

Congestion Pricing & Its Equity Impact on Commuters in Portland, Oregon

When the population of an area grows, why is it that the roads get congested but the movie theaters don't? "Because you have to pay to see a movie," Paul Heyne, senior lecturer of Economics at the University of Washington answers, "If people could walk in free, I would predict a growing problem of theater congestion. Traffic is congested because road use is free." (Ramsey, 1999).

The potential of congestion pricing in alleviating traffic congestion is a hotly debated topic. Two ODOT researchers recently made a contribution to this debate by assessing the equity impacts of congestion pricing on Portland commuters using 1996 Oregon Population Survey data. Their research suggests that congestion pricing would mostly affect middle and high income commuters in Portland.

Introduction

According to economic theory, consumers will make economically efficient choices only if prices reflect the full marginal costs of the goods. Traffic congestion, economists argue, is a classic "tragedy of the commons" - the apparently free good is over-consumed, leading to harm to all (Hardin, 1968). When drivers fail to internalize the costs that they may be imposing on others, roadways tend to be overused leading to traffic congestion. By charging users a toll so that the total user fees reflect the scarcity of roadway capacity, the argument continues, traffic congestion would be reduced and social welfare would be increased. This concept is called congestion pricing.¹

As traffic congestion in the Portland Metro area is projected to increase significantly over the next twenty years (ODOT, 1998), congestion pricing becomes a promising solution to the problem. While congestion pricing promotes economic efficiency and as a result, makes society as a whole better off, it does not imply that the resulting benefits are distributed equally among consumers. Thus, one persistent criticism of congestion pricing is that the concept discriminates against the poor.

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Such criticism raises the issue of equity. If congestion pricing were implemented in the Portland area, would the benefits go to only a few affluent commuters who can afford to pay the tolls? Would congestion pricing disproportionately force out those who would not be able to pay the extra fees, as some critics claim? An empirical study by Svadlenak and Jones (1998)² sheds some light on the above concerns.

Empirical Study

Research Objective. Using data from the 1996 Oregon Population Survey, Svadlenak and Jones assess the equity impacts of congestion pricing on different Portland commuters by examining their socioeconomic characteristics and commuting habits. Based on the survey data of trips to work, commuters are classified into five categories: Single Occupancy Vehicle (SOV)-peak, SOV-off-peak, Carpool-peak, Carpool-off-peak, and All other modes (including transit). For the purpose of this study, peak hours are defined as between 4-6 p.m. and SOV commuters are those who travel to work alone in a car, truck or van. By focusing on congestion pricing impacts by income group, the paper offers insights on groups of commuters who are likely to bear the initial burden and their willingness-to-pay.

Household Income and Commuting Patterns. Assuming that household income has a strong influence on the perceived value of time, the authors first examine the income and occupational characteristics of employed people in the Portland area (Clackamas, Multnomah and Washington counties). An income index representing household income as a multiple of poverty level for a given household size is constructed in order to account for the influence of household size on relative affluence (i.e., a value of 1 indicates that household income is at the poverty level after being adjusted for household size.). To provide income and poverty comparisons between commuters of different groups, the

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Factor ^a	Model 1 Commuting by other modes ^b	Model 2 Commuting by SOV ^c	Model 3 Commuting during peak hours ^d
Income Index	Probability of commuting by other modes increases as income decreases	Probability of commuting by SOV increases as income increases	Excluded
Age	Probability of commuting by other modes increases as age increases	Excluded	Excluded
Gender	Excluded	Women are less likely to commute by SOV than men	Excluded
Occupation	Manual workers are less likely to choose other modes than owners, managers, and professionals	Clerical, sales and manual workers are more likely to commute by SOV than owners, managers, and professionals	Manual and service workers are less likely to commute during peak hours than owners, managers, and professionals

Table 1 - ^aFactors having a statistically significant ($p \leq 0.05$) influence on commuting pattern; ^bDependent variable: Other modes=1, SOV & Carpool=0; ^cDependent variable: SOV=1, Other modes & Carpool=0; ^dDependent variable: Peak=1, Off-peak=0, data for other modes excluded. *Source: Svadlenak and Jones (1998), Table 5.*

authors perform a series of statistical analyses on the income differences. Results indicate that SOV-peak commuters in Portland have a median household income index of **4.03**, which is **21** percent higher than that of all commuters in Portland. About 3.2% of SOV-peak commuters in Portland fall below the poverty level. In contrast, the poverty rate for off-peak carpoolers commuting in Portland is 9.9% - the highest among the five commuter groups.

Factors influencing commuting patterns. To sort out the factors contributing to the observed income disparity among commuter groups, the authors perform a series of logistic regressions to estimate the impact of income, age, gender, and occupation on the likelihood of commuting (1) by other modes, (2) by SOV, and (3) during peak hours (See above table). Results indicate that 1) higher income commuters tend to commute by SOV and lower income commuters tend to commute by other modes; 2) occupation is the only factor that has a statistically significant influence on commuting during peak hours.

Initial Impact. The following figure shows the estimated

distribution of Portland commuters in different income groups by employment status and commuting patterns. The distribution can be used to estimate the fraction of commuters in each income group who would be required to pay a toll to get to work under different pricing scenarios. For example, the percentages shown refer to those who commute by SOV in each income group during peak hours – a likely pricing scenario.

Conclusion

Based on data from the 1996 Oregon Population Survey, the study suggests that income influences the selection of travel mode while the time of travel is influenced by occupation. As a result, only about 3% of peak-hour SOV commuters are below poverty. Therefore, if congestion pricing is implemented at peak hours in Portland, it is likely that middle and high income commuters will pay the largest share. However, the authors also caution that compensatory programs for low-income road users, such as toll or transponder credits, may still be desirable as even a small percentage may amount to a lot of people.

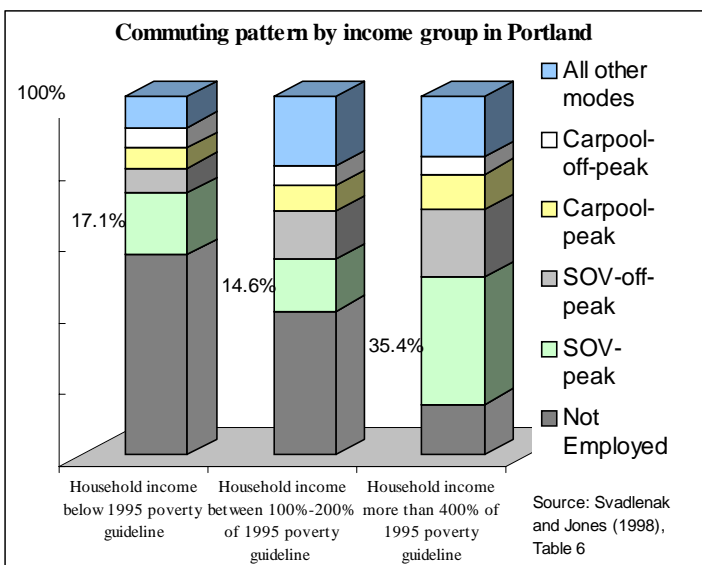


Figure 1

Endnotes

- ¹ For a succinct discussion on the congestion pricing theory, please see Dahl, David S. (April 1996), "Primer on congestion pricing," *Fedgazette*, Federal Reserve Bank of Minneapolis. <http://minneapolisfed.org/pubs/fedgaz/fg964c.html>
- ² Jack Svadlenak, John.R.Svadlenak@odot.state.or.us, is an economist in the Policy Section and Bernie Jones is manager of the Research Section, Bernie.P.Jones@odot.state.or.us. The article was published in *The Northwest Journal of Business and Economics*, an independent research journal.

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