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Getting the Prices Right

An Evaluation of Pricing Parking by Demand in San Francisco

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Abstract

Problem, research strategy, and findings: Underpriced and overcrowded curbside parking creates problems for everyone except a few lucky drivers who find a cheap space; all the other drivers who cruise to find an open space waste time and fuel, congest traffic, and pollute. The study finds that curbside parking is a major problem in San Francisco; when curbside parking is priced correctly, it can generate revenue to fund transit, and cities lose revenue when curbside parking is underpriced. The study finds that San Francisco's SFpark, a pilot program that uses a dynamic pricing system to allocate open spaces, has been successful in reducing the number of cars parked on the street, reducing the price of parking, and reducing the time it takes to find a parking space. The study also finds that the price elasticity of parking demand is high, so that a small increase in price can lead to a large decrease in demand. The study concludes that SFpark is a successful pilot program that should be expanded to other cities.

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offers the first evaluation of pricing that varies by time of day and location to manage curb parking.

Takeaway for practice: San Francisco can improve its program by making drivers more aware of the variable prices, reducing the disabled placard abuse, and introducing seasonal price adjustments. Other cities can incorporate performance parking as a form of congestion pricing.

Research support: University of California Transportation Center.

Keywords: performance parking price elasticity of demand optimal pricing

This article is referred to by:
[Comment on Pierce and Shoup: Evaluating the Impacts of Performance-Based Parking.](#)

In 2011, San Francisco adopted the biggest price reform for on-street parking since the invention of the parking meter. Oklahoma City installed the world's first parking meters in 1935, charging 5 cents an hour (85 cents in 2013 currency). Most cities' pricing policies have changed little since then. Parking meters usually charge the same price all day, and some cities charge the same price everywhere.¹ San Francisco has moved toward a more efficient and equitable system of on-street parking prices that vary by time of day and from block to block.

Is this a good thing? In principle, absolutely. SFpark, San Francisco's new pricing program, is a first-of-its-kind experiment in dynamic pricing of public space. It's the first time a city has used dynamic pricing to manage public space since the 1950s. The program was designed to keep the amount of space available for parking in line with demand. When used properly, it can help reduce the amount of space needed for parking (see, e.g., Shoup, p. 29).

The parking price that achieves one or two open spaces per block is not a free-market price; it is instead a public price for a public service, and it should be set to achieve the public goal of effectively managing the parking supply. Because cities can charge parked cars more easily than moving cars, getting the prices right for curbside parking is a cheaper version of congestion pricing for traffic.

In this appendix, we explain the target outcomes of more than 100 SFpark's suggestions. We next explain the process of establishing a target rate after a period of vacancy during the study by



Scholars have often treated the b space as a

1997; Shoup [2011](#); Vickrey, 1954, 1994). They generally conclude that cities should set the right prices for curb parking because the wrong prices do so much harm. Where curb parking is underpriced and overcrowded, drivers cruise the streets hoping to find an open space. This cruising greatly increases traffic congestion: Ten studies conducted in eight cities between 1927 and 2011 found that an average of 34% of cars in congested downtown traffic were cruising for parking ([Table 1](#)). In 2007, for example, researchers interviewed drivers stopped at traffic signals in New York City and found that roughly one third were cruising. Another study in a 15-block commercial district in Los Angeles estimated that cruising for curb parking created nearly 1.5 million excess vehicle kilometers of travel per year, equivalent to 38 trips around the earth or four trips to the moon (Shoup, [2011](#), Chapter 14).

Table 1 Studies of cruising for curb parking.

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Underpriced parking creates large social costs for everyone except a few lucky drivers who happen to find a cheap space. Overpriced parking also causes problems; when curb spaces remain empty, nearby stores lose potential customers, employees lose jobs, and governments lose tax revenue. To avoid the problems caused by mispriced parking, some cities, including San Francisco, Seattle, and Washington, DC, have begun to adjust their curb-parking prices by location and time of day. The process of adjusting prices based on occupancy has been called demand-based or performance-based pricing. This pricing policy can improve the performance of both curb parking and the adjacent

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San Francisco has increased the price of curb parking to \$18 mill parkwith an onsive regulation site for its

Tolling a



http://ops.fhwa.dot.gov/tolling_pricing/value_pricing/projects/not_involving_tolls/parking_pricing/ca_sfpark_sf.htm).

In seven pilot zones, San Francisco has installed sensors that report the occupancy of each curb space on every block and parking meters that charge variable prices according to the time of day. Using this new technology, the city adjusts parking prices in response to the occupancy rates about once every six weeks. This trial-and-error process aims to create a structure of prices that vary by time and location to produce an average occupancy rate of between 60% and 80% on every block.

Consider the prices of curb parking on a weekday at the well-known tourist destination, Fisherman's Wharf, in May 2012 ([Figure 1](#)). Each block has different prices during three periods of the day (before noon, from noon to 3 p.m., and after 3 p.m.). Before the first changes in August 2011, the price was \$3 an hour at all times. By May 2012, prices on almost every block had declined for the period before noon, while most prices had increased between noon and 3 p.m. Most prices after 3 p.m. were lower than during mid-day, but higher than in the morning. The price of parking on the block on the far left of the maps in [Figure 1](#), for example, was \$1.50 an hour before noon, \$3 an hour from noon to 3 p.m., and \$1.75 an hour after 3 p.m. A driver who arrived at 11 a.m. and parked for two hours thus paid \$1.50 for the first hour and \$3 for the second hour.

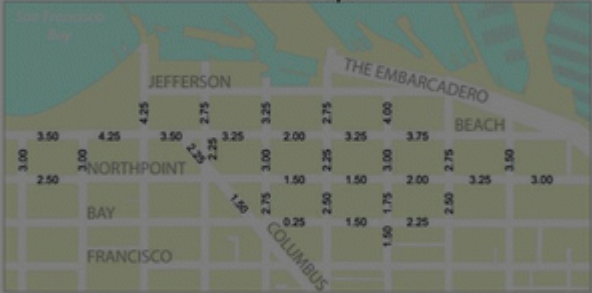
Figure 1 Parking prices on a weekday at Fisherman's Wharf in May 2012. (Color figure available online.)



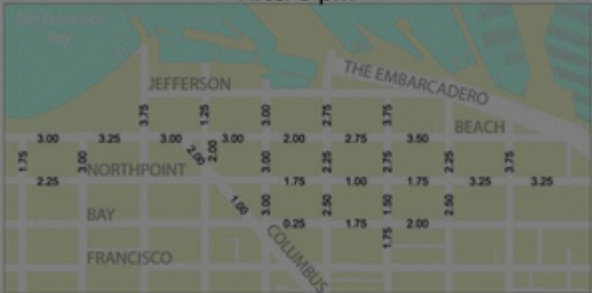
Before Noon



Noon to 3 pm



After 3 pm



[Display full size](#)

SFpark based these price adjustments purely on observed occupancy. Planners cannot predict the right price for parking on every block at every time of day, but they can use a simple trial-and-error process to adjust prices in response to occupancy rates. Figure 2 illustrates how nudging prices up on crowded block A and down on underoccupied block B can shift only one car to improve the performance of both blocks.

Figure 2 (Figure 2 is not available online.)



Before SFpark



Block A - Central Business District Location - No Open Spots



Block B - Nearby Location - 3 Open Spots

After SFpark



Block A - Central Business District Location - 1 Open Spot



Block B - Nearby Location - 2 Open Spots

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Will Performance Prices Change Drivers' Behavior?

Using prices to change the behavior of only a few parkers can open up one or two spaces on every block. By reducing the need to cruise for curbside parking, this small change will provide large benefits for almost everyone. As Stanford University professor Balaji Prabhakar commented about small policy changes that produce large benefits, "This is one of the nicer problems. You don't have to change everyone's behavior; in fact, it's better if you don't" (Markoff, 2012, p. D1).

Nudging the price up on an underpriced, overcrowded block provides several important benefits. Previously, drivers spent an average of 10,000 hours a year cruising for parking in Los Angeles. By reducing the time in traffic, SFpark will save drivers time and money. A shorter time in traffic also means less time in traffic. Fourth, drivers will arrive in traffic less often. behavior. Beyond that, by stating

prices possible without creating a parking shortage. Relying on transparent, data-based rules to set prices makes an end run around the usual politics of parking prices (Table 2). Demand sets the prices for parking, and wanting more revenue no longer justifies raising prices.

Table 2 Prices change according to occupancy rates in the previous period.



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First Movers

If higher prices encourage a few parkers to move away from the most crowded blocks, who will move first? Three types of drivers are most likely to park farther away: long-term parkers, solo drivers, and those who place a low value on saving travel time. (Shoup's [2011] chapter 18 presents a model of how parking prices affect location choices.)

Vickrey (1954) noted that if prices are set to create an open space on every block, “there would be an incentive for each parker to park as far as possible in locations where the demand is light, and there will be a natural tendency for the long-term parkers to park somewhat farther away from the areas of heaviest demand” (p. 64). Long-term parkers have more to gain from moving to cheaper curb spaces. A driver who parks for four hours in a distant space that costs \$1 an hour less will save \$4, while a driver who parks for 15 minutes would save only 25 cents. It therefore seems likely that drivers will move to the cheaper but less convenient distant space, saving money but increasing the inconvenience of the space and the inconvenience to other drivers.

Solo drivers are also likely to move to the cheaper but less convenient distant space. A solo driver who parks for 1 hour in a distant space that costs \$1 an hour less will save \$1, while a solo driver who parks for 15 minutes would save only 25 cents. Therefore, solo drivers are also likely to move to the cheaper but less convenient distant space, saving money but increasing the inconvenience of the space and the inconvenience to other drivers.

Drivers who enjoy walking or who place a low value on saving time spent walking will also shift toward the cheaper spaces. For example, drivers who arrive early and have time to spare will park farther away, while drivers who arrive late will park closer. Lower-income drivers who place a lower value on saving time are also more likely to park farther away. If parking prices remain the same everywhere, lower-income drivers cannot save money by shifting their parking locations and walking farther.

SFpark thus allocates parking spaces more efficiently than uniform prices can. Short-time parkers, carpoolers, those who have difficulty walking, and those who place a high value on saving time will shift toward the more convenient parking spaces. In contrast, long-time parkers, solo drivers, those who enjoy walking, and those who place a low value on saving time will shift toward the more distant parking spaces. SFpark will give all drivers a new opportunity to save money or time, which should benefit everyone.

Did SFpark Change Drivers’ Behavior in the Right Direction?

Following several years of planning, the San Francisco Municipal Transportation Authority (SFMTA) launched SFpark in April 2011 by installing new parking meters and extending or removing the time limits on curb spaces. The pilot program covers seven zones that contain 7,000 metered curb spaces and 14 public garages. The initial prices in each zone simply carried over from the previous, uniform pricing scheme. SFpark made the first price changes at the block level in August 2011.

Most metered spaces in San Francisco are on the street, and the time of day and day of the week affect the availability of these spaces. The target occupancy for a given period is typically 80 percent. Otherwise, the spaces are available according to the needs of the city and the surrounding area. The metering is transparent, and the prices are set by the city. In setting the prices, the city will be able to reduce the amount of time spent cruising for a space and ensure that the spaces are used more efficiently. In this article



customers as possible to the adjacent businesses. The greater the unpredictability of parking demand, the greater the conflict becomes between the two goals.

Raising the meter rates to ensure at least one vacant space most of the time will reduce the average occupancy rate. For example, large groups gathering for lunch at a restaurant may generate exceptionally high parking demand on a block on some days, so cities cannot aim for a consistently high occupancy rate of 80%–90% without often reaching 100% occupancy. Fully occupied curb parking produces unwanted cruising, while a low average occupancy means fewer customers. San Francisco set the target occupancy rate at between 60% and 80% to deal with the stochastic variation in parking demand and to balance the competing goals of reliable availability and high occupancy.

If SFpark works as intended, prices will move occupancy rates toward the target range. So how did prices affect occupancies during the first year of the program? To answer this question, we can examine how the 5,294 price changes during SFpark's first year affected occupancy rates in the subsequent periods.

The Data

SFpark made six price adjustments during the first year (Table 3). Prices increased in 32% of the cases, declined in 31%, and remained the same in 37%, with almost no change in the average price. There was, however, a pronounced spatial pattern to the changes.

Table 3: Price Changes by Zone and Time Period

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Prices rose in the Civic Center and Financial District, while prices fell in the Mission District and North Beach. Overall, prices increased by 1% during the first year, without a significant change in the average price.

Before the program, prices for all zones were the same.

In this article

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price changes affected occupancy rates. Price elasticity is defined as the percent change in the occupancy rate (the quantity parking demanded) divided by the percent change in the meter price. For example, if a 10% price increase leads to a 5% fall in occupancy, the price elasticity of demand is -0.5 ($= -5\% \div 10\%$).

Using data from parking meters in Seattle, Ottosson Chen, Wang, and Lin (2013) calculated the price elasticity of demand for on-street parking by time of day at the block level. Because the authors did not have data on parking occupancy, however, they inferred occupancy from the meter payment data. Our study is the first to use measured occupancy to estimate the elasticity of demand for on-street parking.

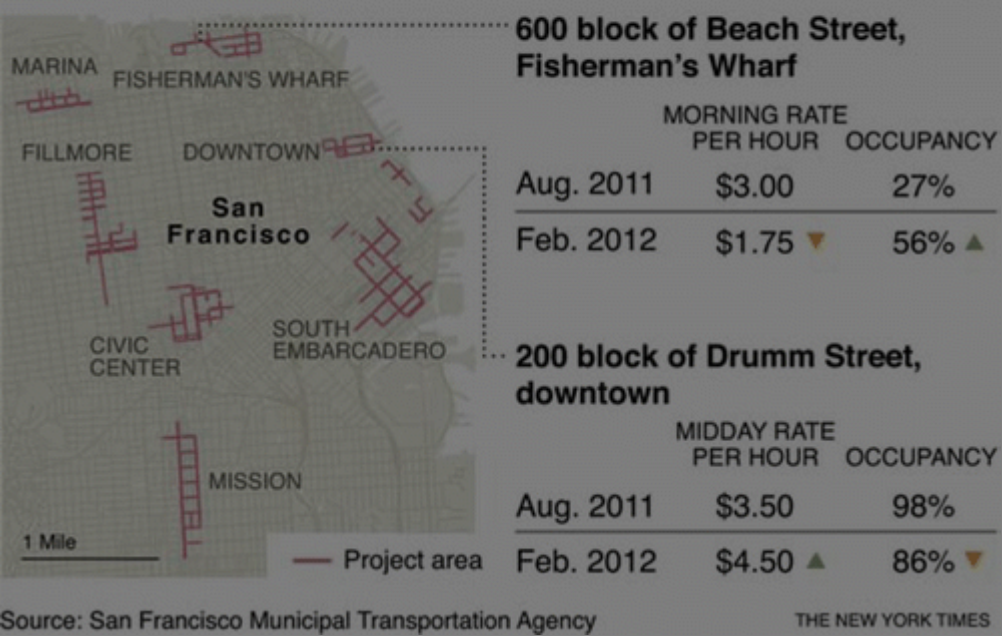
We illustrate the price elasticity of demand for curb parking by referring to the results of two SFpark price changes reported in the New York Times (Cooper & McGinty, 2012). [Figure 3](#) shows the price and occupancy changes at two locations: the 600 block of Beach Street at Fisherman's Wharf and the 200 block of Drumm Street in Downtown. On Beach Street, the initial price in August 2011 was \$3 an hour and the initial occupancy only 27%. By February 2012, the price had decreased to \$1.75 an hour, while occupancy had increased to 56%. Because occupancy rose by 70% after the price fell by 53%, the elasticity of demand was -1.3 .^{[8](#)} Meter revenue rose after the price fell because demand was elastic: Higher occupancy more than offset the lower price. In this case, SFpark produced lower prices, higher occupancy, and more revenue.

Figure 3 Pricing parking by demand. Source: Cooper and McGinty, 2012. Reprinted with permission from the New York Times. (Color figure available online.)



Pricing Parking by Demand

San Francisco is trying to make sure there is at least one parking spot available on each block by raising meter rates on its most crowded streets and lowering them on the emptiest ones. Here is a snapshot of how the program has worked on two blocks.



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On Drumm Street, the initial price was \$3.50 an hour and the initial occupancy was 98%. After the price increased to \$4.50 an hour, occupancy decreased to 86%. The price elasticity of demand was -0.5 because occupancy fell by 13% after the price rose by 25%. Meter revenue increased when the price increased because demand was inelastic: Occupancy decreased by less than the price increased.

The price changes moved occupancy toward the desired goal and increased total revenue on both Beach and Drumm Streets. Nevertheless, given the target occupancy range of 50% to 60%, the program was still far from its goal (occupancy was only 56%) and the program had not yet achieved its goal. The program was only 56% occupied because of the program's design. The program was designed to generate for only six cases.



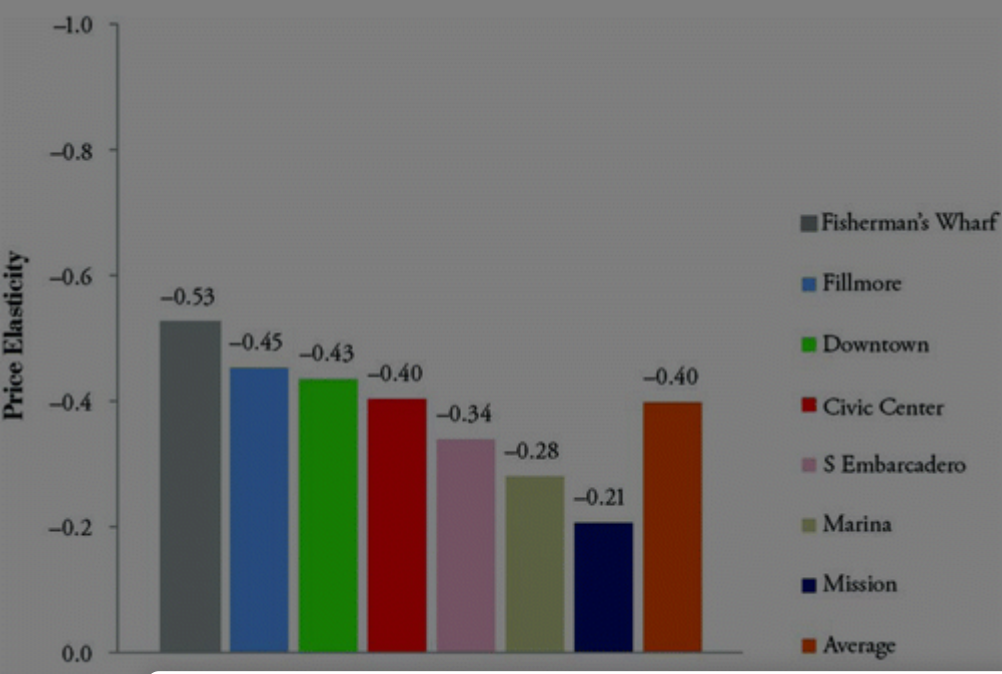
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ring the average occupancy one for each

that the price elasticity of demand for curb parking is far from uniform. Elasticity varies according to location, time of day, day of the week, initial price, and date of the price change. The data also show astonishing variation in the price elasticity of demand at the block level.

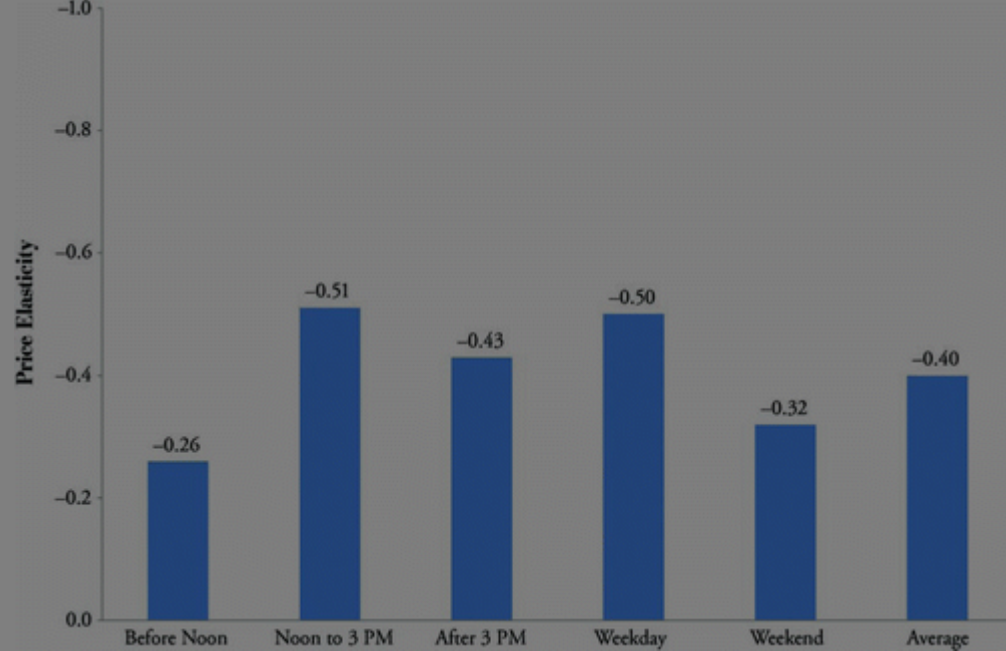
Elasticity Varies by Location. Figure 4 shows that the average price elasticity varies considerably across the seven pilot zones of SFpark, from -0.53 at Fisherman's Wharf to -0.21 in the Mission District. The greatest disparity appears between the mostly residential Mission and Marina zones, which are the least elastic and therefore respond least to price changes, and the predominantly commercial and office zones that are most elastic and respond the most to price changes.

Figure 4 Elasticity by location. (Color figure available online.)



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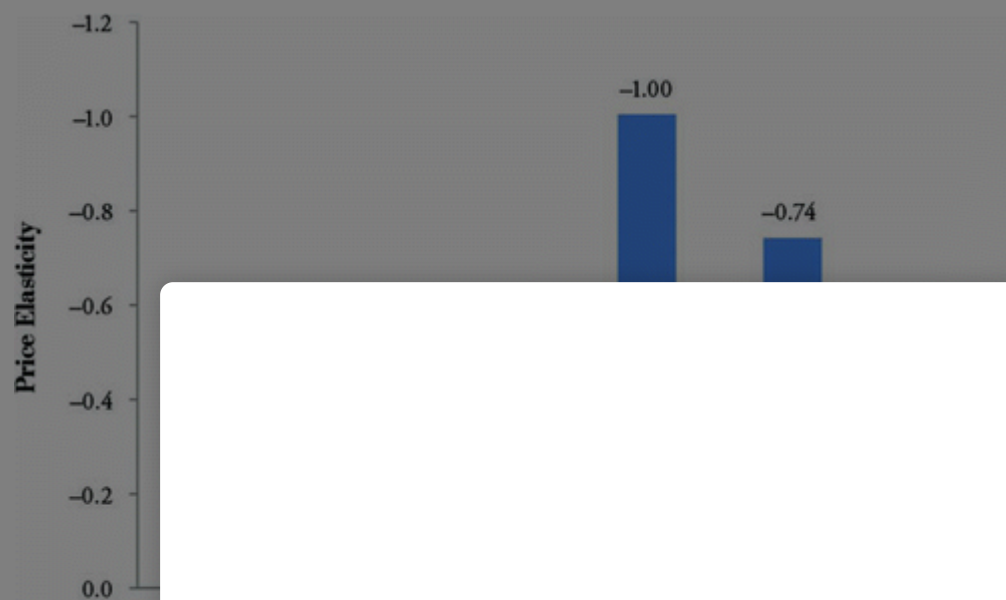
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Elasticity Varies by Initial Price. Figure 6 shows that the elasticity also varies according to the initial price of parking before a price change. The price elasticity of demand for the cheapest parking (between \$0 and \$1) is very low. Elasticity increases as price rises until it reaches \$4, and then declines.

Figure 6 Elasticity by initial price. (Color figure available online.)

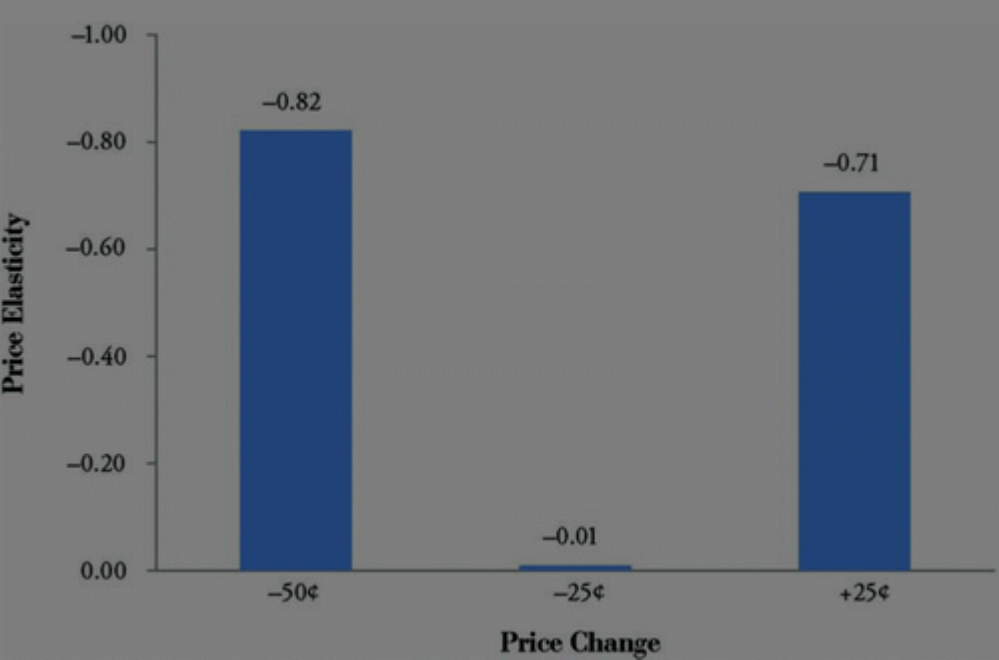


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Elasticity increases as price rises until it reaches \$4, and then declines. Only three of the

hour. For price changes of 25 cents an hour, customers reacted more strongly to price increases than to price decreases, a phenomenon often observed in other markets (for example, see Kalyanaram and Winer, [1995](#); Thaler, [1985](#)).

Figure 7 Elasticity by size of the price change. (Color figure available online.)

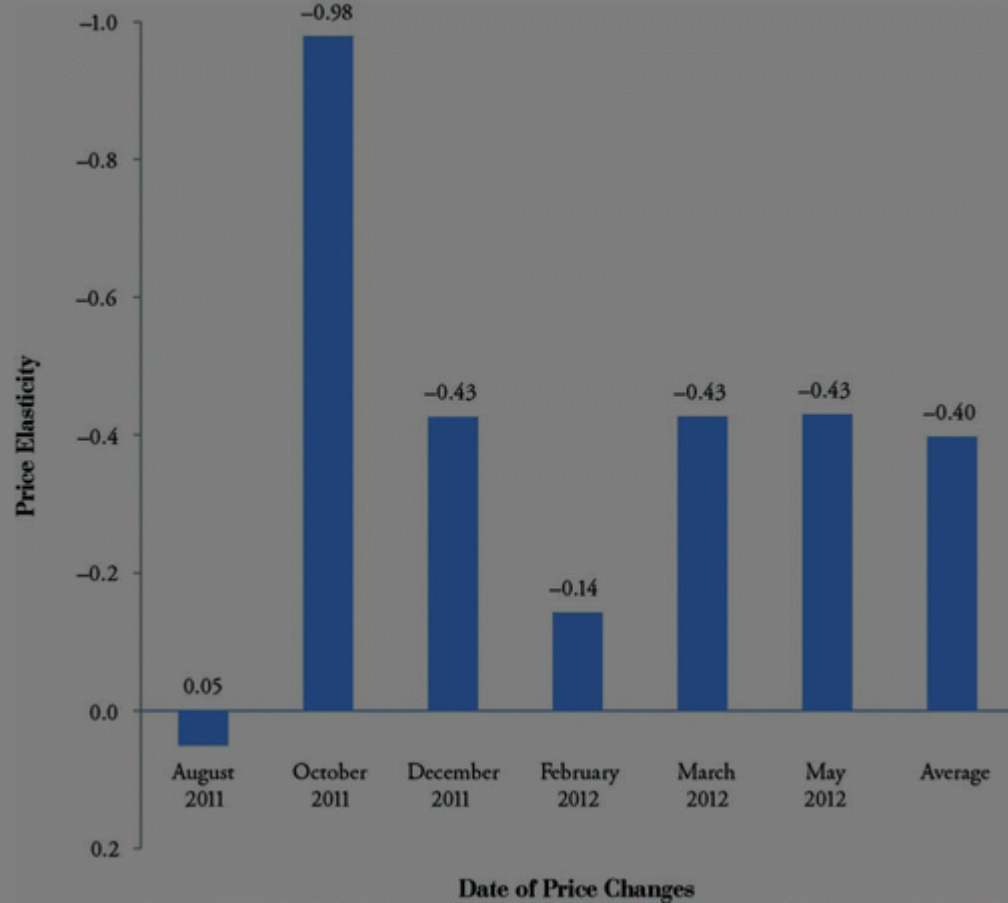


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Elasticity Varies Over Time. [Figure 8](#) shows the price elasticity of demand for parking in response to each of the first six price changes of the pilot program. The absolute value of elasticity was small after the first price change, increased dramatically after the second, and then declined following subsequent price changes.

Figure 8 Elasticity over time.(Color figure available online.)





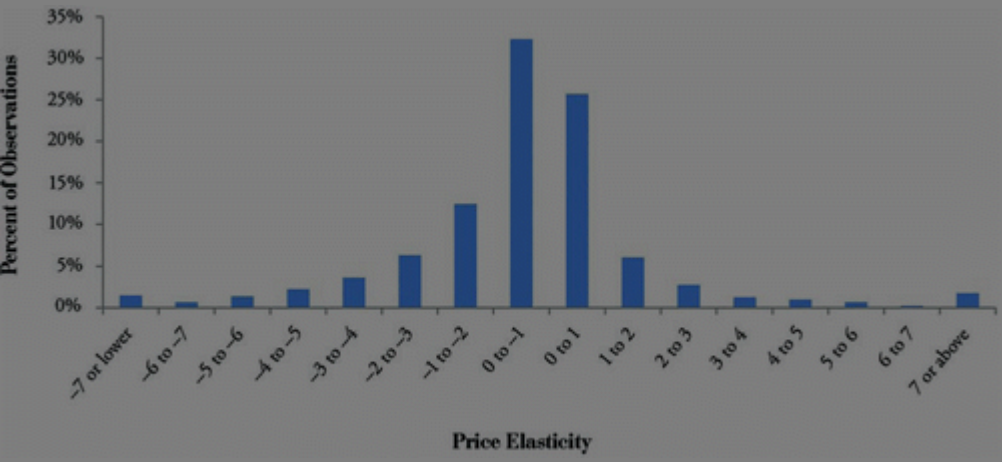
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Two factors may explain the small positive elasticity after the first price change. First, many drivers probably had not heard about SFpark when the first price changes occurred in August 2011. If so, they were unaware of the lower prices available to those who were willing to walk farther from their parking spaces to their destinations. More drivers may have learned about SFpark after the second price change in October. Thus, those most willing to shift their parking locations to save money may have moved from expensive blocks to cheaper blocks to take advantage of the reductions SFpark made available. This could explain the small positive elasticity after the first price change. Another factor could be that drivers were not used to paying for parking, so they were not as responsive to price changes. This could explain the decline in elasticity after the second price change.

A second factor could be that there were many other factors affecting parking demand at the same time. For example, there were many factors affecting parking demand at the same time, such as variations in traffic volume, special events (like parades), and weather. These factors could all have contributed to the decline in elasticity. Therefore, the decline in elasticity could be explained by all these other factors. Elasticity could also be affected by changes in parking locations. If parking locations changed, this could affect the elasticity. For example, if parking locations moved from expensive blocks to cheaper blocks, this could explain the decline in elasticity.

varied over a wide range of values, from +0.05 to -0.98 (Figure 8). When we plot the elasticity of demand for individual price changes at the block level, we find astonishing variety. Figure 9 shows the distribution of the price elasticities calculated for 5,294 individual price and occupancy changes on 1,492 city blocks.

Figure 9 Distribution of elasticities for 5,294 price changes. (Color figure available online.)



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The wide range of price elasticities suggests, as one would expect, that many variables other than price affect parking demand. In many cases, the price elasticity was positive, which means that occupancy either rose after prices rose or fell after prices fell. Higher prices do not cause higher occupancy and lower prices do not cause lower occupancy, so other factors must have overwhelmed the effects of prices on occupancy in the cases of positive price elasticity. The wide range of elasticity at the block level also suggests that the circumstances on individual blocks vary so greatly that planners

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We conducted a study by examining morning and evening parking occupancy on the street. We found that occupancy was highest on weekdays and lowest on weekends. The occupancy was also highest on the street with the highest parking fees. Yet, even

Table 4 Blocks with largest elasticity range in Civic Center on weekday mornings.

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For instance, on the 200 block of Van Ness Avenue the initial average occupancy was 33% on weekday mornings. After the price fell from \$3.00 to \$2.75 an hour, occupancy rose to 47%, yielding a price elasticity of -4.0 . In the subsequent period, even though the price dropped to \$2.50 an hour, occupancy fell to 20%, yielding an elasticity of $+8.5$. Powerful factors other than price must have influenced demand on this block. Because demand is clearly site-and-time specific, there is no way to measure the aggregate demand for curb parking and no way to set the right prices other than by aiming for the right occupancy.

Have the Occupancy Rates Moved Toward the Goal?

Occupancy data in the first year of the program suggest that SFpark has made considerable progress toward solving the important problems of severe overcrowding on some blocks and very low occupancy on others. [Table 5](#) shows that, on severely under- and overoccupied blocks (those with initial occupancy rates below 30% or above 90%), the price changes tended to move occupancy in the right direction in the subsequent period. Occupancy on the underoccupied blocks rose after two thirds of the price decreases, and occupancy on the overcrowded blocks fell after two thirds of the price increases.

Table 5 Overcrowded blocks

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SFpark has been in effect since the beginning. SFpark is currently disabled.

Information About Performance Prices

Because parking prices and availability can vary greatly within a short distance, drivers need real-time information on prices and availability to park in the optimal spots. (If SFpark achieves its goal of open parking spaces on every block, drivers can choose parking location only by price.) On its website, SFpark publishes maps that show the price and availability of parking on every block at each time of day (as in [Figure 1](#)), and it makes the same information available on smart phones. In addition, anyone can enroll to receive email messages from SFpark when prices change. Nevertheless, many drivers, especially tourists, remain unaware of these price variations and thus miss the opportunity to save money by walking a few blocks from their cars to their destinations. If most drivers do not know that parking prices vary by location and time of day, SFpark will not easily achieve the desired one or two open spaces on each block.

Many drivers may think it is not worth the effort to research parking prices to get the best deal possible. These drivers are not irrational, but rather are displaying what economists call rational inattention (for example, see Wiederholt, [2010](#)). Parking for a short time does not cost much, and drivers who automatically park close to their destinations without thinking hard about prices are not necessarily making bad choices. Instead, they are saving time and energy by taking advantage of the open spaces they see, demonstrating their inelastic demand for parking. Everyone buys some things without doing the research necessary to learn about all the cheaper or better alternatives.



Although SFpark makes the parking market more efficient, it cannot guarantee that everyone will choose the optimal parking space. Technology is advancing rapidly, however, and automobile guidance systems can easily incorporate pricing data from SFpark (SFpark encourages people to develop apps and software using their data at <http://sfpark.org/how-it-works/open-source-data/>). Drivers may soon be able to input their destinations, the length of time they want to park, and how much they value time spent walking from their parking spaces to their destinations. When they approach their destinations, the guidance systems will give them turn-by-turn voice directions to the optimal curb or off-street parking space. The system will then show the best walking route to and from their destination. As communications systems become cheaper and easier to use, more drivers will use finer-grained information to make better transportation and parking choices. When that time comes, occupancy rates will respond more quickly to curb-parking prices, and SFpark will come closer to achieving its goals.

SFpark is a work in progress, but the information it produces may eventually convert curb parking from a frustrating source of congestion and pollution into one of the most efficient transportation markets in the 21st century.

Disabled Placard Abuse

The staff of SFpark report that widespread abuse of disabled parking placards helps to explain why occupancy does not reliably respond to price changes. California allows all drivers with disabled placards to park free for an unlimited time at parking meters, so higher prices increase the temptation to abuse placards. Raising prices on crowded blocks may be a good idea, but it will also increase the demand for disabled placards. The city of San Francisco is considering a reform that would allow parking meters to account for the number of disabled placards in use. This reform would allow disabled drivers to receive a discount on their parking fee. In this article, we discuss the impact of this reform, and how it might be implemented. In Michigan, disabled drivers can park free at parking meters. This is a problem for the city of Detroit, which has a large number of disabled drivers. The city is considering a reform that would allow disabled drivers to receive a discount on their parking fee. This reform would allow disabled drivers to receive a discount on their parking fee. In this article, we discuss the impact of this reform, and how it might be implemented.



meters. Enforcement is easy because an able-bodied driver who misuses the distinctive severely disabled placard is conspicuously violating the law. Illinois adopted a similar two-tier placard reform in 2012 (Illinois General Assembly Public Act 097-0845, 2013).

Equity in Performance Pricing

While it is clear that performance-parking prices can improve transportation efficiency, are they fair? In San Francisco, 30% of households do not own a car, so they do not pay anything for parking (U.S. Census Bureau, 2010). How the city spends its parking revenue also affects the equity implications of charging for parking.^{[11](#)} San Francisco uses all its parking meter revenue to subsidize public transit, so if SFpark increases parking revenue, higher-income drivers who park at the curb will subsidize lower-income families who rely on public transit. Also, because buses are often mired in traffic congested by drivers who are cruising for underpriced curb parking, SFpark will further aid bus riders by reducing traffic congestion and increasing bus speeds.

Performance pricing is not price discrimination, which is a strategy of charging different people different prices for the same thing. All drivers who park on the same block at the same time pay the same price. Performance pricing is also not the same as maximizing revenue. [Table 3](#) shows that the average price of parking fell by 1% during the first year of SFpark. Because demand was, on average, inelastic (-0.4), the city could increase revenue by charging higher prices. SFpark's goal, however, is to optimize occupancy, not to maximize revenue.

Charging demand-responsive prices for curb parking has even more obvious implications in the process and over time. Drivers in the underpriced curb parking areas feel they are contributing to the problem, and the Los Angeles Department of Transportation (Dickers) has implemented a "no parking on the bike paths" policy in many other cities. In Mexico City, the city-owned parking spaces are twice as many as the number of bike paths.

parking and spending the revenue to pay for public services (e.g., public transport and sidewalk improvements) will help the majority of poorer households without cars at the expense of richer households who now park free on the streets and sidewalks. Performance-parking prices will also reduce traffic congestion and, thus, improve the lives of all transit riders, pedestrians, and cyclists.

To defend free parking on streets and sidewalks, car owners sometimes rhetorically push poor people in front of them as human shields, claiming that charging for parking will harm the poor. This is inaccurate. Free curb parking limits the revenue available to pay for public services, and poor people cannot replace public services with private purchases as easily as richer people can. The poorest cannot afford cars, but they do benefit from public services, such as public transport, that parking revenues can finance. Using curb-parking revenue to pay for local public services is much fairer than keeping curb parking free, losing the revenue needed to pay for public services, creating chaotic parking problems on busy streets, and increasing traffic congestion caused by drivers who are searching for free parking. Claiming that performance-parking prices will harm the poor defends a narrow special interest by feigning a concern for the broad public interest.

Two Suggested Improvements

Our findings suggest at least two ways to improve SFpark: 1) refine its periods of operation and 2) shift from reaction to prediction in setting prices.

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Because many businesses are now open in the evenings, and meters can charge variable prices and have variable time limits (or no time limits), the old rationale for free parking in the evening no longer applies. Meters in the Port of San Francisco operate until 11 p.m., and several other cities operate their parking meters until midnight in the busiest areas, so SFpark will not break new ground by extending its meter hours past 6 p.m. The purpose of metering in the evening is to prevent shortages, not to create turnover.

A screenshot of a presentation slide. A large white rectangular box obscures the central portion of the slide. To the right of the box, there is a small grey square containing a white 'X' icon, which is a common UI element for closing a window or dialog. The background of the slide is dark grey with some faint, illegible text visible around the edges of the white box.

The diagram consists of a central white circle with a dark blue border. Inside the circle are several small dots in dark blue, light blue, and green. The circle is surrounded by a dark blue ring. The background is a light gray gradient.

SFpark can also adjust prices for other predictable factors, such as construction projects that reduce the parking supply or events that increase demand. SFpark already charges special prices during San Francisco Giants games at AT&T Park: \$7 an hour for spaces closest to the ballpark, and \$5 an hour for spaces farther away. For major public events, such as San Francisco's Gay Pride Parade that attracts over a million revelers to the city streets, SFpark charges up to \$18 an hour for curb parking. The current policy of charging special prices for special events thus provides a precedent for setting other prices based on expected demand. Shifting from reaction to prediction in adjusting parking prices may allow SFpark to keep parking occupancy closer to the target rates. Like hockey players who skate to where the puck is going, SFpark can price parking based on future demand, not simply on past occupancy.

Conclusion: A Promising Pilot Program

SFpark was established as a pilot program to examine the feasibility of adjusting prices to achieve availability targets. SFpark appears to be meeting this goal, and other cities are watching the results closely. Los Angeles has already adopted a similar program called LA Express Park (see <http://www.laexpresspark.org/>).

As a test of new transportation technology, SFpark is similar to the trial runs of congestion pricing programs in London, Singapore, and Stockholm. In comparison to congestion pricing, however, SFpark has shown that parking pricing is relatively simple and cheap. Cities can adopt programs like SFpark even if they do not yet have all the resources to implement a more complex congestion pricing program. The success of SFpark shows that parking pricing is a promising approach to managing urban mobility. It is a simple and cheap way to manage parking and reduce congestion. It is a promising approach to managing urban mobility. It is a simple and cheap way to manage parking and reduce congestion.

SFpark's success in meeting its goals is a promising sign for the future of parking pricing. The program has shown that parking pricing is a simple and cheap way to manage parking and reduce congestion. It is a promising approach to managing urban mobility. It is a simple and cheap way to manage parking and reduce congestion. It is a promising approach to managing urban mobility. It is a simple and cheap way to manage parking and reduce congestion.

With performance-parking prices, drivers will find places to park their cars just as easily as they find places to buy gasoline. But drivers will also have to think about the price of parking just as they now think about the prices of fuel, tires, insurance, registration, repairs, and cars themselves. Parking will become a part of the market economy, and prices will help manage the demand for cars and driving.

If SFpark succeeds in setting prices to achieve the right occupancy for curb parking, almost everyone will benefit. Other cities can then adopt their own versions of performance-parking prices. Getting the prices for curb parking right can do a world of good.

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Notes

1. In Boston, for example, the meters charge \$1.25 an hour throughout the city. Glaeser (2013) explains the problems with this policy.
2. In a paper by Glaeser and Gyourko (2003), Glaeser says that the “unfortunate” result of the parking policy is that it leaves “no room for doubt as to the fact that the policy is a failure.”
3. The title of the paper is “The Economics of the Automobile Society was ‘My Love’.” The paper is available at [http://www.automobilesociety.org/and-determines-the-future-of-one-of-the-many-ideas-for-the-future-of-the-automobile](#).
4. Weitzman (1984) shows that a system of parking permits can produce the same outcome as a system of parking prices.

5. The San Francisco Municipal Transportation Authority (2011) explains how SFpark was established and how it works in more detail.
6. A few meters operate from 7 a.m. to 6 p.m., meters in Fisherman's Wharf operate from 7 a.m. to 7 p.m., and some meters in the Port of San Francisco operate from 7 a.m. to 11 p.m.
7. Newspapers, radio, and television are other sources of information that frequently report on SFpark. Some residents of San Francisco seem obsessed about parking, as suggested by a recently published 168-page guide to parking in the city (Labua, [2011](#)).
8. We used the midpoint formula to measure the price elasticity of demand because it provides the same result regardless of the direction of the price change. See Krugman and Wells ([2005](#)), for example, for a discussion of the midpoint formula for the price elasticity of demand.
9. The generally higher levels of traffic congestion in the afternoon and on weekdays may also help to explain the more elastic demand for parking at those times. If traffic is more congested, a smaller increase in the price of parking may tip the decision against driving for less essential trips.
10. We tried to explore whether these blocks were subject to abnormal exogenous shocks in this time period, such as special events, building construction, or street closures. Our search did not turn up any abnormalities, but we still cannot rule this out as a possibility.

11. Good (2007) emphasizes that congestion tolls or parking charges are necessary to reduce congestion and improve the efficiency of the transportation system.
12. The study found that 46% of San Francisco City who owned a car paid \$6 per month; for those who did not, the cost was \$50 pesos (U.S. \$8).
13. For example, the cost for \$47

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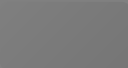
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