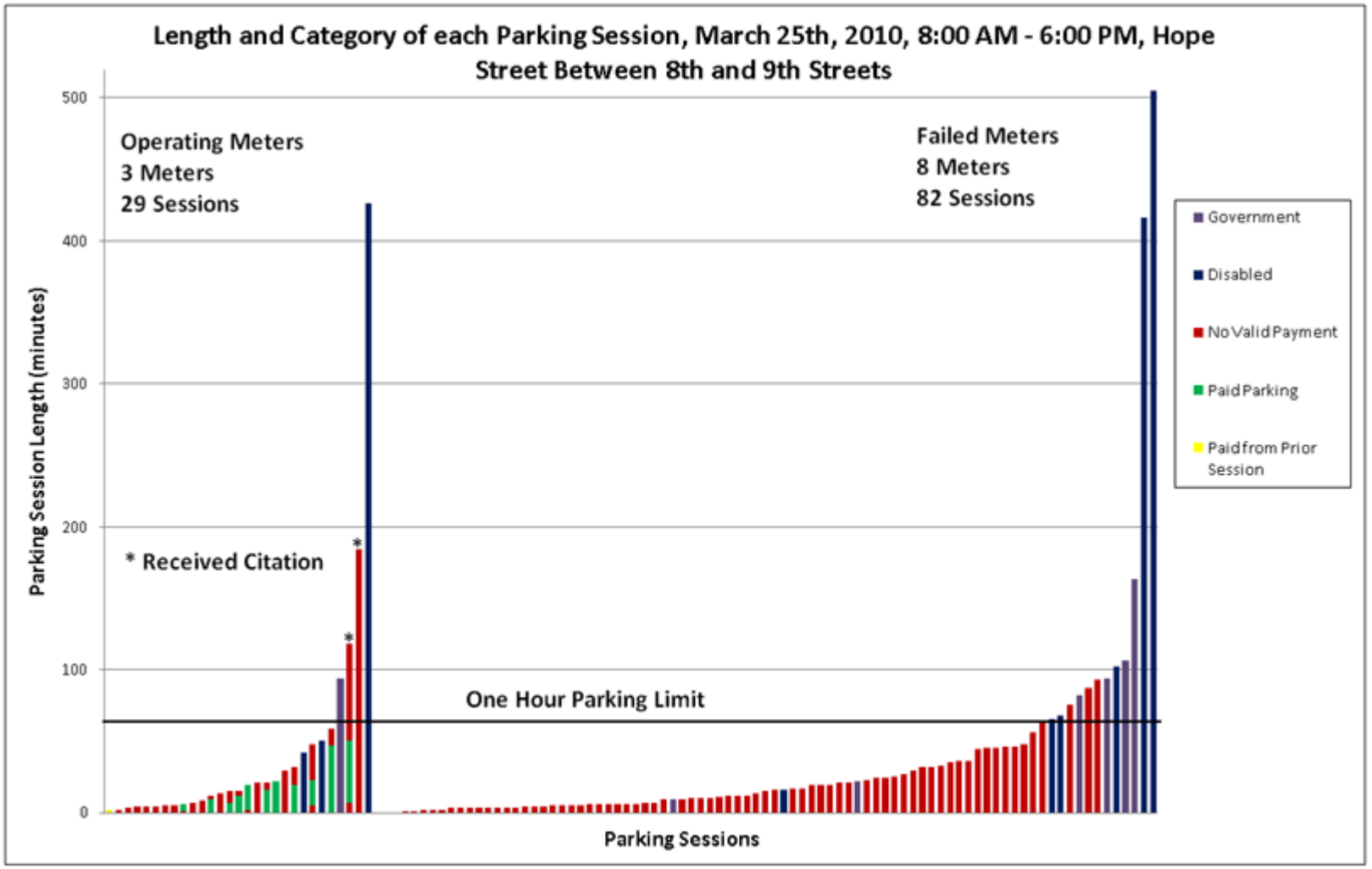


Figure 13. Parking Session Length and Type, Hope Street Survey

As Figure 13 indicates, drivers lacking government or disability exemptions generally limited their parking sessions to under an hour whether or not the meter was operating. This is an interesting result as these drivers, by virtue of parking at a failed meter, receive a payment exemption for this session. It would appear that these drivers are accustomed to using curb parking for short sessions through normal exposure to price and did not alter their plans merely because parking was free for this session. Most of these drivers attempted to pay.

There were three long parking sessions by vehicles displaying disability credentials. These three vehicles alone (less than 3 percent of the total number of parking sessions) took up over 20 percent of the available daily parking time on the block face. This block also saw several longer parking sessions by government vehicles.

Unlike the prior survey, this block face had a much higher vacancy rate. This is curious given the close proximity between the two survey locations, but indicates the location-specific nature of parking demand. Figure 14 below shows the summary of parking occupancy by time during the survey period.

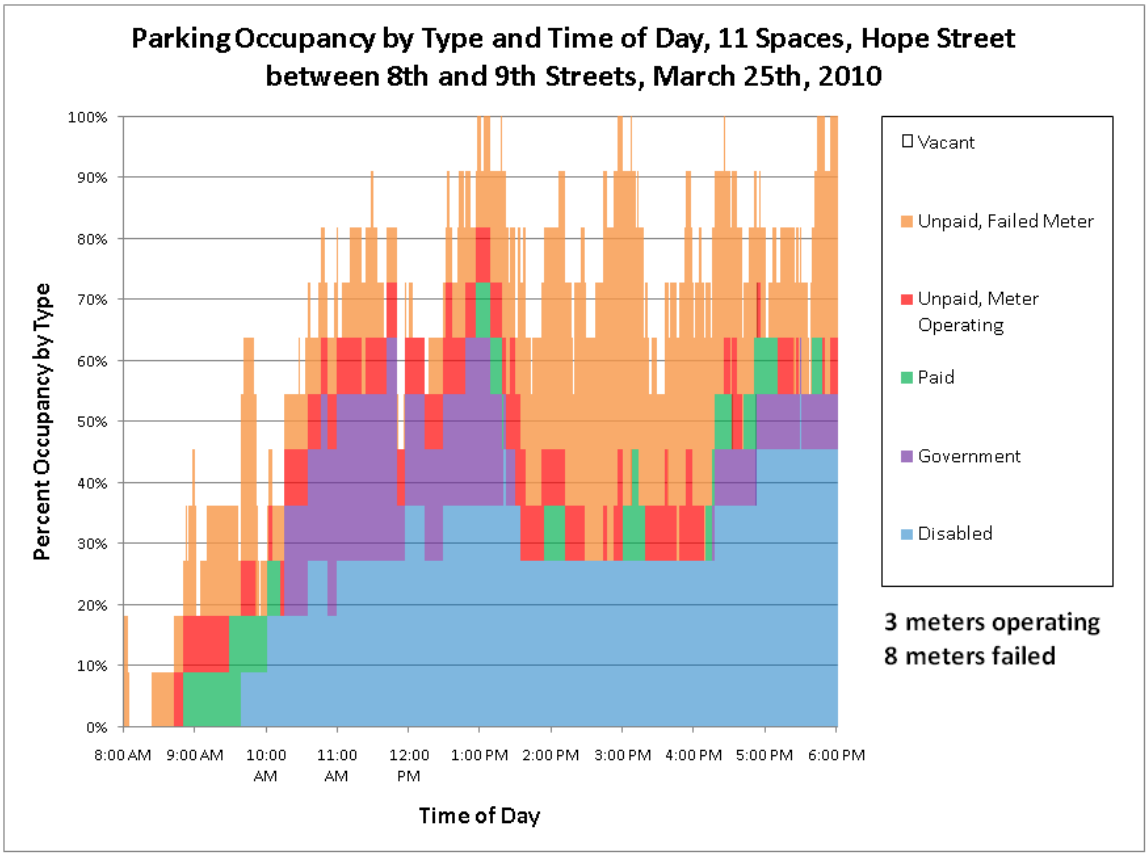


Figure 14. Parking Occupancy by Type and Time of Day

Unpaid parking sessions are broken out between those at an operable or inoperable meter (where payment was not possible). There were only a few brief periods during the day when the block was completely occupied. On this block the amount of paid parking time was very low.

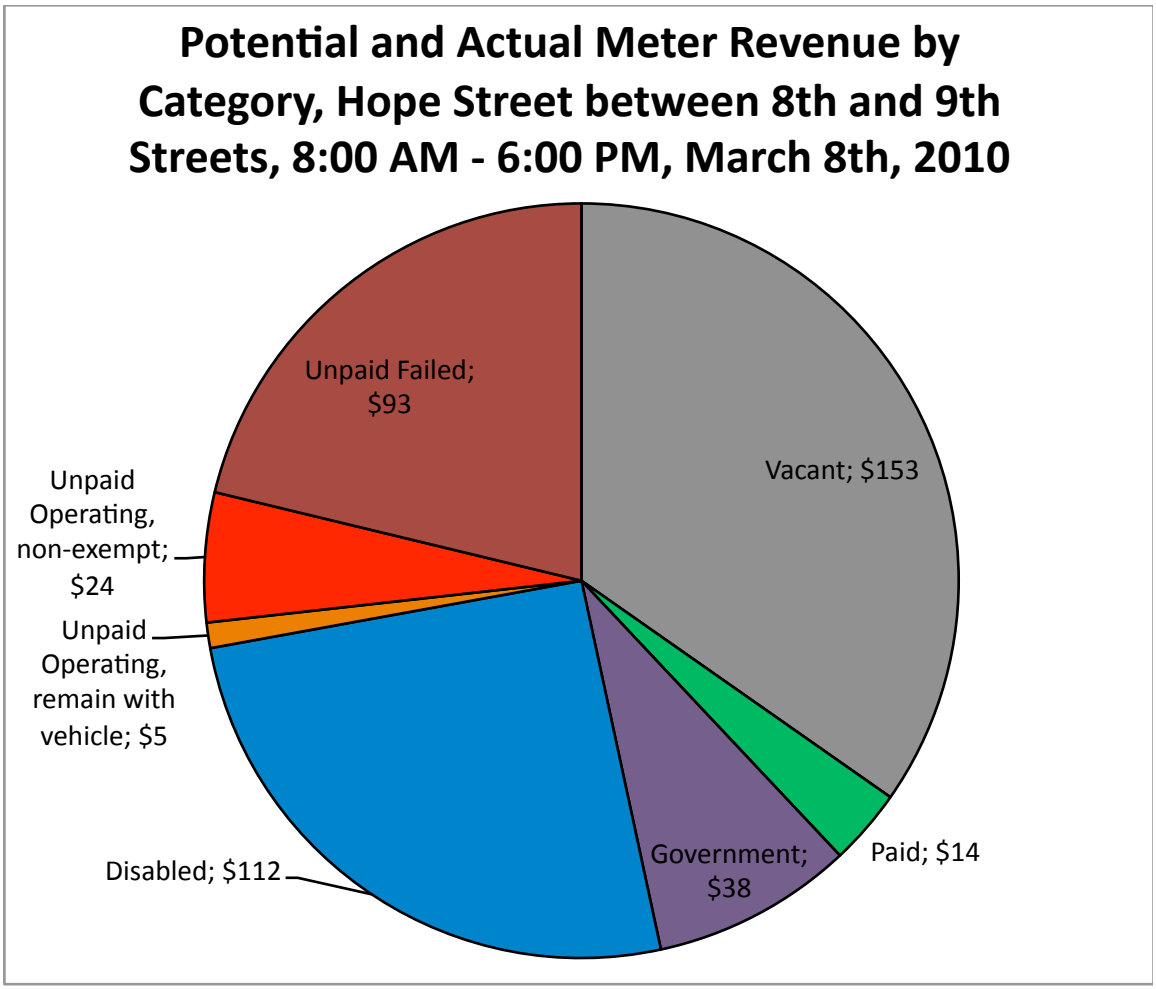


Figure 15. Potential and Actual Revenue by Category

Potential revenue at the meters was $4 per hour ($440 total), but actual revenue was only $0.14 per hour ($15.33 total). For the three operating meters, the potential revenue was $4 per hour, but actual revenue was only $0.51 per hour. The largest category of missing revenue for this block was simply vacancy. This indicates for this block and day, the meter rate of $4 per hour is too high. There was an off-street lot on the same block face offering a $6 flat rate, and it is likely that

most paying customers who were staying longer than for a very short session chose this option.

Combining data from both time surveys, parking durations for each user type was evaluated.

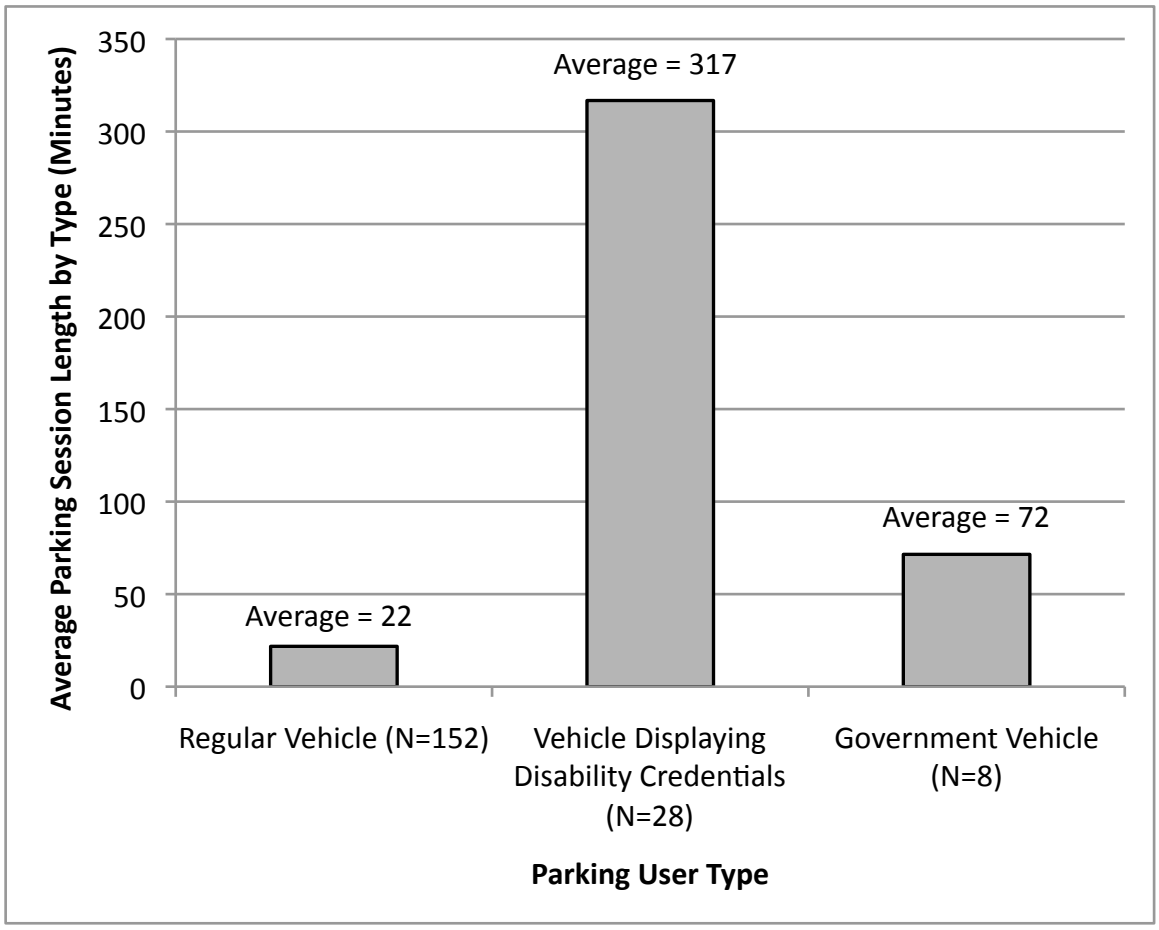


Figure 16. Average Parking Session Length by User Type

Regardless of the amount of time paid, nonexempt parking users had average session lengths of about 22 minutes. This indicates a high level of turnover and it would appear that longer term parking sessions from this group are made in off-street facilities. However, drivers displaying disability credentials parked on

average for over five hours. This result was in an area signed with a one hour parking limit. Though our sample size is small, it shows clearly that parking users with exemption from payment due to disability credentials park for longer and thus consume more of the overall available curb parking time.

C. Municipal Interviews

In an attempt to gain some understanding of how the issue of payment exemption affects parking meter management decisions, I contacted several local municipal parking managers. These interviews were conducted in February and March of 2010. Invitations and follow-ups (where necessary) were sent to 12 California municipalities via email and phone. Only three responding cities answered the survey in time for inclusion in this report. The three cities are all in the Los Angeles region. Due to the small sample size, the responses are reported in a way to shield individual respondents' identification.

When asked about policies that go into setting rates, two of the individuals responded that the principal reason is simply keeping up with inflation. Only one of the cities reported that they try to use rates in certain areas as a signal to drivers. Two of the cities envisioned upcoming rate increases in the next 1–3 years while one did not see any rate increases in the near future.

Each manager was asked about current levels of parking demand at their meters. All respondents noted that there are areas in their cities where occupancy levels are regularly 100 percent. Similarly all respondents indicated that they see

large portions of their meters occupied by drivers displaying disabled plates or placards. One city had conducted a formal survey looking at occupancy by vehicles displaying placards while the other two parking managers spoke from personal knowledge.

In terms of enforcement of potential placard abuse, one city reported that they perform regular checks. The other two cities reported little enforcement, with one calling it "difficult and time consuming." They both indicated that budget constraints further complicated enforcement efforts.

Finally, when asked if the exemption of drivers with disabled placards was a barrier to their city's parking goals, a range of responses was received. One replied that, "No, our plans factor them in, but we would certainly like to see the law changed." Another responded that there was nothing they could do about the state law, but that the time limit exemption was a barrier to parking turnover. This city also noted that there is usually a high level of vehicles with placards near hospitals, as the hospitals charge for off-street disabled parking. Finally, the last city responded that the policy is absolutely a problem for them in that it "effectively reduces the amount of on-street parking available."

The range of results was interesting, and this survey is a method that could be expanded to gather further data. Only one of the respondents indicated that price changes are used as a way to influence demand. All of the respondents indicated that they would like the state law changed, but two expressly indicated

that they felt that there was no way that they could influence the issue at the state level.

VI. Reform of California Disabled Meter Payment Exemption

This section reviews past legislative reactions and recent rulings on the disabled placard program, as related to meter parking in California. In response to perceived program problems, a full State Senate hearing was held on placards in 1990. However, there were no significant program changes. The normal state and local response has been to increase enforcement efforts against obvious misuse. However with the large number of placards in circulation (6 for every meter in the City of LA, for example), even their legitimate use could mean that goals of efficiency through meter pricing are unsuccessful.

Changing the law in California is likely to be a politically difficult option. Such action could be seen as taking away rights from the disabled – a group that most feel are universally deserving, regardless of how effective the policy currently is. One researcher looked at exempting disabled motorists from a potential congestion charge in Leeds, UK, and found that the benefits would accrue to a wealthier than average group (Bonsall and Kelly 2005). Data in California, however, do show a negative correlation between income and disability and the existing payment exemption could be supported as leveling the economic playing field. That said, disability is a highly variable term and income is also related to

other socioeconomic factors. If payment exemption is intended to increase equity, it should be applied to all motorists below some economic threshold, regardless of disability status. One possible way to bridge the gap and build support could be targeted revenue reinvestment of the incremental increase in meter revenue.

A. History

Municipal parking managers surveyed are aware that disabled parking payment exemption is an issue in managing metered parking, but indicated that they feel the problem is outside of their scope of authority. This is in part true, as the law providing this exemption is at the state level. The issue of placard usage and fraud has been investigated and discussed in the California Legislature, but few steps have been taken to substantially change the program. In 1990, the Senate Committee on Transportation held special hearings on administration and reform of disabled placard provisions. More recently, the state legislature approved Assembly Bill (AB) 144, which was signed into law by Governor Arnold Schwarzenegger in October 2009.

In the 1990 hearings, a DMV official gave some history of the current program, largely formalized in its current form in 1977. It was lightly regulated in the early years, with the DMV maintaining a manual file of the permits, which at the time were issued for an unlimited period of time. This was addressed in 1985 by recalling all outstanding permits and requiring individuals to resubmit a statement of qualification. Prior to the recall there were over 2,000,000 placates or placards in

circulation. The report states that the recall reduced the number of valid plates or placards to 658,000 in 1990 (California Legislature Senate Committee on Transportation 1990).

During the hearing a member of the San Francisco Police Department was interviewed. He had been involved in investigating claims of disabled placard fraud. He cited the prevalence of photocopied versions of placards and noted that he had seen them for sale in local flea markets. In the report, he stated that 90 percent of the individuals he contacted while working (these were individuals who did not have an obvious disability) were using the permits illegally to obtain free or preferential parking. In a number of cases, the individual volunteered that they were using the placard of a deceased relative (California Legislature Senate Committee on Transportation 1990).

The panel went on to interview a manager with Parking Enforcement in San Francisco. She directly asked the legislature to consider changing the law that allows for unlimited parking time at virtually any zone in the city, citing that they usually see 22 of 24 meters in downtown San Francisco occupied by drivers displaying placards (Ibid). She also stated the frustration in her department of not being able to ask drivers for the card identifying themselves as the appropriate user of the placard. This issue of limited local enforcement was not fixed until 2009 with AB 144, but the issues of no time limits or payment requirement have not changed.

Assemblywoman Gloria Ma (D-San Francisco) introduced AB 144 to make enforcement of disabled placard laws easier and more effective. In a summary on

the bill, Ma noted that, "In a City with all too many cars and not enough parking, it's important that disabled parking is protected for those who are disabled…" (Ma 2009).

Her bill decriminalizes misuse of placards, which has the effect of allowing parking enforcement to write citations. This makes sense, as they write the vast majority of parking-related citations. It also raises some of the fines for counterfeiting placards. In her release, she adds that, "The number of disabled placards issued between 1995 and 2005 increased 122 percent while the number of cars registered between those same years only increased about 11 percent—it doesn't add up" (Ma 2009). Of course, as her statistics on the number of placards issued uses official DMV records, these are all valid and legal placards, and nothing in her bill addresses the fact that their proliferation, in her words, "doesn't add up." *The New York Times* ran a story on the Assembly Bill and the effort to better regulate use of disabled placards. In that article, Ma is quoted as saying that she had seen the placards for sale on Craigslist, and that the response to her bill has been overwhelmingly positive (McKinley 2009).

B. Targeted Enforcement

Targeted enforcement is the usual response to address abuse, but it does not alter the basic economic advantages that placards provide for curb parking. The NBC Los Angeles investigation noted that little to no local enforcement takes place

in Los Angeles. In contrast, San Francisco has made more concerted efforts. In 2009 they increased their enforcement officers involved in placard enforcement operations from two to five pairs of officers. The results were a more than doubling of placard seizures (from 739 to 1,520) in the first three quarters of fiscal year 2008–2009 compared to the same period one year prior (Begin 2009).

There are a few key barriers to meaningful enforcement as a deterrent. The window of time where someone could be approached exiting or entering their car is a small fraction of the overall parking duration time. Additionally, in the case of the UCLA football players, they were using placards that were validly issued. One author, in broadly discussing policies to rectify the current propensity for abuse in the disabled system quite bluntly states that, "none of these reforms will solve the basic problem that these permits provide their holders with something for nothing" (Epstein 2002).

The best option to address the proliferation of placards used at curb spaces would be to reduce the economic value that they have. In practice, this would involve either eliminating or reducing the number of hours individuals are allowed to park at meters without making a payment. Levinson (2010) notes that when there is a proposed change involving some aspect of road pricing that "political acceptability depends very much on the distribution (and perception of the distribution) of gains and losses" (Levinson 2010).

C. Political Difficulties for Meaningful Change

Supporting the elimination of a perceived benefit for disabled individuals is unlikely to be a politically popular position to take. Whether or not the benefit is rational or beneficial, it is likely one that many support. This concept is generally described as the concept of the deserving and undeserving poor. In the United States, the New Deal and the Social Security Act of 1935 affirmed moral categorizations of the poor in terms of work ethic, gender, and race (Handler and Hasenfeld 1991). These acts categorized unemployed able-bodied males as the least deserving of all groups, but there have historically been shifting constructs of what groups are considered truly deserving.

Studies have largely shown that people look more favorably on giving aid to groups that they believe to fit the role of deserving (Appelbaum 2001). Conversely, policies are less supported for groups who are seen as somehow responsible for their poverty, whose success then relies on scant aid and their ability to pull themselves out of poverty (Ibid). Additionally, in conditions of scarcity, individuals are more likely to provide aid to individuals who are not perceived as being responsible for their needy state as compared to those who are perceived to be responsible (Skitka and Tetlock 1992).

In one survey, the likelihood of average respondents to advocate for aid for certain groups was assessed (Appelbaum 2001). Individuals who were physically disabled were the group that most would advocate for providing aid. To reinforce this concept of deserving versus undeserving, the same study respondents reported

that they would be much more likely to support benefits for widows with children than single mothers.

Based on these equity issues, researchers examined the equity of proposed congestion cordon charges in Leeds, in the United Kingdom (UK). They note that one way of protecting at-risk groups is a simple exemption, but that there is difficulty in clearly deciding who should be exempted. They cite the London congestion charging scheme which exempted disabled placard users ("Blue Badges" as they are known in the UK[3]), taxis, certain residents, alternative-fueled vehicles, and several other groups. In addition to these groups, there was a large group of low-income workers who also asked for exemption (Bonsall and Kelly 2005). These groups were not granted an exemption and the authors note that, "Clearly, the choice of groups to receive an exemption or discount is a political matter" (Ibid, p. 408).

Bonsall and Kelly (2005) used a model to examine the equity of proposed cordon charging for drivers in Leeds under several different pricing schemes. Their model, based on local data, assumed that 4 percent of the drivers entering the cordon area would be disabled. Further, just 9 percent of these drivers (or 0.36% of all drivers) were categorized as having low income based on community data. For comparison, 42 percent of individuals traveling to local colleges and 32 percent of individuals traveling to local shops were in the low-income bracket (Bonsall and

[3] For reference, 4.5 percent of the UK population had Blue Badges in 2007 (Department for Transport 2007).

Kelly 2005). Based on these data, they showed that providing this benefit for disabled drivers would result in 90 percent of the benefits accruing to disabled drivers who are not in the lowest income bracket—a larger disparity than even exempting all drivers who were entering the area to visit a local hospital (Ibid). The conclusion is that from an economic equity angle, little would be gained by exempting this charge.

While the model employed by Bonsall and Kelly (2005) found that disability (in terms of receiving a Blue Badge) and poverty were not highly related, other studies show some level of negative correlation. However, it is important to note that disability is a broad term. Mental disabilities, for example, would not automatically qualify an individual for a disabled placard. Stapleton (2006) analyzed 2005 American Community Survey (ACS) information on poverty, employment, and disability nationwide. He found that, for all the disability categories, those individuals reporting a mental disability had the highest poverty rate (30.1 percent). Comparing individuals with any disability versus those without, those with a disability had lower rates of employment (37.9 percent versus 77.6 percent) and higher rates of poverty (23.3 percent versus 8.9 percent). Examining California ACS income data in 2008, Table 8 compares median earnings for those reporting a disability versus no disability.

	2008 Median Earnings, Estimates for California Residents	
	With a Disability	No Disability
Total	**$21,959**	**$31,505**
Male	**$25,993**	**$36,532**
Female	**$18,018**	**$26,290**

Table 8. ACS California Median Earnings Estimates by Disability Status, 2008 (United States Census Bureau 2008)

Based on these data, it is fair to conclude that disability is usually correlated to lower levels of employment and income. However, the issues of poverty and disability are also intertwined tightly with race, gender, and level of disability (Jans, Stoddard et al. 1999). While there is a link between poverty and disability, their effects one another other are highly variable because of other factors.

While it has not been shown that free meter parking is a key benefit that can aid individuals with disabilities in overcoming poverty, it is likely a benefit that many Californians support by default. However, if the policy does nothing to ensure improved access through finding available parking—clearly a benefit they do need—its value should be called into question.

One way of overcoming these equity and political difficulties is through efficiently reinvesting some portion of the incremental revenue associated with a policy change (Levinson 2010). If the exemption allowing for unlimited, unpaid

parking is changed to a policy limiting parking session lengths or requiring payment, it is likely that there would be an appreciable increase in revenue. Some of this revenue could be dedicated to improving ADA compliance for sidewalks, paratransit services, or some other areas that would directly increase mobility for individuals with disabilities.

Authors have noted this form of targeted revenue recycling benefits those who need it most (the poorest), if the collection costs are not too high (Fridstrom et al. 2000; Teubel 2000). Under a policy change requiring time limits or payment, the collection costs would have little to no increase. The change would cause more parking turnover, and more revenue. Most of the increase in revenue would likely be from able-bodied motorists who now can more easily locate parking. With revenue recycling, such an arrangement would have benefits for all parties.

VII. Policy Change Case Studies

Several municipalities have moved or are moving to end or limit free parking by individuals displaying disability credentials. The following profiles a selection of these communities. In cities where a change has been made to remove the payment exemption, positive increases in revenue and meter turnover have been seen. In these cities there has been little to no political backlash on the policy change.

While their individual processes and approaches are different, all of these cities are in states that allow localities to vary this policy. Current state law does not

afford the same right to municipalities in California. The experience of policy change in these cities could provide guidance and information for a similar change in California.

A. Arlington, VA

In 1994 Virginia passed a state law allowing localities to opt out of providing free curb parking to drivers displaying disabled credentials. If localities wanted to opt out, the new state law required them to pass a local ordinance and clearly post that all drivers are subject to payment (Virginia Code § 46.2-1245). One of the first localities to enforce parking regulations for drivers with disability credentials was Arlington County, which is just across the Potomac River from Washington, D.C. Arlington is a prime center of employment in the populous Northern Virginia area. Here, in high-demand areas, drivers displaying disability credentials were seen to be taking up to 90 percent of the curb spaces on certain blocks with average disabled occupancy in these areas of around 45 percent (O'Leary 2009). Frank O'Leary, Arlington County Treasurer, estimated that the County was losing on the order of $500,000–$700,000 a year on meter and citation revenue (Wagner 1998).

O'Leary helped lead the campaign to pass a local ordinance, which was at first met with resistance from board members. Mr. O'Leary made the early step of involving the disabled community. In his meetings with them to discuss the current parking situation, it became clear that the current regulations were not serving them. Like everyone else, meter parking was difficult for them to locate. They also

had concerns over the ability of disabled individuals to physically make meter payments (O'Leary 2009). The ordinance ultimately passed unanimously.

Arlington, where the meters now read "All May Park, All Must Pay," made several important steps to ensure that their change in policy would not be a hardship on the disabled community. They increased the number of parking spots (with meters) designated for disabled individuals from 44 to 136 (Moreno 1998). Additionally, they introduced a personal in-car parking meter (called the "Parkulator"). This allows drivers to pre-pay for parking and easily activate the device when parked at a meter. They were given out free to disabled drivers, and came pre-loaded with $25 worth of free parking time.

It has been over 10 years since Arlington County changed their policies and there has been no call to revert back to providing free meter parking for disabled individuals. After the first year of the change, meter revenue increased by $350,000 and the number of disabled parking meters provided is greater than the supply generally needed, which serves as an indicator that these individuals are now able to more easily locate parking (O'Leary 2009).

B. Buffalo, NY

Buffalo, New York doubled their parking rates (from 50 cents an hour to $1 an hour) in 1995, but overall revenue actually declined by about 3 percent (Dolan 1997). A spot check on 10 percent of the city meters by a local newspaper reporting

on the topic showed that while almost all of the meters were still occupied (90 percent), about 38 percent were occupied by drivers displaying placards who were not paying. An additional 23 percent of the meters failed or jammed (Ibid). In 2000, the City Hall Parking Officials stated that about one in every five drivers displaying disabled parking permits was an "able-bodied individual abusing the system" (Dolan 2000).

After years of discussion, the Buffalo City Council voted 8–5 to end free unlimited parking for drivers with disabled plates or placards in 2002 (Meyer 2002). During hearings leading up to the change, the city's disability advocate, Rosemarie McKenna, testified that what individuals with disabilities want is equal access, not special treatment. "The free parking is not a right, it's not even a privilege. I would just encourage you again to put us on an equal playing field" (Campagna 2000). Other advocates noted that the current policy afforded little benefit because so many able-bodied motorists abuse the policy that the disabled can never find a parking place (Ibid).

The change was not without controversy. Local citizens organized a small, 1,500 signature petition, asking the Council not to change the policy. Their main concern centered around this change taking place in the context of another pending proposal to partially subsidize a local private development (Meyer 2001). At earlier hearings, drivers had complained about the change and asked for a plan that will allow them to pay a flat amount for the year (Campagna 2000). The five dissenting

Council members felt that increasing enforcement efforts would solve the problem (Meyer 2002).

The City estimated that the change would generate about $300,000 annually in increased meter revenue (Meyer 2002). To ensure that all residents would be physically able to pay, the city, like Arlington, distributed in-car parking meters for a fee, with the fee discounted for disabled drivers. Following the change, City officials noted that curb parking was much more widely available. McKenna, the City's advocate for the disabled, remarked that the results indicated that the change was successful at curbing abuse of the policy by able-bodied motorists (Ibid).

C. Philadelphia, PA

In late 2000, a bill eliminating free all-day parking for drivers displaying disabled tags or permits was unanimously approved by the Philadelphia City Council. This marked a reversal from the 1982 ordinance that granted these privileges (Ditzen 2000b). At the proceedings, the director of on-street parking for Philadelphia, Richard Dickson, testified that these payment-exempt drivers "clog" 41 percent of the metered parking spaces in the core area of Center City on weekdays (Ibid). Before this meeting, the director had called the issue "the single biggest problem in parking in Center City" (Ditzen 2000b). The bill's sponsor added that these vehicles at times occupy 65 percent of the metered parking spaces (Ditzen 2000a).

Philadelphia's 1982 law had been purposefully generous. It was meant to specifically relieve stress for those disabled citizens needing to navigate the Center City area (Ibid). The percent of drivers displaying these placards quickly rose in the 1990s. Parking officials stated that these drivers rose from 11 percent of vehicles in 1990 to 20 percent in 1995, 24 percent in 1997, and 40 percent in 2000 (Ibid).

At one point, employees at Philadelphia's Parking Authority added to this dramatic rise in disabled permit parking. A local news investigation found that about 75 percent of spaces around the Authority's office were occupied by vehicles with placards in 1995. Further investigation found that about two dozen of these vehicles were used by Authority employees who had no qualifying disabilities. This ultimately led to the dismissal of nine Authority employees. The Director of the Parking Authority at the time noted that it "was especially troublesome if disabled privileges were being abused by those responsible for enforcing parking regulations" (Gelles 1995).

The ultimate solution was to allow one hour of expired meter time for drivers displaying disabled tags or placards. Reversing the policy in Philadelphia led to immediate benefits. Meter vacancies rose from a scant 5 percent to about 13 percent, with space turnover increasing by 20 percent and meter revenues increasing about 16 percent (Ditzen 2002). The Director of the Parking Authority commented that, "the biggest surprise for me was there was virtually no negative feedback….those people who were really disabled and needed access to all-day

parking were willing to park in garages," adding that those who were likely abusing the benefit "seem to have quietly gone away" (Ibid).

D. Seattle, WA

Like California, the state of Washington requires localities to permit free meter parking for individuals with disability plates or placards (RCW 46.61.582). However, Washington also allows localities to cap this free parking at four hours by local ordinance. At the time of writing this report, only Spokane has passed such an ordinance. They limit free parking in their downtown entertainment district to four hours for drivers displaying disabled tags or placards (Gilmore 2009).

The City of Seattle, Washington conducted a recent parking survey and found that in the areas surrounding two downtown hospitals that 37 percent and 44 percent of the vehicles parked displayed disabled tags or permits (Heffron Transportation 2009). Furthermore, 54 percent and 37 percent, respectively, of these vehicles parked for longer than four hours in what is otherwise a two-hour zone (Ibid). Of those placards included in the survey, it was found that 7 percent were expired or belonged to deceased individuals (Gilmore 2009).

Based on the survey findings, the Seattle Department of Transportation is attempting (at time of writing) to adopt a local ordinance restricting free parking for placard holders to four hours in the study area. "Placards represent golden tickets to free parking, especially in downtown Seattle where monthly parking is so expensive," the City of Seattle noted in a bulletin advertising for meetings on the

proposed change (Seattle Department of Transportation 2010). In the same bulletin, their department also notes that, "Other efforts to address placard abuse have been effective but limited, because it is so easy to obtain an unauthorized DP placard" (Ibid).

VIII. Discussion and Conclusion

The background for controlling parking demand through pricing is well established in the academic literature. However, to use price effectively, exemptions must be limited. The fact that drivers in California with handicapped credentials are afforded free, unlimited meter parking means that for this group, meter parking is regulated on a first-come, first-served basis—the same policy that multiple authors cite as being inefficient and necessitating parking meters in the first place (Roth 1965; Epstein 2002; Shoup 2005).

The policy to provide a payment exemption for individuals began with a narrow scope to provide exemptions for seriously disabled individuals who would have physical difficulties in paying for metered parking. Over time the qualifications for receiving a disability permit have continually increased and the number of valid permits issued has summarily increased. The placards increasingly appear to be standard issue for residents aged 65 and over. This is concerning, as nationwide, the percentage of population 65 and older is expected to increase 130 percent from 1998 to 2050 (Rosenbloom 2001).

On-street meter surveys revealed that drivers displaying disability credentials were noted at a rate about three times higher than their percentage of the overall population. Our constant observation surveys indicated that these drivers consume dramatically more curb parking time, with average parking sessions of over five hours in some of the highest-demand parking areas in the state of California. These results support the hypothesis that, especially as their numbers further increase, drivers with placards are a barrier to controlling curb parking demand through pricing in California.

In addition to creating lower numbers of vacancies at any given time, these drivers reduce local parking revenue for municipalities. The concept of meter parking is to create turnover, but meters have also become an increasingly important and stable financial asset for cities. The financial impact of this payment exemption is enormous. In one day of observations at 14 spaces, we noted that drivers with placards consumed $488 dollars worth of meter time. If our observations represent a normal weekday, this amounts to around $125,000 in lost revenue per year on this block face alone. Overall, vehicles with placards represented 30 percent of the vehicles parked citywide at meters. In 2009, Los Angeles received $28 million in parking meter revenue (Willon 2009). If these 30 percent of vehicles were replaced by paying vehicles, LA would realize an additional $8 million in annual revenue.

Comparing the data from the Flower Street and Hope Street surveys show that the "market rate" is elusive and likely would have to be set at the block face

level. Even though the block faces are only two city blocks apart and share the same rate ($4/hour), their overall occupancy levels were very different. Throughout the entire day of observations, on average about 35% of the meter spaces on Hope Street were vacant. There were only a few brief periods of full occupancy. In contrast, the Flower Street survey block face was completely occupied almost the entire day.

The true market rate demand for parking is clouded in both survey areas due to the large number of parkers exempt from paying any rate. Anderson and de Palma (2004) noted that parking priced below market value will be overused. Comparing the parking session length of payment-required (22 minutes) and payment-exempt drivers (317 minutes) seems to clearly reinforce this point. Also, the fact that vehicles with placards were seen occupying all observed meter spaces at a rate three times their population percentage support Anderson and de Palma's conclusion.

Even with the large contingent of payment exempt motorist, the results do reinforce the validity of some of the work on parking pricing. Examining the session lengths for the continuous surveys, the high meter price does encourage turnover amongst drivers subject to payment. While often dwelling in the space beyond the amount of time paid, the average session length for these drivers was only 22 minutes. On the surveyed block face on Hope Street, there was an off-street lot offering a flat $6 rate for all day parking. Based on this and the high vacancy rate, it appears that $4 an hour is higher than the market price. As predicted by work by

Shoup (2006) and Arnott and Depalma (1991), pricing at the market level (or in this case above) creates vacant spaces.

While conceived in the best of intentions, the disabled meter payment exemption would appear to make all motorists worse off by decreasing overall parking vacancies in high demand areas. Metering parking is a tool to increase turnover as free parking will be over consumed in areas of highest demand, and the current policy is directly opposite this rationale. For cities, the loss in meter revenue is potentially very large. The ultimate barrier to any policy change is ultimately political.

The results from this report show that a serious look at the topic of exemption is needed to advance both the academic and practical sides of parking pricing. Small-scale exemptions can address equity concerns, but the number of exempt individuals must be kept below some threshold. One of the worst outcomes would be for communities to continue to increase meter rates under the guise of combating congestion only to see placard usage rates continue to increase and none of the proposed benefits be realized.

A. Policy Recommendations

Arlington, Philadelphia, and Buffalo, the three case study cities that have removed the unlimited free meter parking privilege for placard holders, have all experienced meter efficiency gains, revenue increases, and relatively little backlash.

The main political barrier is likely finding a sponsor in the California Legislature who will go on record as introducing a bill to allow municipalities to opt out of providing unlimited parking meter time for drivers with disabilities. This is a group that is perceived (rightfully so, in most cases) as deserving of special accommodations. However with such a large number of placards in use, the benefits for meter payment exemption are less apparent.

The recent introduction and Senate passage of Senate Bill 518, which is aimed at encouraging market-rate pricing in California, show that the legislature is not clueless on issues affecting parking usage and transportation (Lowenthal 2009). A possible way to bridge the gap is for the state legislature to include a provision mandating some portion of local incremental revenue increases to be appropriately reinvested to directly aid in mobility for individuals with disabilities. Authors have shown societal benefits from parking pricing in reducing excess vehicle travel and local vehicle congestion in high demand areas (Arnott and Rowse 2009). Other researchers have shown the benefits of recycling revenue into programs for affected parties (Fridstrom et al. 2000; Teubel 2000). Combining these two elements, it is a possible outcome that all motorists, disabled and able-bodied, would be better off if payment was required of all. Meter turnover would increase, enabling pricing policies to allow all motorists to find parking close to their destination. The increase in revenue could provide a boost for cities, a portion of which could be designated to improve sidewalk ADA compliance, specialized paratransit services, etc.

The Philadelphia model of providing some short period of free meter parking time would seem to be a good compromise for managing the issue where an individual has severe impairments that may preclude them from feeding a meter. Longer parking sessions can be better accommodated in off-street facilities. While this may be difficult for enforcement, our observations on Hope Street showed that motorists without explicit payment exemption largely adhered to the posted parking time limit even for broken meters where parking was free. Additionally, improvements in technology, such as parking sensors that measure occupancy length and automated mobile enforcement, could make time limit enforcement much more efficient.

B. Future Study Recommendations

As compared to only looking at occupancy over time or making equal-interval observations, the method of constantly observing meter parking by user type and recording payment and occupancy lengths is a new method for obtaining fully detailed parking information. While such surveys are time and resource intensive, they are the only methods currently available to obtain a full picture of parking demand and payment compliance by user type. The studies reported on in this thesis all took place in high-price meter areas. To understand how price affects overall demand and demand by user type, such surveys should be replicated in areas where meter prices are lower.

This report did not make any attempt to evaluate off-street parking, but it is believed that since such facilities require payment, they are less often used by placard holders who can park for free at meters. Off-street garages provide disabled spaces by ADA regulations and their usage in metered areas could be evaluated. This would directly compliment some earlier work showing that, when faced with cheap curb parking, motorists will seek out this option.

The placard data obtained from the DMV showed a dramatic increase in the number of valid placards, but the data was only available at the county level. While interesting in aggregate, much resolution is lost when trying to compare placard issuance to other factors. To fully understand relationships between placard distribution and other demographic data, the number of placards per some smaller unit of area (cities, towns) could be explored.

IX. Appendices

A. Appendix A – Survey Collection Sheet

TIME START		TIME MIDDLE		TIME FINISH	

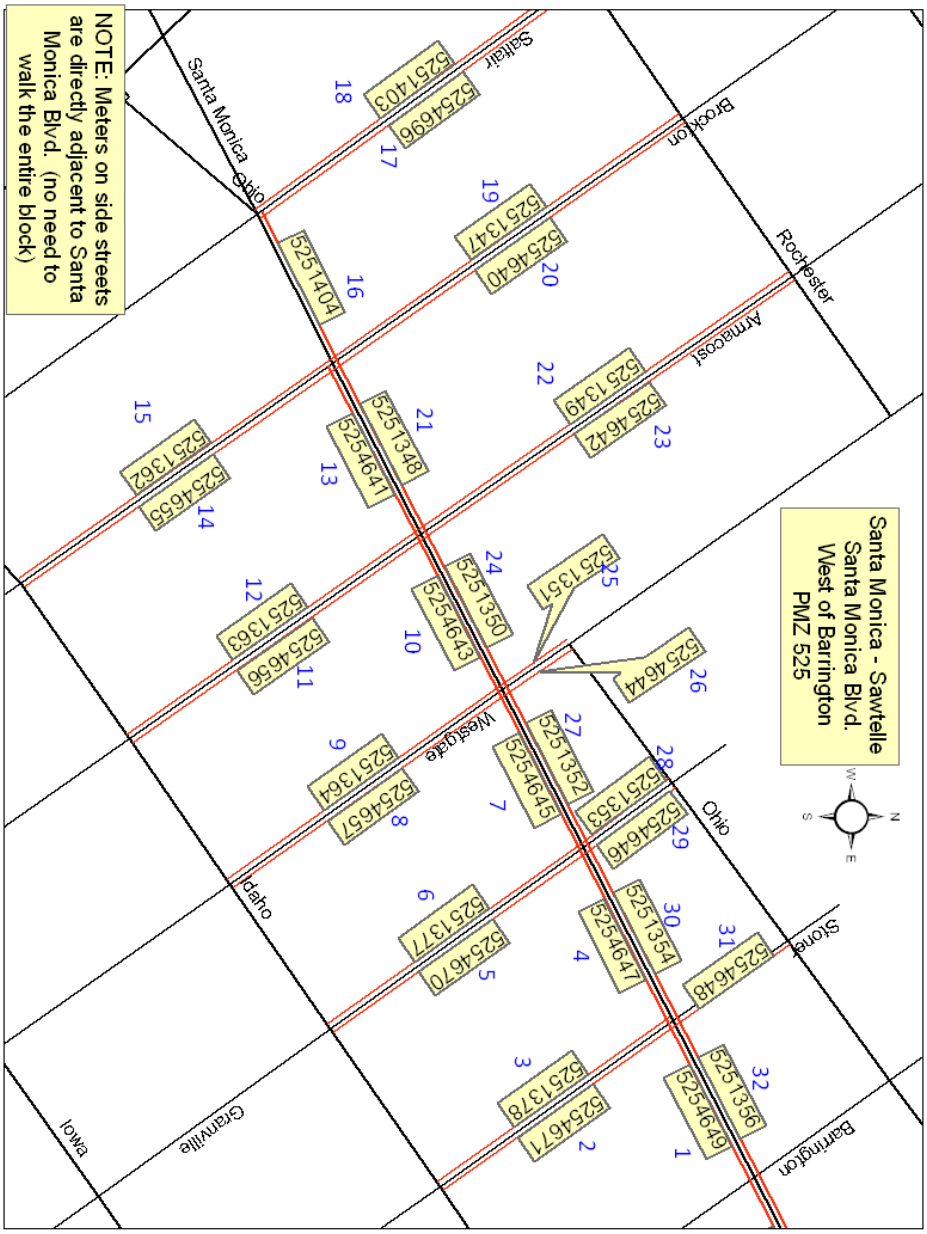
SM - Sawtelle

SS 525 SM West of Barrington

CONVENTIONAL SINGLE SPACE METERS

Date												
			PAID			UNPAID			FAILED			
ID	Block Side ID	Vacant	Regular	Disabled	Govt.	Expired	Disabled	Govt.	Vacant	Regular	Disabled	Govt.	Citations
1	5254649												
2	5254671												
3	5251378												
4	5254647												
5	5254670												
6	5251377												
7	5254645												
8	5254657												
9	5251364												
10	5254643												
11	5254656												
12	5251363												
13	5254641												
14	5254655												
15	5251362												
16	5251404												
17	5254696												

B. Appendix B– Survey Collection Route Map



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