COLLEGE OF URBAN AND PUBLIC AFFAIRS
School of Urban Studies and Planning
USP537 – Economics of Urban Transportation

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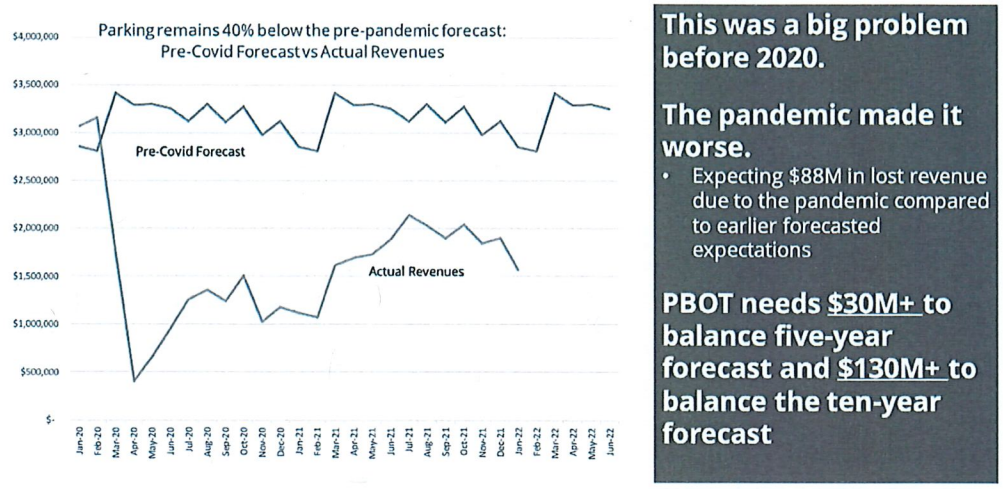
Winter 2024

KEY - Problem Set #1 (Due 02/07/2024 by 10a; hand in on paper at beginning of class; if you cannot attend that day, leave in my mailbox, Urban 350)

For full credit, please show your work!

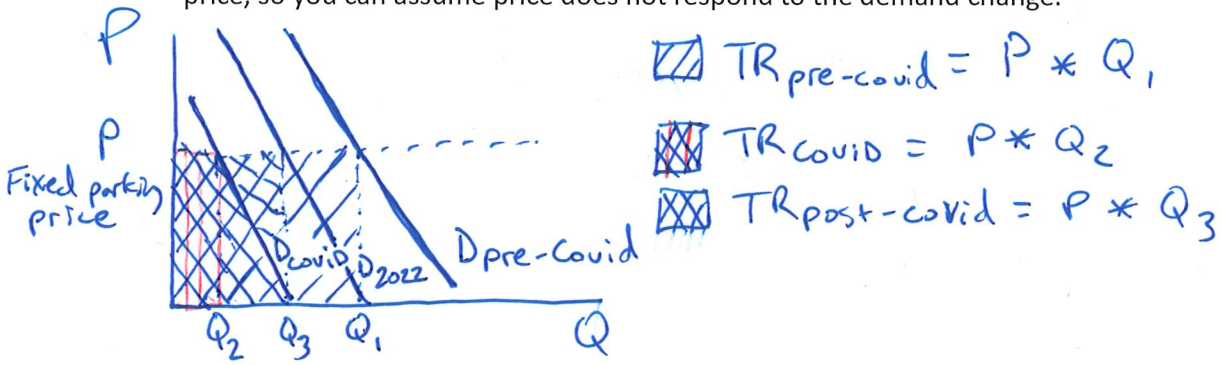
OUR CURRENT FINANCIAL PICTURE: PANDEMIC EXACERBATED CHALLENGES



1.

Portland, like other cities, saw significant decreases in downtown parking demand during the pandemic and after.

a. Sketch an (inverse) demand graph showing parking market equilibrium at 3 time points: pre-Covid 2020, Covid (April 2020), and post-Covid (2022). Also label revenue areas for pre- and post-Covid periods. The city sets the market price, so you can assume price does not respond to the demand change.

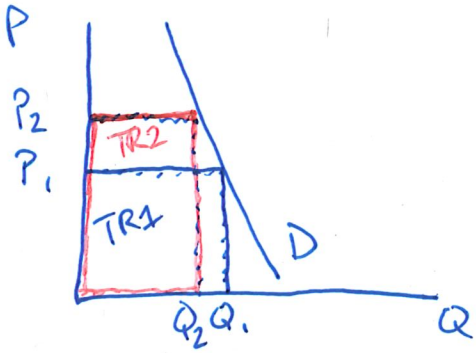


b. Briefly explain in words what your demand plots show.

Total revenue declined in proportion to ↑ demanded quantity since parking prices were fixed.

Demand for downtown parking shifted inwards substantially during Covid. This mainly reflected a shift in relative preferences away from downtown work and other destinations and toward working from home and online shopping and entertainment. By 2022, demand had shifted back to about half its original level.

c. In mid-2022, PBOT announced that it would be implementing two parking rate increases for a total of 60 cents. Sketch a demand graph showing the impact of the price increase, and very briefly describe the effect in words.



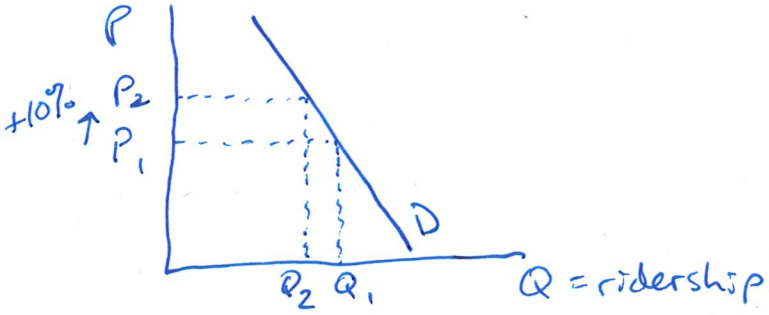
Downtown parking demand will decrease due to the price increase. Assuming an elasticity of -0.5 (Litman Table 25), % change in Q_D will be about half the % chg in P, and parking revenue will increase.

d. Choose any travel mode other than driving, and explain how the parking fee increase might impact the market for that mode. What key piece of economic information would we need to know *how much* the impact would be?

Transit; Public transit is a substitute for driving; therefore, demand for transit will increase due to the increased price of driving. How much depends on the cross-price elasticity of transit demand with respect to auto cost.

2. To offset rising costs, Portland's transit agency TriMet wants to *increase* fares by 10%. They expect no changes in transit demand. Assume the short-run price elasticity of demand is equal to 0.3 (close to the Simpson-Curtin rule value of 1/3).

a. Sketch and label a simple (inverse) demand curve that clearly shows the impact of the fare change before and after.



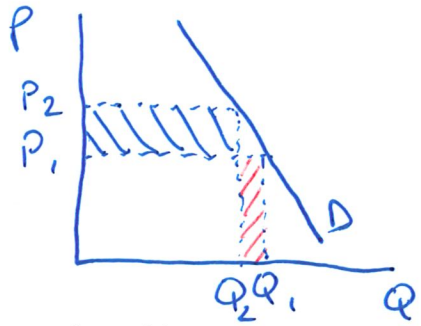
b. Calculate the expected percentage ridership change due to the fare increase.

$\%\text{ chg } Q_D = \%\text{ chg } P * E_d$

$\%\text{ chg } Q_D = 10\% * -0.3$ [Note: price elasticity always negative]

$\boxed{\%\text{ chg } Q_D = -3\%}$

c. Re-sketch your graph from (a) to also show the change in total fare revenue before and after the fare increase.



Revenue increase due to price effect

Revenue decrease due to quantity effect

d. Will TriMet's total fare revenue increase or decrease after the change? How do you know (note: "the revenue looks bigger on the graph" is not sufficient 😉)?

Increase in revenue due to a price increase with inelastic demand ($\varepsilon_d = 0.3$)

e. Using the shortcut method, calculate the expected percentage change in total revenue for TriMet. Be sure to include the direction of the change.

$$\%\text{ chg } TR = \%\text{ chg } P + \%\text{ chg } Q$$
$$\%\text{ chg } TR = 10\% + (-3\%)$$
$$\%\text{ chg } TR = 7\%\text{ increase}$$

f. Would you expect the long-run price elasticity of demand for public transit to be larger or smaller? Explain why.

Larger (more elastic) as transit riders take price increase into account when making other decisions: where to live, purchase car or bike, where to work, and so on.

g. Based on (f), briefly describe (no need for numbers, just in relative terms) how the long-run impacts of the fare change would compare to the short run impacts for: change in ridership and change in total revenue. Assume no changes to long-run transit demand.

Ridership in longer term would decrease by more than 3%, all else equal, reflecting increased elasticity / greater flexibility. Revenue would increase by less than 7% in longer run, and could even decrease if elasticity exceeded 1.

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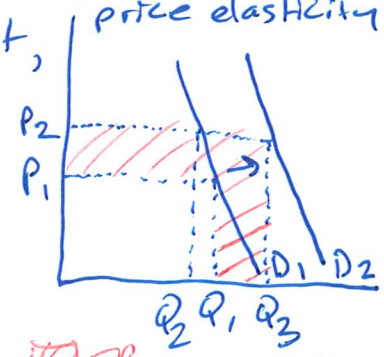
3. Just as TriMet announces the fare increase from (2) above, the City of Portland announces they've partnered with an e-scooter provider to provide free scooter rides for everyone. Using the concept of related goods, choose <u>one</u> side of the debate and explain why and how the free scooters would likely alter the results from (2) in terms of short-run ridership and revenue impacts. Use at least one graph sketch, and be sure to frame your answer within the economic demand framework.

[Note: either option below is sufficient]

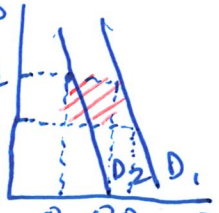
If... Scooter share <u>complements</u> transit, transit demand would increase due to a decrease in price for a complementary related good. TR increase would be greater. Q_D would be closer to or even exceed Q_1.

Note: Both results depend on cross-price elasticity.



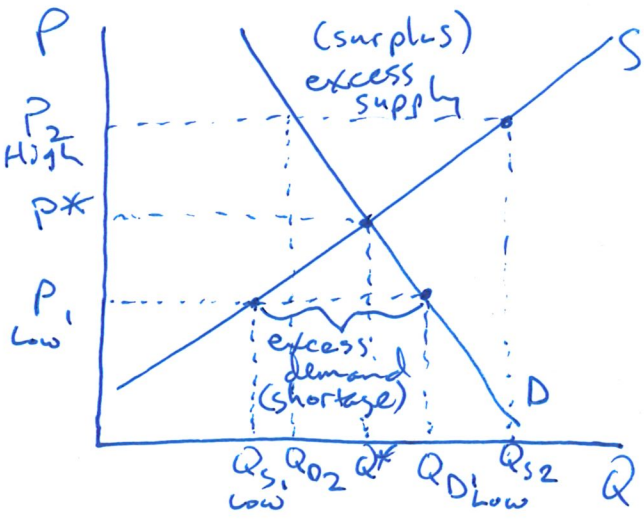
TR increase

If scooter share <u>substitutes</u> for transit, transit demand would decrease due to a decrease in price for a competing good. TR increase would be smaller, perhaps even negative. Q_D would decline more than $Q_1 \rightarrow Q_2$.



TR reduction due to scooter share

4. As pandemic restrictions ease and downtown Portland office workers begin returning to work in larger numbers, private parking lot owners will have to guess at what price drivers would be willing to pay. Explain with a graphical sketch and in words how price signals and market corrections would lead to a new equilibrium price, even if the owners guessed wrong initially. Assume the private market for downtown parking is competitive and does not exhibit returns to scale. Ignore the impact of public parking.



If parking lot owners initially set a price of P_1, lots would be filled. This would send a signal to raise the price. Higher prices reduce Q_D & lure additional owners to open their lots, increasing Q_S. Lots are too empty, leading to price reductions increasing Q_D & decreasing Q_S until we reach P^* and Q^* the short-run equilibrium where MB (marginal benefit) = MC (marginal cost)