

Issue Paper #1 Transportation Pricing Options and Approaches

January 2002

Background

Metropolitan regions throughout the United States face the converging challenges of providing for the basic mobility needs of their residents while also attempting to manage growth in personal vehicle travel. Limited public financial capacity for transportation infrastructure investment has encouraged transportation professionals and regional policy makers to begin discussing the potential benefits associated with reforming the way we pay for, and finance, transportation.

The discussion of transportation pricing/finance reform in the central Puget Sound region of Washington State was initiated by policies contained in the regional transportation plan. As a first step, the Puget Sound Regional Council (PSRC) created a Transportation Pricing Task Force in 1995 to carrying out the policy directives. The Task Force was comprised of local elected officials, transportation professionals, area business representatives, and environmental and public interest group advocates.

The Task Force's mission was to educate and inform, and provide public and elected officials with a framework for discussion and problem solving. The research effort, of which this issue paper is a part, analyzed options for reforming transportation finance, through the introduction of more market-oriented finance tools, to better ensure that public revenues are adequate to maintain, preserve and improve the region's transportation system, and to better balance transportation supply with demand.

Transportation Pricing Types

Transportation pricing is a broad terminology that refers to charges levied in exchange for transportation services (access to infrastructure, a seat on a bus, etc). These

charges are distinct from general taxes that have a loose or non-existent relationship with a specific, identifiable service, with a unique value, for a particular customer. Since prices are also finance instruments, they can stand in contrast to, or comparison with, other types of public financing strategies. Prices are complex signifiers that have multiple roles in governing the efficient exchange of valuable resources in highly structured market environments. Below are described a number of common price-type instruments commonly associated with the provision of personal transportation infrastructure and services.

License Fees, Registration Charges, and Taxes on the Value of Vehicles

These types of fees are not really a price at all, since there is no direct relationship between the fee and a service provided. Instead these are taxes that may or may not be dedicated to transportation purposes. Fees typically do not relate to the highly variable costs that users of the transportation system impose on the infrastructure, government services or each other.

License and registration fees are commonly applied. In the U.S. fees are usually modest and often cover administration, records and enforcement functions. In other parts of the world general fees may be quite large and may serve multiple purposes including: restricting auto imports, purchases, registrations, and supporting general government expenditures

Fuel Taxes

Arguably fuel taxes are not a price mechanism since they are taxes on fuel consumption and not a price charged for access to a particular good or service rendered. Fuel taxes are however, reasonably tied to use of roadway infrastructure. Fuel taxes could be

considered an average cost pricing instrument that does not differentiate between various cost inducing circumstances, all use is charged the same.

Fuel taxes are commonly applied. In the U.S. there are both federal and state fuel taxes which typically do not cover all direct transportation expenditures, although may burden users in a disproportional manner relative to the costs they impose. In other parts of the world (Europe, Asia) fuel taxes may generate revenues larger than total direct transportation related government expenditures.

Transit Fares

These are fares collected as payment for transit services provided. A price in the strictest sense of the word, but not a priced based on marginal costs. Transit fares are typically average cost prices (averaged below full operational cost recovery), although higher peak charges offer some increased efficiency in pricing. Transit fares are usually not intended as a rationing instrument, but rather are set to support operations. Fare policies often strive to balance cost recovery issues with equity issues, providing some price bargains to certain types of users. Transit fares rarely reflect the delay costs that users impose on other customers, and therefor result in some distortion of user behavior.

Transit fares are common everywhere, their application, and the degree to which they are "efficient" fares, varies widely based on local conditions.

Ferry Tariffs

Ferry tariffs function much like transit fares. Many ferry routes have only an origin and destination, limiting delay induced by users to queues for boardings and eliminating delay caused by demand for interim stops.

Like transit fares, ferry tariffs are applied in a number of ways, and based on local conditions. Recently, in Washington State, ferry tariffs have been restructured to cover a higher percentage of operating expenses system-wide, but not on a route-by-route basis. Ferry tariffs are higher during the peak travel season but not during peak travel times of the day. For the most part, principle of marginal cost pricing are not applied to the setting of ferry tariffs.

Parking Pricing

In densely built urban environments, where land availability is limited and there is competition for its use, there is often a private market for the renting and

leasing of surface and structured parking. There has also been a long history of municipal metering of on-street parking space to ration its use among residents and visitors of downtown. Distinct from these examples, are targeted policies that aim to increase, or manage, fees for parking by public agencies to achieve some other policy objective, such as reduce auto use or alleviate congestion on urban roadways.

Parking taxes and limitations on parking capacity have been instituted in a number of US locations. In contrast to their implications, the available research is mixed concerning the long-term benefits of these strategies in practical settings. The difficulty with these approaches is twofold. First, it has been difficult to implement truly region wide parking charges, since much business parking is on the private property of companies who provide parking for their employees. Consequently, parking taxes and restrictions have been selective, and have caused workers and companies to avoid areas where restrictions are in place. Ironically, therefore, parking policy may accelerate the decline of centrally located workplaces, further increasing the dependency on the automobile. The second difficulty is that it has been difficult to avoid affecting retailing and other auto-oriented uses in areas with high parking charges. The result has been that there must be sharp distinctions between long-term (commute) and short-term (shopping) parking pricing structures. This distinction is hard to enforce in practice, and results in long-term parkers "moving" their vehicles among short-term spaces, increasing midday downtown congestion.

Toll Road and Bridge Financing

Tolls are most commonly used as a means to pay for a particular piece of infrastructure. The tolls levied on the infrastructure go to paying the financing costs of building, and sometimes operating, the facility. Tolls are usually an average cost, or constant rate price, for access to a service that may or may not have constant service characteristics. A toll facility that is never congested has more or less constant service characteristics, and if privately provided, a cost recovery toll will often solely determine who chooses to access the facility.

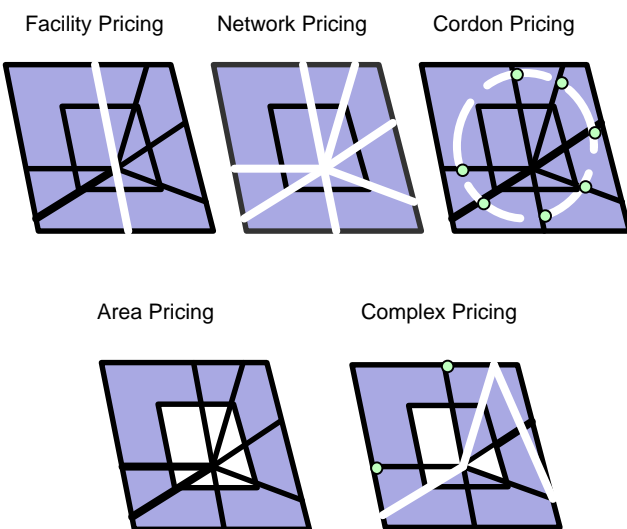
Although a common approach to infrastructure financing through out the world and the U.S., there are no current examples of toll facility financing in Washington State. Toll financing has been applied in Washington State in the past and is being utilized as a financing tool for a second Tacoma Narrows Bridge on SR 16.

Cordon Tolls and Area Road Pricing

Cordon tolls and area road pricing programs have been employed for multiple purposes, to finance investment in transportation infrastructure and services and to manage access to a highly congested urban environment. Cordon tolls levy a charge on access to a particular location, area pricing may involve the selling of licenses allowing access to an area, or may employ a distance or time based price within a certain defined geography. Where area pricing programs are in effect (Singapore), or being considered (Italy, UK, Hong Kong) highly congested urban conditions are the primary driving force for implementation. In these environments it is generally agreed that major new roadway capacity cannot be provided due to financial, or other, constraints. In these cases area pricing manages auto access to the area while helping to finance alternatives to auto-mobility. Area pricing programs may utilize constant charges or charges that vary by time of day, day of the week, the type of users, or other factors considered relevant. Increased variability of charges may improve the relative efficiency of the program.

In total an uncommon practice. Area prices have been in application in downtown Singapore since 1975. The program started as a paper license based program that evolved to electronic tolling with prices that vary by time of day. The city of London is planning to implement area pricing within Inner London and other locations in the UK (Edinburgh), Italy (Genoa, Venice) and Hong Kong have evaluated proposals.

Figure 1. Types of Roadway Pricing



Congestion Prices

Congestion pricing involves variable charges for access to infrastructure or geography. The economic rationale for congestion charges is based on principles of marginal cost pricing. Without congestion prices users of congested facilities impose delay costs on other users, yet the access (money) costs for the facility remain the same. Congestion prices reflect the capacity burdening costs of accessing the facility at the time that access is secured. Facilities that are congested during certain times of the day do not offer a single service but rather various types of service depending on the degree that congestion degrades performance. Congestion pricing safeguards a constant service characteristic while varying the charge for access to reflect relative demand for access. Capacity burdening costs also relate directly to new infrastructure financing since it is peak period capacity constraints that drive the demand for investment.

Congestion charges are in application in the area pricing program in Singapore, and on a number of specific roadway facilities in the U.S. and abroad. Peak charges for transit services are also examples of congestion pricing. Congestion charges may vary infrequently and in small increments or may be more complex and vary dynamically with actual roadway conditions. Some examples of variable pricing on roadway infrastructure include: the A1 and A14 roadways in France, toll rings around the cities of Bergen and Trondheim, Highway 407 in Toronto, I-15 and SR-91 in California, the I-10 (Katy Freeway) in Houston, the Cape Coral and Midpoint Bridges in Florida, the New Jersey Turnpike Authority roads and the Port Authority of New York and New Jersey crossings, the Dulles Greenway in Virginia, the Namsan #1 and #3 Tunnels in Korea, and the Tappan Zee Bridge in New York.

Privately Provided Transportation Services

Needless to say there are numerous privately provided transportation services. Where working markets exist, transactions costs are low, and competition thrives, prices for these services are predominantly based on market interactions of supply and demand (marginal costs). The examples of taxi and airline services both usually involve some structured government regulations that establish property rights (restrict entry, regulate safety, etc.), or prevent solitary control of the market. Deregulation of the airline industry has led to transformations in ticket pricing that more closely reflect the marginal costs of purchasing a particular unit of

airplane passenger capacity (a seat) on a particular flight, at a particular point in time.

In many urban areas (Bangkok, Honk Kong, Manila, Jakarta, Mexico City, Sao Paulo, Delhi, and others) a large variety of privately provided transit services are available that meet a number of different consumer purposes and needs. These include: jitneys, private van taxis, pedicabs, motorcycle taxis, horse and hand carts for personal and small business goods transport. These examples point out that many other models of service provision are possible, other than the publicly provided transport services that are commonly found in urbanized areas in the U.S.

Regional Policy Guidance on Transportation Pricing

The central Puget Sound region has spent considerable effort evaluating transportation pricing as a means to achieving stated policy objectives contained in its Metropolitan Transportation Plan. Through the efforts of the Transportation Pricing Task Force an analytical evaluation of pricing alternatives was conducted which led to the development of a number of research findings and recommendations. In summary the Task Force concluded that a transportation financing structure based on use, especially in the form of variable roadway charging, can provide significant benefits to society. It is possible to devise a pricing system to:

- maximize vehicle throughput on priced transportation facilities;
- minimize delay along otherwise congested corridors;
- raise substantial revenues for reinvestment in the transportation system;
- help achieve environmental objectives resulting from reduced delay and automobile usage;
- improve the fairness and predictability of transportation finance.

Our current finance and pricing structures do not reflect actual costs and benefits. The region's objectives are to have transportation prices better balance transportation supply and demand, much as prices do in most other areas of our economic lives. Reforms to the transportation finance structure, whether systematic or small-scale tests and programs should reflect this underlying principle. Ultimately, pricing and finance reform programs or proposals should be designed and evaluated under the principles adopted by the Transportation Pricing Task Force and outlined in a technical paper within this series.

The Pricing Task Force recommendations relate to continuing the public dialogue, improving analytical tools, developing a demonstration project, and pursuing broad educational and outreach objectives. The recommendations provide some guidance on how to move forward in thinking about pricing in relation to the financing of new transportation investments, as well as in relation to aiding the maintenance, preservation, and management of existing infrastructure.

The first step in this process is to strive to have user fees largely cover the costs of maintaining and preserving existing infrastructure. In many respects, after the loss of MVET funds, this is the case for most Washington State roadway expenditures, and is increasingly so for the State Ferry System.

The second step in this process addresses the question, how should major new projects be financed and managed. A marginal cost approach to paying for new infrastructure is in effect toll financing, where tolls vary by roadway conditions so that the costs of congestion, and possibly other external cost factors, are incorporated into a pricing strategy (capacity burdening costs relate directly to infrastructure financing since it is peak period capacity constraints that drive the demand for new investment). Users of the infrastructure who do not burden capacity experience reduced tolls or no tolls at all.

The third element in the Pricing Task Force recommendation recognizes that, eventually, marginal cost pricing may become a broader management strategy, which could apply to facilities other than new construction or major improvements. This type of approach has been the focus of a number of policy efforts in Europe and Asia where they have concluded that a very limited number of new road projects will be built and aggressive management is one of the only tools available to improve auto-mobility. It is generally agreed that this region is not at the stage where the broad use of pricing as a total system management strategy is a near term option.

The relationship between marginal cost pricing, infrastructure management, and capacity investments has been extensively explored in the economic and engineering literature. These relationships are not reviewed here but are treated in other issue and technical papers in this series. Facility self-financing through marginal cost pricing is possible under particular circumstances, specifically where all travel alternatives are priced at the marginal cost. In these situations self-financing through marginal cost pricing is in effect a benefit-cost test; projects that cannot be self-

financed are not considered cost-beneficial but may indeed be built for other reasons.

In the real world, it is generally agreed that within the foreseeable future only new infrastructure, or improved infrastructure, will be candidate for marginal cost pricing. This argues that it is unlikely that pricing access to infrastructure, at marginal cost, will yield revenues sufficient to pay for the project under foreseeable capital financing approaches. In short, even if marginal cost based pricing were implemented, in select corridors, it would be necessary to secure other types of project financing as well. This being said, marginal cost pricing is still the appropriate price management strategy to consider for application to public projects. While private sector financing would require complete cost recovery and some return on investment, public sector management allows for the achievement of greater public good through the implementation of selective, efficient pricing, which is the recommendation of the Pricing Task Force. Marginal cost pricing applied on a select corridor, or corridors, would differ from traditional tolls in that there would be periods of the day during which tolls would be reduced or eliminated. Driver response would spread traffic over a greater portion of the day, and many drivers would be given an option to avoid tolls during off peak periods, improving consumer welfare over traditional tolling situations.

It is useful to examine a sample set of circumstances. A new bridge is being built. Analysis suggests that users would be willing to pay a toll that would cover finance of the construction over a 30-year period. Analysis also suggests that tolls based on marginal costs (primarily the capacity burdening charge/congestion charge) would not fully cover the financing of the bridge. Let us assume that it would take 50 years to pay off the bonds instead of 30 years. The bridge is built based on the notion that benefits exceed costs, but what price point should be employed? It can be demonstrated that a price based on marginal costs (toll varies by level of congestion) yields the greatest benefit to society. The cost recovery toll results in underutilization of the infrastructure during large periods of the day and may still result in excess demand during peak travel periods.

The particular circumstances that surround the corridor implementation of marginal cost pricing preclude the ability to pre-answer many of the particular design, reinvestment, management questions that have been raised around specific projects. Marginal cost pricing by definition varies by circumstances, but consistently responds to the particular demand characteristics encountered. Traffic diversion, equity and privacy concerns, the need for additional travel alternative and

a host of other considerations are recognized in the findings of the Pricing Task Force, but are appropriately addressed as part of a specific intended application.

In summary, the work of the Transportation Pricing Task Force provides some guidance for approaching pricing at the facility, or corridor level. The implementation of pricing will largely be the result of needing finance tools that can also improve facility performance and improve financing equity for particular projects. This will only happen one corridor at a time for the foreseeable future. There may be circumstances where this approach makes no sense at all, and there may be circumstances where little else makes sense. At the regional level, the Regional Council is committed to attempting to improve the analytical tools available for analyzing the potential benefits of this approach, and to developing a demonstration project which can help to provide greater understanding of the program and facility design issues that have been raised in the context of specific corridor studies.

This paper is part of a series produced by the Puget Sound Regional Council. Research and analysis for this paper series was conducted under guidance from the Transportation Pricing Task Force, an ad hoc committee of elected, business, and civic representatives. Dr. Randall Pozdena, and the consulting firm ECONorthwest, provided technical assistance. For additional papers in this series, or more information contact:

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