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Do parking fees affect retail sales? Evidence from Starbucks

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ABSTRACT

Parking meters are a common feature of urban areas, yet their economic impacts are not well understood. Local governments use meters to raise revenue and to ration scarce parking spaces. On-street parking, however, is seldom priced at the market rate. When inefficiently priced, parking meters may negatively affect the businesses and individuals they are intended to serve. This paper uses a quasi-experimental research design and an observational data set to assess metered parking policy. Sharp twice-daily changes in parking meter enforcement provide a comparison of customer traffic to a popular retail area in free and metered parking environments. Regression discontinuity results suggest that when there is an excess supply of parking (i.e., many spaces are vacant), a small 50 cent per-hour parking fee deters commerce. At two separate Starbucks establishments, the meter fee reduced customer traffic by almost 30%. However, when there is excess demand for parking (i.e., all spaces are constantly occupied), there is no evidence that meters help to increase customer traffic. These results suggest that sub-optimal meter pricing can impose substantial costs on nearby businesses.

1. Introduction

Metered parking is an important, yet often overlooked, component of urban transportation policy. Cities primarily use parking meters to generate revenue and to help ration scarce space by generating turnover. Although meter revenues are usually modest, parking policy broadly affects land use, the environment, and many individuals. Like automobile travel itself, parking is a derived demand with little inherent value; therefore, policy will affect many economic activities that use parking as an input. Understanding the direct and indirect effects of meters on businesses, drivers, and residents is critical to crafting sensible parking policies.

Parking policy can also have significant spill-over effects on urban areas. For example, underpriced on-street parking (during peak periods) can exacerbate urban traffic congestion by inducing drivers to cruise for an inexpensive parking space. These phenomena have been modeled by Glazer and Niskanen (1992), Arnott and Rowse (1999), Arnott and Inci (2006), and Shoup (2006).[1] A common conclusion from the models is that metered parking rates should be raised to the point where cruising is reduced or eliminated. Hence, an optimal parking policy needs to consider the interplay among congestion costs, cruising costs, the amount of road capacity devoted to parking, and fees.

Given the ubiquity of parking, there is still much to be learned about the broader economic impacts of parking policy and empirical research is indeed scant. Reviews of the existing empirical literature by both Marsden (2006) and Shoup (2005) echo this shortcoming — most parking policies are grounded on an inadequate base of evidence. For example, many municipalities require retailers to meet minimum parking requirements, often without much reasonable justification.

To address such problems recent empirical research has focused on better understanding the economics of parking, and the approaches have been varied. Studies using discrete choice models and revealed-preference data by Kelly and Clinch (2009) and Kobus et al. (2013) have examined drivers' willingness to pay for on-street parking and the price elasticity of demand for parking.[2] A hedonic price based study by van Ommeren et al. (2011) used variations in real estate prices to estimate the cost of cruising for parking and the value of on-street parking to homeowners in Amsterdam. But the broader economic impacts of parking policy on business districts and neighborhoods are still largely unknown.

Although more attention is being paid to parking, the relative shortage of empirical research is surprising considering the large

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[1] A study by van Ommeren et al. (2012) provides estimates of the average time spent cruising for parking in the Netherlands.

[2] The study by Kelly and Clinch (2009) only accounts for the parking fee and does not include the time search costs. Kobus et al. (2013) analyze parking in an area without cruising-caused time search costs.

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amounts of land that urban areas devote to parking. To a certain extent, the shortage stems from a lack of reliable data on parking regulation, supply, and demand. Very few cities devote resources to collecting useful data other than the total meter receipts or the total number of spaces. Notable exceptions include SFpark in San Francisco and the city of Santa Monica, both of which keep digital records of parking space utilization. Such data can be used to aid city officials when considering price changes or capacity expansions. But even with better city-wide data, it would still be challenging to empirically identify the economic impacts of prior changes to parking policy: cities usually raise rates and expand on-street parking in places that are already popular and congested. Because parking policy directly and indirectly affects many disparate groups of individuals, assessing its effects can prove difficult. But there is clearly more that researchers can say about designing sensible policies.

This paper examines the effect of increased parking meter fees on shopping behavior in nearby retail areas — a little studied but frequently debated topic.[3] Some argue that in crowded and congested areas, increased fees can generate parking space turnover, which benefits retailers and shoppers by increasing customer flow.[4] But business owners often object to increases in parking fees, fearing that higher fees will deter customers from visiting their stores during the times of day when parking spaces are freely available. So the ultimate effect of fees on retail sales is not immediately clear and it likely depends on the underlying demand for parking, which varies over time and across locations.

Consider the following outline of a parking model (developed more fully later in the paper), which illustrates two potential effects of fees on retailers. When parking is saturated (i.e., spaces are used at capacity), per-minute fees generate turnover, which in turn increases customer flow. But increased flow comes at the cost of reducing average shopping time per customer. If purchases increase at a decreasing rate with shopping time, the negative sales effect of shorter shopping times is more than offset by the increase in the number of customers, raising total retail sales. Thus, an increase in parking charges could actually help nearby retailers, which is a potentially surprising conclusion.

However, when parking is not saturated (i.e., empty parking spaces are freely available), the higher charges do not raise the availability of parking and thus do not increase customer flow. By reducing shopping time, higher charges reduce individual purchases and thus total retail sales. This negative effect is compounded when higher charges deter consumers from initiating shopping trips, amplifying the sales reduction.[5] Thus, the beneficial effect of parking charges for retailers under saturated conditions is likely to be reversed when parking is not saturated.

These opposing effects hinge importantly on the impact of higher parking charges on customer flow. The sales gain in the saturated case requires a turnover-induced increase in customers, while the loss in the non-saturated case is partly driven by a decline in customers.

The goal of this paper is to empirically test for these two opposing effects on customer flow using a unique observational data set and a quasi-experimental research design. The outcome of this analysis will help assess the effectiveness of conventional metered parking policy. But first, to help explain this paper's research design, imagine the following hypothetical experiment with the same empirical goal (i.e., estimating the causal effect of parking fees on customer flow). In the experiment, researchers would enforce parking fees during random time periods at a particular location. They would estimate the causal effect of the meters by comparing customer flow at the nearby stores across the different periods. Although the analysis would be straightforward, such an experiment would be costly and difficult to coordinate.

This paper implements a similar quasi-experimental research design that utilizes sharp temporal changes in parking meter enforcement. That is, most parking meters only require payment for a portion of the day, which is usually from an exact (yet arbitrary) time in the morning to an exact time in the evening. Each sharp change in enforcement delineates a free parking environment from a metered parking environment. If the unobserved determinants of shopping behavior were to be uncorrelated with time, one could simply estimate the meter's effect by comparing total customer flow during the two periods.

However, the unobserved determinants of shopping behavior are clearly correlated with time as individuals have idiosyncratic preferences. For example, work schedules may constrain individuals to shop during the lunch hour or in the evening. Simply comparing customer traffic between the two enforcement periods would confound the effect of the parking policy with a time preference for shopping. To avoid this problem, one could restrict the analysis to a very short time period surrounding the change in enforcement. Limiting the sample in this way helps disentangle the unobserved time-varying determinants of shopping behavior from the change in meter enforcement.

To implement this idea, the current study uses the regression discontinuity design to analyze a minute-by-minute measure of customer flow. The sample includes observations from short intervals before and after each change in parking meter enforcement. Across these short intervals, the unobserved determinants of shopping behavior should be similar such that observations immediately before the change in enforcement serve as a good control group for observations immediately after. Furthermore, if arriving customers do not have *precise* control over their arrival times, then assignment into a treatment group (fees in effect) and a control group (fees not in effect) is as good as random.

Using the regression discontinuity design in this context requires a fine-grained measure of customer flow, which is not publicly available. To overcome this obstacle, a set of observational data was collected at a popular and often crowded neighborhood in Southern California. This neighborhood contains a strip of retail establishments served by parking meters, which are enforced from 10:00 AM to 7:00 PM daily. The key observational measure is a per minute count of customers entering six retail establishments.

The regression results indicate that small per-minute parking fees can have a substantial effect on commerce. The 10:00 AM imposition of fees, which occurs at a non-saturated time, reduces customer traffic in accordance with expectations. At two separate coffee shops, a relatively small 50 cent per hour meter fee reduced customer flow by almost 30%. However, the 7:00 PM cessation of parking charges, which occurs during the saturated period, had almost no effect on customer traffic at two clothing stores and was associated with a small increase in traffic at a drug store. These findings are contrary to the expectation that a reduction in parking fees should result in a decrease in customer flow. Also, the regression discontinuity results are subject to one important caveat: the measured effect of fees on customer traffic should be interpreted as local effects that are specific to the observed neighborhood at specific times of day.

These negative findings do not support the argument that higher parking charges benefit retailers by increasing customer flow. The only way such an effect could occur is if the higher charges raise customer traffic under saturated conditions, and the evidence in this paper does not support such an impact. In sum,

[3] See for example "New L.A. parking laws cause unrest," *Los Angeles Times*, January 5, 2009.

[4] Shoup (2006).

[5] This effect may also be present in the saturated case, potentially overturning some of the above conclusions.