[This is my section of a 3-person project on value pricing. This section, Section 2, is a review of various value pricing implementation. Section 1 was an introduction and Section 3 was a proposed implementation.]

Value pricing case studies

S. Sabina Wolfson

In this section I will broadly review the state of value pricing internationally and nationally. The first area-wide value pricing scheme in the world began in 1975 in Singapore.[1] However, Asia is so different than the U.S., and the value pricing schemes generally so severe, that the likelihood of anything similar being implemented in the U.S. seems miniscule. Thus, all I will say about Asia is that the scheme in Singapore has been successful and continues (in modified and expanded format) to the preset day. I will start below by discussing cases in Europe, Australia, and Canada. Then I will turn to (and emphasize) cases in the U.S.

Keep in mind that the most-discussed current example of value pricing – that in London – seemed radical and unlikely just a few years ago. The future continues to be extraordinarily hard to predict. It is possible that extensive public outreach/education can make "radical" value pricing schemes more acceptable. Further, while many people do not have favorable attitudes towards value pricing at the outset, after living with value pricing, attitudes become more positive since the benefits of value pricing become apparent.

Value pricing case studies: *Europe*

A number of European cities utilize area-wide value pricing, and there is some momentum behind expanding the use of value pricing in Europe.[2] (There are also single-corridor/facility pricing schemes in Europe, but those are not discussed here since cases in Australia and North America are discussed later.)

London (England).[3] In February 2003, London's mayor (Ken Livingstone) established a 22-sq/km "congestion charging" zone in the city center. The congestion charge was made more

acceptable to the public through extensive public outreach. (Currently, the majority of people surveyed say congestion charging has benefited or made no difference). Also, a great deal of solid research was done before implementation and continues to the present. There is a charge of £5 a day to drive within the zone during the day on weekdays (the charge also applies to parking on public roads within the zone[4]). There are numerous exemptions including a 90% discount for residents of the zone, a 100% discount for taxis, and so on.

There has been a 30% reduction in congestion in the zone, resulting in increased traffic speeds. This results in busses (and private vehicles) moving substantially faster and being more reliable. As was promised by the government, the number of busses was increased substantially as the charge was introduced. There has been a 30% increase in bus ridership. Revenue generated from the charge (about £80 million last year) is used in part to improve public transit. There has also been a decrease in pollution from traffic (about a 10% reduction) and economic impacts on businesses within the zone appear to be minimal.

(Note that London was not the first location the U.K. to implement city center congestion charging. Under the U.K.'s Transport Act of 2000, Durham was the first city to implement such charges in 2002.[5] The scheme is much smaller and simpler than that in London.)

Norway.[6] Norway has four area-wide value pricing schemes – referred to as "ring tolls" – in Bergen, Oslo, Stavanger, and Trondheim. The Bergen implementation began in 1986, making it the second oldest area-wide pricing scheme in the world.

The Trondheim scheme (started in 1991, population 150,000) is more elaborate than the others. This scheme has toll rates that vary by time of day (not just peak versus off-peak) and type of vehicle (heavy commercial vehicles are charged double). A toll is assessed each time a vehicle crosses the ring (with some exceptions). The toll has reduced peak hour traffic 10% while

providing revenue to improve roads and transit. Of particular interest is the fact that public opinion in Trondheim was initially rather negative (72% opposed), but quickly became more positive (after two months 48% opposed), and continues to improve (36% opposed in 1996).

Rome (Italy).[7] Rome implemented area-wide value pricing in 2002. Drivers are charged to enter the central business district during the day on weekdays. The stated aim was to increase the public transit modal split. There has been a 20% decrease in traffic and a 6% increase in public transit usage. (Rome also has a Limited Traffic Zone, established in 1988.)

Stockholm (Sweden).[8] Stockholm is implementing area-wide value pricing. One of the stated aims is to reduce peak hour congestion. Some technology issues have arisen which have slowed the implementation (set to open 2005). This delay might be a problem since a public referendum date has been set (in 2006) for citizens to vote on keeping the scheme, and there might not be much time for testing and accepting the scheme before the referendum date arrives.

Value pricing case studies: *Australia & Canada*

To my knowledge there are no area-wide schemes in Australia or Canada (nor are there any in the U.S.). However, there are many single-corridors with charges (generic toll roads). The examples of interest here are those that involve advanced technology and variable pricing.

Melbourne (Australia).[9] Melbourne has a 22 km long toll highway called CityLink. This is a fully electronic scheme using overhead gantries (to collect cashless tolls) with about 700,000 transactions per day. There are 3 different pricing levels based on vehicle type. Drivers can purchase daylong passes or pay-per-trip (based on entrance and exit locations). The toll is reduced for commercial vehicles during nighttime hours (8pm to 6am).

Toronto (Canada).[10] Toronto has a 108 km long (fully electronic) toll highway, the 407 Express Toll Route. Tolls are based on the time of day (peak versus off-peak), distance traveled,

and type of vehicle. Vehicles without transponders are charged a steep surcharge. Of interest, this facility was built by the government and later sold at a profit to a private group.

Value pricing case studies: *United States*

Value pricing implementations exist in the U.S. and there is some government support – in the form of the Federal Highway Administration's (FHA) *Value Pricing Pilot Program*[11] – for increasing the use of value pricing. The FHA program includes awards in 16 different states. The types of schemes being considered under the program span the whole range of value pricing techniques. The program is "aimed at learning the potential of different value pricing approaches for reducing congestion." A worthy aim.

HOT (high occupancy toll) lanes. In the U.S., HOT lanes are a (relatively) common value pricing scheme. Such lanes generate revenue and increase throughput by charging SOVs (single occupancy vehicles) to use low-congestion lanes; HOVs (high occupancy vehicles) use the low-congestion lanes for free or a reduced charge. (This utilizes capacity better by operating at efficient levels of congestion.) The (relative) acceptability of HOT lanes is likely due to a combination of: (1) the existence of many HOV lanes that can be "easily" converted to HOT lanes, (2) the capitalistic mentality of most Americans, (3) the already-established notion of paying for a premium service (trains, planes, hotels, etc.), (4) the limited nature of HOT lanes compared to area-wide schemes[12], and (5) technology improvements allowing for barrier-less electronic toll collection.

It can be difficult to implement HOT lanes (in the political sense), but, after being established, HOT lanes are generally valued by motorists, including those motorists that do *not* use the HOT lanes.[13] Two existing HOT lane implementations are discussed below. Other implementations exist and schemes are under consideration in many different locations.[14]

HOT lanes: Orange County (California) State Route 91.[15] The oldest implementation of "dynamic" road pricing in the U.S. – operating since 1995 – is along Orange County's SR-91. The 91X Express Lanes, built using private funds, are four HOT lanes (two in each direction, 10-miles in extent) in the median of the freeway. Tolls are collected via overhead readers communicating with windshield-mounted transponders. Since these lanes added additional capacity, it is not surprising that congestion was reduced on the other lanes of SR-91 and traffic volumes on parallel freeways did not increase. Tolls vary based on time-of-day and day-of-week from $1.00 to $4.75. (There is a published schedule of the 16 different toll levels. Market research indicated that users preferred predictable tolls rather than true dynamic tolls.) Most commuters do not use the toll lanes on a daily basis, but, rather, when they have a particular reason. In terms of equity, users do tend to be from higher income groups, however gender is a more important variable than income in predicting usage (female commuters use the lanes more).

HOT lanes: San Diego (California) Interstate 15.[16] San Diego's I-15 has two (reversible) HOT lanes (8-miles in extent) that were previously HOV lanes. As of 1998 this implementation includes dynamic toll prices based on real-time congestion levels. (Prior to this a monthly fee was charged for SOV use of the lanes.) The throughput of I-15 has increased through better utilization of existing capacity. Tolls generally vary between $0.50 and $4.00 (though can go up to $8.00), and HOVs can use the lanes for free. The current toll (adjusted to keep service at LOS C or better) is posted on electronic message signs. Tolls are collected like they are on the 91X Express Lanes. New express bus service has been introduced as part of the scheme, utilizing some of the $1.2 million per year generated from the tolls.

FAIR (fast and intertwined regular) lanes. FAIR lanes are like HOT lanes (drivers pay to use low-congestion lanes) except that the users of the other (high-congestion) lanes are

compensated. There are implementation issues with FAIR lanes (for example, to be fair, all drivers need transponders), yet such lanes are under consideration in a few locations.[17] Current research (with focus groups) indicates that road users are quite taken with the notion of "getting something for nothing" – that is – for being compensated for using the "regular" (high-congestion) lanes rather than the "fast" (low-congestion) lanes.[18] This might make FAIR lanes more politically acceptable than HOT lanes in some cases. (Interestingly, the level of compensation for using the regular lanes is quite elastic – both 25% and 50% are seen as reasonable amounts). Overall, as with HOT lanes, the fact that the lanes increase drivers' choices is viewed positively.

Usage-based vehicle charges. The notion of usage-based vehicle charges is to pass along costs to drivers based on actual usage.[19] I know of no existing area-wide usage-based vehicle charge scheme, but a few locations are considering such charges.[20] (Note, however, that there are existing car-sharing programs which can be though to broadly fall under this category.[21])

A usage-based vehicle charge pilot project was conducted in 1998 by the Progressive Insurance Company in Houston (Texas).[22] In general, most vehicle costs are fixed (about 70%) so there is little incentive to reduce usage (since savings will be minimal due to the high proportion of fixed costs). One of the fixed costs is car insurance. In this pilot project, insurance was split into variable and fixed components. GPS technology was used to track time, speed, and location to calculate the variable cost based on actual usage.[23] Participants in this pilot project reduced their mileage by 13%, presumably due to this variable cost.

Value pricing case studies: *New York Region*

Tappan Zee Bridge. On the Tappan Zee Bridge in Westchester County, trucks are charged a double toll during peak hours.[24] Studies of this bridge suggest that variable pricing for all vehicles could shift about 10% of the traffic to off-peak hours.[25]

Hudson River crossings.[26] The Port Authority of New York and New Jersey has implemented variable tolls for the Hudson River bridge and tunnel crossings, charging passenger vehicles with E-ZPass $4 during off-peak and $5 during peak hours (cash tolls are $6 at all times). The morning peak traffic has reduced by 7% and the evening peak traffic has reduced by 4%.[27] Note that, for these crossings, peak hours are the typical weekday commuting hours *and* weekends from noon to 8pm; value pricing can be used at any time-of-day and day-of-week that has congestion, not just regular commuting hours. Trucks are charged more than passenger vehicles during all hours but pay less off-peak and even less during "overnight hours".

New Jersey Turnpike.[28] The New Jersey Turnpike Authority charges passenger vehicles with E-ZPass less during off-peak than peak hours (cash tolls are greater and have no off-peak discount). While the traffic continues to grow, growth is faster in the off-peak hours than during the peak hours.[29] Commercial vehicles pay more than passenger vehicles during all hours. (The Garden State Parkway charges a peak-period surcharge, but it is so small as to be meaningless.[30])

Value pricing case studies: *What does the situation worldwide tell us?*

Clearly the technology exists for implementing many different types of value pricing. In addition, value pricing has the ability to reduce congestion and increase throughput while generating revenue. The hindrance to implementation is a lack of political will and citizen understanding. This is not just the case in the U.S. A congestion charging referendum in Edinburgh (Scotland) just returned a 75% negative vote in 2005.[31] Hong Kong tried in 1983 and again in 1997 to implement area-wide value pricing but it was found to be "politically unworkable".[32] Political difficulties surround the HOT lanes along Orange County's SR-91 (regarding a strict "noncompete clause") and the lanes might be purchased by the government from the private owner.[33] The Australian government just "ruled out" replacing fuel tax with a

usage-based distance fee.[34] And so on. New York City has talked about value pricing for years, but nothing has actually happened. It is unlikely that value pricing can take place without a strong political champion (such as London has in Ken Livingstone) and public education.

As a final note, it is important to remember that schemes seem to become more popular (or at least less *un*popular) over time. In one sense this is actually a good thing: Value pricing coupled with improved transit should make travel easier, so, once an implementation is in place, the benefits of it should become apparent, making it more popular. In another sense this makes implementing value pricing difficult: It is hard to gain support prior to implementation. Thus, again, the political will is needed to push through value pricing, to actually get it implemented, so that the benefits can be felt.

---

[1] See Chapter 6, *The Transit Metropolis*, Robert Cervero, 1998. See also pages 14-6 to 14-10, TCRP Report 95: *Road Value Pricing*.

[2] There is currently a coordinated set of European projects involving various value pricing schemes – some aimed at implementation and some aimed at collecting data through test projects and simulations – in Bristol (United Kingdom), Copenhagen (Denmark), Edinburgh (Scotland), Genoa (Italy), Gothenburg (Sweden), Helsinki (Finland), Rome (Italy), and Trondheim (Norway). The stated aim is "to demonstrate and evaluate the effectiveness and acceptance of integrated urban transport pricing schemes to achieve transport goals and raise revenue". See www.progress-project.org.

[3] See the excellent Transportation for London site www.tfl.gov.uk. See also pages 14-12 to 14-13, TCRP Report 95: *Road Value Pricing*. See also a nice comparison of London to New York City – there are many similarities – in Table 3 of the Regional Plan Association's *An Exploration of Motor Vehicle Congestion Pricing in New York*.

[4] The price of parking is always important to consider. Vukan Vuchic (*Transportation for Livable Cities*, 1999, page 77) states this succinctly: *"free parking" is a major – often the most important – factor in the encouragement of car commuting*.

[5] See www.cyberium.co.uk. See also Page 14-6, TCRP Report 95: *Road Value Pricing*.

[6] See Transport for London *Congestion Charging Fact Sheets*. See also page 14-11 to 14-12, TCRP Report 95: *Road Value Pricing*.

[7] See FHA's *Value Pricing Notes*, Winter 2002.

[8] See *Stockholm congestion toll put on hold – IBM to stop work*, Toll Roads News, 2005.

[9] See www.citylink.com.au. See also www.roadtraffic-technology.com.

[10] See www.407etr.com. See also pages 14-14 to 14-15, TCRP Report 95: *Road Value Pricing*.

[11] See FHA's *Value Pricing Pilot Program* at www.fhwa.dot.gov.

[12] Attitude surveys show that HOT lanes have about twice the initial support of area-wide schemes. But area-wide schemes are being considered in some locations such as Ft. Myers Beach (Florida) and San Francisco (California). See *Toll to drive downtown?*, San Francisco Examiner, 15 February 2005. See also the Reason Foundation's *Funding Roads with Pricing*. See also FHA's *Value Pricing Pilot Program* at www.fhwa.dot.gov.

[13] Both users and non-users seem to value the option provided by the existence of HOT lanes. Further – contrary to the argument that HOT lanes are "Lexus Lanes" – the lanes are valued by both high and low income drivers. The argument that working class drivers will not use the lanes is both elitist and inaccurate. See page 70, *The Transit Metropolis*, Robert Cervero, 1998. See also page 10, *The Role of Fast and Intertwined Regular (FAIR) Lanes in the New York Metropolitan Region*, Eno Transportation Foundation, 2002. See also FHA's *Value Pricing Pilot Program* Project Description of San Diego's Interstate 15.

[14] Including Dallas (Texas), Denver (Colorado), Houston (Texas), Miami-Dade (Florida), Minneapolis-St. Paul (Minnesota), Portland (Oregon), Raleigh (North Carolina), San Antonio (Texas), and Santa Cruz (California).

[15] See Intelligent Transportation Systems' Decision Report, *Congestion Pricing*, 2002. See also pages 14-39 and 14-57 to 14-61, TCRP Report 95: *Road Value Pricing*.

[16] See Intelligent Transportation Systems' Decision Report, *Congestion Pricing*, 2002. See also FHA's *Value Pricing Pilot Program* Project Description of San Diego's Interstate 15. See also pages 14-54 to 14-57, TCRP Report 95: *Road Value Pricing*.

[17] Including Alameda County (California), Atlanta (Georgia), and Portland (Oregon).

[18] See page 15, *The Role of Fast and Intertwined Regular (FAIR) Lanes in the New York Metropolitan Region*, Eno Transportation Foundation, 2002.

[19] Are such charges necessary, or just conceptually compelling? One article claims that, by 2014, Oregon state income from gas taxes will start to decline (despite population growth) due to more fuel efficient vehicles. This suggests another source of revenue such as usage-based vehicle charges will be necessary even to maintain existing roads. See *Pay Per Mile: A Good Driving Idea?* The Car Connection, 2005.

[20] Including Atlanta (Georgia), Oregon, Puget Sound (Washington), and San Francisco (California).

[21] Car-sharing programs vary, but generally a person enrolls (voluntarily) in a program and then is charged for their usage of the shared cars (based on distance and time). This means that users pay more as they drive more and pay less as they drive less. Numerous cities have such programs, including Boston (Massachusetts), New York City, Portland (Oregon), San Francisco (California), Seattle (Washington), and Washington DC.

[22] See pages 14-25 to 14-26, TCRP Report 95: *Road Value Pricing*. Houston also has an interesting modified HOT lane on I-10: HOV-3s use the lane for free, HOV-2s can pay $2 to use the lane, and SOVs are not allowed to use the lane. See Intelligent Transportation Systems' Decision Report, *Congestion Pricing*, 2002.

[23] Of interest, General Motors is going to start installing OnStar in all of its cars. If other manufacturers follow the lead, this could be the necessary technology for widespread usage of usage-based charges. See *GM rolls out new nationwide toll system*, Telematics, 2005.

[24] See pages 14-18 to 14-19, TCRP Report 95: *Road Value Pricing*.

[25] See Intelligent Transportation Systems' Decision Report, *Congestion Pricing*, 2002.

[26] See www.panynj.gov.

[27] See FHA's *Value Pricing Pilot Program* Project Description of Hudson River Crossings in New York.

[28] See www.state.nj.us/turnpike.

[29] See FHA's *Value Pricing Pilot Program* Project Description of New Jersey Turnpike.

[30] See page 14-19, TCRP Report 95: *Road Value Pricing*.

[31] See www.edinburgh.gov.uk/transportedinburgh.

[32] See page 14-6, TCRP Report 95: *Road Value Pricing*.

[33] See *Tollway trial at a dead end in California*, Los Angeles Times, 7 July 2002.

[34] See *GPS plan no match for tolling*, The Border Mail, 22 March 2005.