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FRBSF Weekly Letter

On The Road To Singapore

Congestion on urban highways is a worldwide phenomenon. Commuters in virtually every major city of the Western world face a daily nightmare of delay and frustration as they travel to and from their jobs — even when they can find enough gas to make their trips.

Traditionally, policymakers try to solve the problem of congestion by increasing highway capacity. Much of the 10,000 miles of highway built each year in the United States expands the capacity of existing corridors. Curiously, however, the problem of peak-period congestion does not disappear with the addition of new capacity. Indeed, according to urban specialist Anthony Downs' Law of Peak Hour Expressway Congestion, traffic inevitably grows to fill the available capacity.

Economists believe that the origins of the congestion problem lie in the method we use to price highway services. Although this viewpoint has been accepted by the profession for many years, it is only now finding its way into policy — specifically, with the adoption of a unique highway-pricing experiment in Singapore. But before examining the experiment, we would do well to analyze the origins of the problem.

Pricing roads

In most countries, highway usage is priced indirectly through a system of surcharges on gasoline purchases, although tolls are used for some special facilities. Since the consumption of gasoline is roughly proportional to the mileage traveled, this mechanism implies an essentially uniform charge per mile to all users. A morning freeway commute and a leisurely trip on a back-country road thus are priced at essentially the same figure per mile.

This pricing mechanism, with its virtue of administrative simplicity, has provided a useful method of financing the "brick and mortar" costs of highway construction. As an indicator of the true cost of highway use, however, it has major liabilities.

During commute rush hours, for example, the incremental cost of adding a vehicle to the traffic flow can be extremely high when the delay that is imposed upon other users is considered. To the economist, time is an important resource, and an efficient price system should reflect these time costs. But the present pricing system ignores these effects, thus encouraging drivers who are taking easily avoidable trips to use the roadway and to generate time penalties (congestion) for all other users.

Efficient road prices would thus vary by time of day, with higher prices during commute hours and lower prices when traffic is light and the congestion effects are less pronounced. Recent theoretical studies have shown that a system of such "congestion prices" would foster more efficient use of existing roadways and would lead to lower overall travel costs.

Congestion pricing would also tip the balance in favor of transit usage, particularly bus-transit services. Transit systems now suffer from the liability of relatively slow service, caused by congested road conditions. Congestion pricing would increase the average speed of commute buses without appreciably increasing the individual bus rider's cash costs. (The buses' congestion fees, when spread over 40 or more passengers, would be quite small.)

Implementation problems

Despite the economic arguments, policy makers have found the prescription of congestion pricing hard to swallow for a number of reasons. First, the increases in peak-period prices that are necessary to bring prices into line with costs may be quite large. The cost of peak-period travel on urban California free-

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ways, for example, could be as much as *35 cents* per vehicle mile. This contrasts sharply with the cost implicit in the existing gasoline surcharge of about *one cent* per mile. Although a shift to a new pricing system would bring about time savings and less wasteful use of resources, the political problem of implementing such price increases is obviously quite severe.

Second, although the realignment of road prices would generate positive net effects, it inevitably means that certain users will benefit and others will lose. Some policy makers fear that only the well-to-do would benefit, because only they would be able to afford access to the uncongested facility. Although this view ignores the benefits that would accrue to transit users and carpoolers (who needn't be rich), concern about the equity and distributional implications has been an important factor in delaying reform of highway pricing policies.

Finally, the implementation of road prices that vary by time of day requires the development of innovative pricing mechanisms. Simply changing the price of commute travel through the cost of gasoline (as is happening inadvertently today as a result of energy problems) will not provide the necessary incentives to differentially conserve on peak period travel. The present uniform gasoline surcharge would have to be augmented by special toll facilities or operating permits on congested facilities. This represents a major departure from current administrative practice.

Singapore experiment

For all these reasons, most countries have not tried to implement any such congestion-pricing system. Still, some developing nations have shown an interest in the concept as a means of conserving their scarce economic resources, and the tiny city-state of Singapore has actually put a plan of this type into effect.

Singapore is an island republic of 2.3 million people and 225 square miles off the Malay peninsula. In the decade from 1965 to 1975, population increased by 24 percent and gross domestic product jumped by 188 percent. This rapid growth stimulated automobile ownership and use, so that by 1973 there were 188,000 private automobiles in Singapore. Nearly 45,000 of these vehicles jammed the limited highway facilities during the morning commute peak.

In 1974, Singapore adopted a system of area licensing designed to increase the price of roadways in the congested areas of the city during commute hours. Under this scheme, private automobiles are required to exhibit a special license to enter the controlled area, which is approximately a quarter of a mile on each side, between the hours of 7:30 a.m. and 10:15 a.m. Each license costs about $30 per month (daily licenses are also available).

The licensing scheme is enforced by a small traffic police force stationed at various entry points of the controlled area during morning commute hours. These police have the power to levy substantial fines on violators of the licensing regulations.

The Singapore government, when implementing the congestion pricing scheme, also provided additional bus-transit service as well as extra parking facilities for transit users outside of the downtown area. These measures, along with an exemption for four-person carpools, helped ensure that the benefits of reduced congestion would be enjoyed by all commuters, and not just those who could afford the monthly license. Road facilities around the circumference of the central business district permit through traffic to avoid the controlled area.

The results of the Singapore experiment strongly suggest that the concept of congestion

pricing can actually work. In that test case, congestion has been reduced significantly, with total traffic volume falling by almost 50 percent during the restricted hours. Commute times have generally been reduced, both for those who continue to drive and those who have switched to an alternative mode. The high level of public acceptance indicates that most travelers have benefited from the policy and that commercial activity has not discernibly suffered.

The road from Singapore

The area-licensing scheme is obviously a crude approximation to an ideal system of time-differentiated road prices. Moreover, the relationship between pricing of existing roads and investment in new road facilities has not been clearly articulated in the Singapore approach. Nevertheless, the policy represents an important attempt to balance theoretical concepts and administrative reality.

The apparent success of the Singapore experiment has led a number of other developing nations to consider such a program. The modest costs of the policy (expanded bus service and additional traffic personnel) suggest that it would provide an attractive remedy for congestion in developing countries, and in other countries as well.

In 1977, the Urban Mass Transit Administration (UMTA) of the U.S. Department of Transportation explored the possibility of conducting an area-licensing experiment in an American city. Although several communities discussed the concept with UMTA representatives, none showed an immediate interest in implementing such a plan. But that was before the 1979 energy crisis highlighted the problem of resource conservation. Whether congestion pricing spreads to the United States and other industrialized nations depends upon how they feel in the future about efficiently allocating energy and other resources by improving highway efficiency.

Randall Pozdena

The Dollar of the Future

To help publicize the Anthony dollar coin, the Federal Reserve is making available to the public a Treasury pamphlet entitled, "The Dollar of the Future." Free copies of the pamphlet are available, individually or in bulk, to financial institutions, retailers, schools and community groups. For copies, write or call the Public Information Section, Federal Reserve Bank of San Francisco, P.O. Box 7702, San Francisco, Phone (415) 544-2184 — or call the Bank and Public Services Department at any Federal Reserve office.

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BANKING DATA—TWELFTH FEDERAL RESERVE DISTRICT

(Dollar amounts in millions)

Selected Assets and Liabilities Large Commercial Banks	Amount Outstanding 8/8/79	Change from 8/1/79	Change from year ago @ Dollar	Percent
Loans (gross, adjusted) and investments*	130,720	846	+ 18,172	16.15
Loans (gross, adjusted) — total#	107,982	668	+ 16,938	18.60
Commercial and industrial	31,569	3	+ 4,494	16.60
Real estate	39,349	250	+ 8,228	26.44
Loans to individuals	22,032	98	NA	NA
Securities loans	1,943	– 15	NA	NA
U.S. Treasury securities*	7,456	59	– 373	– 4.76
Other securities*	15,282	119	+ 1,607	11.75
Demand deposits — total#	42,365	– 1,314	+ 2,498	6.27
Demand deposits — adjusted	31,272	473	+ 1,162	3.86
Savings deposits — total	30,533	77	+ 138	4.54
Time deposits — total#	51,405	409	+ 6,050	13.34
Individuals, part. & corp.	43,017	473	+ 6,917	19.16
(Large negotiable CD's)	18,373	349	+ 1,203	7.01

Weekly Averages of Daily Figures	Week ended 8/8/79	Week ended 8/1/79	Comparable year-ago period
Member Bank Reserve Position			
Excess Reserves (+)/Deficiency (–)	26	16	– 38
Borrowings	30	75	15
Net free reserves (+)/Net borrowed(–)	– 4	– 59	– 53
Federal Funds — Seven Large Banks			
Net interbank transactions [Purchases (+)/Sales (–)]	+1862	+ 738	+1381
Net, U.S. Securities dealer transactions [Loans (+)/Borrowings (–)]	– 162	– 425	+ 231

* Excludes trading account securities.
# Includes items not shown separately.
@ Historical data are not strictly comparable due to changes in the reporting panel; however, adjustments have been applied to 1978 data to remove as much as possible the effects of the changes in coverage. In addition, for some items, historical data are not available due to definitional changes.

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