Congestion and Its Discontents

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Introduction

What should we do about congestion? Nothing? Build more roads and highways? Reorganize the layout of our communities so that we are less dependent on our automobiles? Induce a shift from single-occupant automobile to carpooling and public transit? Encourage telecommuting? Revise the greenfield development and the redevelopment processes to encourage and/or enable carpooling and public transit?

These questions have been at the center of American urban transportation policy for more than half a century. More fundamental questions are who should decide and on what basis? What outcomes will maximize general welfare? How much weight should be given to the conservation of open space, farmland, fossil fuels, historic preservation, and other resources? How much to individual preferences?

This paper examines how capacity, operations and demand strategies have been used to address congestion. It begins with an historical background on urban congestion. The next section discusses alternatives to highway capacity expansion. [2] The paper concludes with a discussion of the prospects for the application of these strategies for addressing congestion in the future.

Historical Background on Urban Congestion

The history of congestion is as old as the city itself. Ancient Rome is said to have suffered from chariot gridlock. Dickens' London was an intensely congested place. And many American cities of the nineteenth century were chronically congested as well. But cities had more chronic problems than congestion. Unsanitary water and waste treatment were severe problems. Prevailing beliefs about crowding as a source of disease led to

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[2] Other strategies for addressing congestion, namely land use policies and efforts to improve accessibility, are addressed by other papers in this series and hence are not discussed extensively here.

continuing efforts to reduce the intense concentrations found in central cities. Other initiatives included the construction of urban parks.

Improving transportation speeds was a critical part of this effort, and the latter half of the nineteenth century witnessed a series of experiments with various new forms, including horse cars (steel-wheeled wagons on tracks drawn by horse), elevated steam railways, cable cars, and electric traction street cars. The street car era, beginning in the 1880s and continuing into the 1920s, was a powerful force for expanding the functional radius of cities, allowing decentralization and suburbanization. With the emergence of the private automobile and truck in the early twentieth century, congestion took on a whole new dimension, eventually leading to the invention of the traffic signal, and its widespread implementation in the 1920s (McShane 1994).

Pressure for suburbanization arose not only out of concerns for public health and transportation innovations. It also arose out of a desire by the upper and middle classes to remove their families from the filth and corrupting influence of the central city (Fishman 1987).

Pleasure driving also exploded in the mid-nineteenth century. Urban cemeteries complete with carriageways for pleasure driving were so popular that non-lot-holders were banned on Sundays to control crowding. Public urban parks with carriageways soon followed, with New York City's Central Park becoming the prototype. It provided an extensive network of carriageways for the elite. Omnibuses, hacks and street railways were excluded from the park and restricted to underpasses (McShane 1994).

A parallel development was the landscaped urban parkway, which also excluded wagons and common carriers. An 1868 proposal by Frederick Law Olmsted provided a traveled way abutted on both sides by a landscaped strip, which not only afforded pleasant views but also prevented abutting landowners from legal claim to access. Common law provided for access to landowners of all abutting streets, but not to parks (McShane 1994).

Large scale metropolitan highway system development began to emerge in the 1920s and 1930s as a remedy for urban congestion. Street cars and street railways, which had begun to decline in market share as early as the 1890s, had become intensely unpopular. Cities often refused to allow fare increases, and owners adopted a policy of continued disinvestment, which reduced service quality, leading to a downward spiral (Jones 1985). Los Angeles opted against expanding its public transit system in the 1920s, in favor or an extensive network of urban highways (Wachs 1996).

During the Depression, municipal funds for road building plummeted. But federal programs, under the auspices of the Works Progress Administration, provided extensive funds, and enterprising cities were able to exploit these funds to expand their urban highway systems (Gifford 1983). Robert Moses in New York is perhaps the most well known example (Caro 1974).

Highway spending paused during World War II as materials were required for the war effort. The federal Bureau of Public Roads was not idle during this time, and was engaged in a bold proposal to address what it saw as a major national problem – burgeoning urban highway congestion. The bureau's primary responsibility to date had been the development of a large intercity highway system, which it had begun in the 1920s and largely completed by the early 1930s. The bureau had only limited experience with urban highways, mostly gained during the Depression.

The bureau's proposal for an urban highway program ran into difficulty in the White House and Congress, however. President Roosevelt was concerned about a large, expensive new program at a time when he was seeking to preserve signature programs like the Works Progress Administration and the Reconstruction Finance Corporation. Congress, then still dominated by rural interests, was also less interested in an urban program. Further, the bureau's proposal for urban highways was squarely at odds with a competing proposal for a national system of interregional superhighways, inspired in part by a mix of enthusiasm and alarm over Germany's successful autobahns (Seely 1987; Gifford 1983, 2003).

After the war, auto ownership, suburbanization and congestion exploded, and public pressure for highway expansion grew accordingly. The creation of the federal Highway Trust Fund in 1956 finally provided the funding needed to pay for the Interstate highway system – which had actually been created in law in 1944 (Rose 1990). The ensuing two decades constituted an intense period of urban interstate highway design and construction, along with a comparably ambitious rural interstate program.

The aggressive urban interstate highway program had many impacts, not least of which was that it built a lot of urban highways. Cities across the country developed highway plans and undertook construction. For better or worse, many of those highways were built through low income areas. Prevailing theories of poverty of the day held that urban "blight" could be halted by removing slums.

The prevailing view of how to deal with congestion is captured in the phrase "predict and provide." Transportation officials generally sought to base their highway designs on predictions of traffic, usually a forecast for 20 years. There was little appreciation for the "induced demand" problem, that is, that traffic in urban areas often responded very quickly to new highway capacity and filled it up much sooner than expected.

The twenty-year horizon was an outgrowth of concerns in the 1930s that highways designed in the 1920s had become functionally obsolete due to geometric and capacity limitations. Those highways could not accommodate the increased speeds that became prevalent, and increased vehicle usage led to high levels of congestion, especially in metropolitan areas. Twenty-year forecasts, it was hoped, would avoid such functional obsolescence in the future.

The predict and provide philosophy was behind the development of the standard four-step transportation planning process, beginning in the late 1940s. It was recognized that simple extrapolative forecasting was not adequate for a metropolitan area because traffic typically had multiple paths through the road network to reach its destinations. Thus, adding a new facility or expanding a new one could cause traffic to redistribute itself on the network. The idea of the four-step model was to predict land use twenty years into the future, then the trips such land use would generate (called trip generation and trip distribution), then the modes those trips would use (mode choice), and finally the routes each trip would take (traffic assignment).

The development of these models was seen as a highly challenging technical exercise that would require the best that then-emerging computers could provide. Few recognized at the time that it was at least as much a policy challenge as a technical challenge. Predicting land use twenty years into the future was a hugely uncertain enterprise, and of course, land use depended as much on transportation decisions as transportation performance depended on land use.

An additional issue was the design of the interstate highway facilities. The debate over whether the system should be metropolitan or interregional had continued through the 1940s, and the resolution was to make it both. Thirteen percent of the 40,000-mile system initially allocated in 1947 was for urban routes, about half for radial routes and half for beltways. All of these urban interstates, however, were designed to accommodate high-speed traffic safely, to have limited access, and to have no at-grade intersections. The high-speed geometry was very important for interregional trips. They were less beneficial for local trips, however, which tended to be shorter. In addition, the high speed geometry also required long acceleration and deceleration lanes, which limited the spacing between interchanges to several miles.

As it turned out, many interstate routes were quickly swamped with local trips, which were not well suited to the travel. The long interchange spacing meant that drivers experienced long waits to reach an exit when encountering unexpected delays. The high speed geometry provided few benefits when congestion slowed traffic to a crawl.

This was not terribly surprising in retrospect. Existing traffic on nearby arterials moved quickly to take advantage of the new travel capacity on the new routes. In addition, the availability of was quickly exploited by real estate developers eager to serve the exploding demand for suburban housing.

The initial reaction to this unexpected congestion was to increase the number of lanes on new facilities to accommodate the trips that they attracted. But it soon became apparent that the congestion problem was more complicated than a simple shortage of highway lanes. The express highways had to tie into the local street system, which in turn had to provide access to adequate parking spaces, either on the street, which competed for road space, or in parking lots or parking structures. Expanding the expressway without dealing with the complementary local streets and parking simply would not solve the problem.

Furthermore, initial efforts to address congestion by increasing the size of expressways required significantly more right of way, which in turn required the condemnation of more property, which increased the number of households and businesses displaced. Such displacements increased costs, and in many places prompted a political backlash, which was exacerbated by the disproportionate number of poor and minority communities being affected.

A final exacerbating influence was the fact that federal interstate highway funds could only be spent on interstate highways, and the centerline length of interstate highway routes was fixed in law at 44,000 miles. States could add lanes to a mile of interstate highway and be reimbursed for ninety percent of the cost as long as the federal government agreed that the capacity was required under its twenty-year forecast requirement. But if a state or city wanted to add lanes to another facility to address congestion, it had to pay fifty or one hundred percent of the cost itself.

The ensuing backlash against many urban interstates fed a growing national concern with cities and the environment, and the passage of the National Environmental Policy Act of 1969 (NEPA). NEPA required any project receiving federal funds to undergo an environmental impact assessment and receive a finding that there was no reasonable alternative (*National Environmental Policy Act of 1969* 1970). Other environmental laws enacted near this time included the National Historic Preservation Act of 1966 and the Clean Air Act Amendments of 1970.

Collectively, these acts raised the hurdle for capacity expansion as a remedy for congestion, and led the nation to begin to examine where and whether expanding highway capacity still made sense. Alternatives to predict and provide that began to receive consideration included transportation demand management and improved transportation operations, which are the subjects of the next section.

Alternatives to Highway Capacity Expansion

As concerns about the impacts of new highway capacity grew in the 1970s, attention turned to two alternative approaches. The first was transportation demand management (TDM), which is a set of measures intended to reduce demand for peak hour road space, such as car- and van-pooling and flexible work hours. The second approach was to improve transportation operations. These are discussed in turn below.

Transportation Demand Management

Transportation demand management (TDM) is an umbrella term that encompasses a broad range of measures aimed at reducing or modifying the demand for transportation. The term itself arises out of a desire to consider alternatives to "supply side" measures such as those arising from the predict and provide philosophy. Hence, TDM has come to mean almost any alternative to a general purpose highway lane (see Table 1), including the following (Gifford and Stalebrink 2001):[3]

- Value pricing (also known as congestion pricing) utilizes tolls and other fees to raise the apparent price of travel in order to induce travelers to shift the time of day they travel, the number of people with whom they travel, or their mode of travel.
- Ridesharing (i.e., carpooling and vanpooling) programs match travelers with proximate origins and destinations in order to reduce travel in single occupant vehicles. Ridesharing programs sometimes organize shared rides to originate in park-and-ride lots or other locations, and may encourage ridesharing by providing preferentially located or priced parking.
- Park-and-ride lots provide parking for travelers to leave their private vehicles in order to switch modes to either transit or shared rides.
- High occupancy vehicle (HOV) lanes are highway lanes that are reserved for the use of vehicles containing two or more travelers (the minimum varies among facilities). Lanes are sometimes divided from general purpose travel lanes by physical barriers, or sometimes denoted with "diamonds" or other markings.

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[3] For the purposes of this paper, land-use based TDM strategies are excluded because they are treated in a companion paper.

- High occupancy toll (HOT) lanes are HOV lanes that also allow access for a price to single occupant vehicles.
- Employer commute option programs utilize on-site or dedicated transportation coordinators to work with employees to encourage ridesharing and other TDM measures.
- Telecommuting measures allow employees to work at home or at remote locations some or all of the time instead of commuting to a distant office.
- Alternative work schedules allow employees to work schedules that differ from standard 40 hour per week, fixed schedules (e.g., 9 to 5, or 8:30 to 5 five days per week). Such alternatives include working four 10-hour days with three-day weekends, nine 9-hour days with alternating three-day weekends, etc.
- "Cashing out" free parking provides an option to employees who have access to free parking to "cash out" their access to free parking in exchange for an employer-subsidized transit pass. Recent changes in U.S. law allow employers to treat such

Table 1: TDM Measures

Program/Objectives	Strategy	Measures/Technologies
Improve mobility between points A and B, during peak-periods	• Reduce Travel • Stimulate alternative routes and modes • Promote ride-sharing	• Peak-period road-pricing (congestion or "value" pricing) • Traveler information technologies • Remote parking lots
Reduce environmental impacts from travel in area X	• Stimulate ride-sharing • Improve non-motorized travel conditions • Increased vehicle use fees	• High occupancy vehicle (HOV) lanes • Bike lanes • Transit • Public financial telecommuting incentives
Reduce number of deaths and injuries on road X	• Reduce speed • Improve road conditions	• Increased police visibility • Speed cameras • Traffic calming
Corporation driven TDM programs	• Financial subsidies • Regulation	• On-site employee transportation coordination • Alternative work schedules. • Telecommuting
Source: Gifford, Jonathan L., and Odd J. Stalebrink. "Transportation Demand Management." In *Transport Systems and Traffic Control*, edited by David Hensher and Kenneth Button, 199-208. Oxford: Elsevier, 2001.		

programs as a tax-deductible employee benefit up to $100/month.

- "Family friendly" transportation services are those that attempt to accommodate the needs of commuters with children by, for example, providing child care, grocery, pharmacy and other services at places of employment, near transit stations, or park-and-ride lots. TDM measures have been applied widely since the 1970s. Most major metropolitan areas have adopted at least some TDM measures. Yet comprehensive data on the nature and extent of the adoption of TDM is spotty at best, as is comprehensive evaluation data. At the metropolitan level, however, much more data is available, both ex post evaluations and ex ante planning studies.

Today, there are approximately 1210 miles of HOV lanes nationwide (Transportation Research Board 2001). HOV travel for the journey to work in 2000 comprised 12.2%, or one out of eight, down from 19.7% in 1980, or one out of five (Pucher and Renne 2003). Thus, while the share of HOV is significant, it is declining nationally. Part of the shift is towards 2-person carpools that are often family based, that is, a husband and wife who commute together. However, recently there appears to be a resurgence in 3- to 4-person carpools that is not yet well understood.[4]

In Minneapolis, two HOV lanes on an 11-mile stretch of Interstate 394 carry about the same number of people as two parallel general purpose lanes, 5175 persons/lane in 1674 vehicles in the HOV lanes vs. 5324 persons/lane in 5267 vehicles in the general purpose lanes during the AM peak (Pratt (R. H.) Consultant et al. 2000).

Comprehensive evaluations of the impact of TDM measures other than HOV are quite limited. Given the diversity of the measures, and the range of places where they are located, it is difficult to derive a single measure of impact. The Transit Cooperative Research Program has since 1997 been sponsoring the updating of a handbook, *Traveler Response to Transportation System Changes,* originally published in 1977 and subsequently updated in 1981, which is synthesizing information from a range of applications of TDM nationally (Pratt (R. H.) Associates 1977; Pratt 1981; Pratt (R. H.) Consultant et al. 2000; Pratt 2003). The revised work has begun to appear. One indicator of the complexity of the overall enterprise is that it will be published in nineteen volumes.

The Central Puget Sound Region evaluated a suite of TDM measures to address congestion on State Route 520, which includes a bridge crossing of Lake Washington. Their assessment found that a combination of 14 TDM measures used in various combinations, including parking charges and land-use based measures applied in 10 communities, would yield trip reductions ranging from 0.9% to 11.3%. The most effective measures in their assessment were (DKS Associates 2003):

1. Parking pricing at employment sites. An additional parking fee of $2 to $3 reduced commute trips up to 9.8%.
2. Increased infill and densification would result in reductions of up to 4.4%.
3. Increased missed-use development would result in a reduction of up to 2.8%.
4. Multi-employer transportation management associations would lead to a reduction of up to 1.8%.
5. Alternative mode subsidies would reduce trips by up to 1.6%.

While specific to the particular region, these indicators suggest a range of impacts that might be achievable with a well-designed and implemented TDM program. However, the most effective strategy – parking pricing – is often very difficult to accomplish politically, and hence its benefits in trip reduction could be difficult to achieve.

[4] Alan Pisarsky, personal communication (November 5, 2004).

Transportation Operations

Another option for reducing congestion is improving the operations of highway facilities. A substantial amount of urban congestion arises from so-called "non-recurring" incidents, such as vehicle crashes and breakdowns. The ability to detect such incidents quickly and respond quickly with the necessary resources has received considerable attention in the last decade. In addition, optimizing traffic signal timing can significantly reduce congestion.

Improved highway operations have in part been made possible by the improved detection and communication capabilities afforded through intelligent transportation systems (ITS), which have received substantial funding since the early 1990s. The range of ITS technologies is quite broad. An illustrative list of technologies with particular relevance for congestion reduction are:

1. Incident detection and management systems – Such systems use a variety of detectors, including video monitors, inductive loops buried in the pavement, and acoustic sensors, to detect when traffic flow is interrupted. The prevalence of cellular telephones among highway users has also proved to be a valuable source of detection information. Once detected, such systems can allow reconnaissance to determine what resources are needed on the incident scene and the prompt deployment of those resources. In addition, highway users can be warned of incidents through variable message signs, AM and FM radio and, in more advanced systems, automated in-vehicle traffic monitoring and advisory systems.
2. Advanced traffic management systems – Such systems allow the coordination of traffic signals along a corridor, in a local jurisdiction, or at the regional level. More advanced systems use traffic detectors to adjust traffic signal timings in real time. More basic systems allow a range of operating time plans (morning peak, afternoon peak, midday, night, etc.).
3. Electronic toll collection systems – In areas with tolls, the collection of tolls can be a significant source of congestion. Electronic toll tags are now widely deployed in the U.S. and abroad that allow toll collection at highway speeds.

While the technology of transportation operations is a significant source of potential congestion reduction, the implementation of such systems is usually subject to a number of institutional considerations, including (Horan and Gifford 1993):

1. Jurisdictional issues – Most metropolitan areas consist of a number of separate jurisdictions and the facilities that serve them are owned and operated by a number of separate operating agencies. These include state departments of transportation, cities, counties, townships, toll road authorities, public transit agencies, and so forth. In addition, police, fire and emergency medical service organizations are often responsible for responding to incidents occurring on or around transportation facilities. Collaborating across jurisdictional boundaries is often extremely challenging. As technology has improved and made such coordination and collaboration technically feasible, such jurisdictional issues have often become barriers to effective operations. While regional coordination in the planning and programming of transportation funds has been coordinated at the metropolitan level

through metropolitan planning organizations (MPOs), no comparable organization dedicated to transportation operations has generally existed.

2. Organizational issues – The organizations that own and operate transportation systems often face serious limitations on their capacity to plan, acquire and operate some of the more advanced systems that are available. These limitations can arise from funding shortages, the technical capability of staff and procurement requirements.
3. Behavioral issues – Transportation users themselves may undermine the capability of ITS technologies to address congestion through behavioral changes, such as ignoring HOV restrictions and requirements, ignoring parking restrictions, purchasing anti-detection devices (e.g., radar warnings). In addition, concerns about privacy may inhibit adoption of certain systems.

Concern over jurisdictional and organizational issues has given rise in the last decade to new approaches to transportation operations. The current nomenclature for this effort is "regional operations collaboration and coordination" (ROCC).[5]

Significant research into regional transportation collaboration and cooperation has been conducted in the last 5 years that aims to understand models and best practices at a regional scale (Briggs and Jasper 2001a, b, c, d, e, f, g; Briggs 1999; Gifford and Stalebrink 2002; U.S. Department of Transportation 2002). Successful models include:

1. A virtual organization: a voluntary group of agencies that agree, often through a memorandum of understanding (MOU). Typically virtual organizations own no assets and employ no staff. All resources are provided by the partners.
2. A private corporation: such as a non-profit 501(c)(3), which is legally established to perform some aspect of operations.
3. A regional government or authority, which is usually a preexisting organization such as an MPO that takes on the responsible for some aspect of operations.

The scope of such operating responsibilities may include any or all of the following:

1. sharing of resources, such as staff, funds, equipment;
2. sharing of information, such as construction schedules or operating status; and/or
3. sharing of operational control, such as the ability to control another agency's VMS during night operations when the owner agency's staff is not on duty.

While improving operations is not a panacea, it can significantly reduce congestion in a region. However, successful transportation operations require a combination of technological and institutional development.

[5] It is telling of the sensitivity of such activities that the nomenclature has evolved considerably. Initially, the term "new regional organizations" was adopted, but that aroused concern from existing organizations. Subsequently the term "regional operating organizations" was adopted, but that gave rise to concern that it implied the existence or creation of a regional organization.

High Occupancy Toll (HOT) Lanes

High-occupancy toll, or HOT, lanes have recently received considerable attention as a tool for expanding highway capacity in congested urban areas. HOT lanes allow access to a facility – usually an HOV lane – for a price. As usually conceived, the price varies in order to ensure that the tolled facility is always free flowing. A driver then has the choice whether to pay the toll and travel unimpeded or travel for no toll on (usually congested) general purpose lanes.

Virginia is considering the addition of HOT lanes to its portion of the Capital Beltway (Interstate 95 and 495), and California has implemented HOT lanes in the State Route (SR) 91 corridor in Los Angeles and Interstate 15 in San Diego. The San Diego lanes are currently being extended.

A recent study of traveler behavior on SR 91 indicates that its users value their time at the rate of $21.46/hour and value travel time reliability at a rate of $19.56/hour. The sum of the two rates – travel time and reliability – closely matches the peak rate charged on the express lanes during the time of the study. At peak hour the average commuter would pay $1.89 to realize travel savings of 5.6 minutes and an additional $0.98 to avoid the possibility a 3-minute delay, totaling $2.85, which is somewhat less than the peak toll of $3.30.[6] This suggests that somewhat less than half the peak traffic would use the express lanes, which is consistent with observed behavior. The median motorist in the study sample would pay $0.42/trip to reduce the frequency of 10-minute delays from 0.2 to 0.1 (Poole 2004; Small, Winston, and Yan 2002).

While only deployed in a few places in the U.S., HOT lanes have received considerable attention as mechanisms for expanding highway capacity, or making better use of underutilized HOV lane capacity.

Pricing Other than HOT Lanes

In addition to HOT lanes, congestion pricing has been successfully implemented in a number of world cities. One of the highest profile applications occurred in central London in 2003. Other significant implementations include Singapore (beginning in 1975) and Rome (2001). In the London case, the city imposed a charge of £5 (about $8) for any private vehicle entering an area of 8 square miles in central London. The restricted zone employs 1 million workers and, prior to the charge, had average traffic speeds of 9 mph, with vehicles spending half their time in queues. As of late 2003, the impact within the zone was a reduction in traffic delays of 30%, a reduction in travel times across the zone of 15%, and an increase in travel time reliability of 30%. Outside of the zone, travel on the orbital surrounding the zone changed within a threshold of 7% plus or minus. Most ex-car users transferred to public transport. Transport officials claim that only 4,000 people per day are no longer entering central London as a result of the charge. However, the reduction of 60,000 car trips per day into the zone has coincided with a reduction of 60,000 to 80,000 fewer people entering the zone daily. Transport officials attributed the reduction to factors other than the congestion charge (Iraq War, SARS, economic downturn, etc.). However, it is still too early to determine the long term impact on economic

[6] The study's definition of reliability was the 80th percentile of the travel time savings minus the median time savings, which peaked at 3 minutes at about 8 a.m.

activity in central zone. Current the city is planning to expand the congestion charge to an adjacent zone (Dix 2004).

Other significant congestion charging initiatives have been launched in a few other major metropolitan areas, including Singapore and Rome. The Singapore system was instituted in 1975, and remains one of the most successful. Car traffic into the central business district during the morning peak dropped about 80% after it was introduced. The scope was expanded to include the evening peak in 1988, and to the entire day in 1994 (Cheung 2004). The Rome system was institute in 2001 and restricted access to the historic center, leading to a reduction from 90,000 to about 72,000 vehicles per day (Di Carlo 2004).

Discussion

What can we learn from the past century of experience with urban highway congestion? First, of course, it is important to remember that congestion is not an entirely bad thing, and absence of congestion should not necessarily be the objective of public policy. Chernobyl, after all, has no congestion (Taylor 2002). While highway congestion can be frustrating to those who are caught up in it, much if not most congestion is routine, that is, it occurs in the same places day after day. Yet people routinely make decisions about where to live and where to work and how to travel between them recognizing that their trips are going to occur in congestion. There are alternatives to such lifestyles. This tells us that the benefits they derive from living and working where they do more than offset the frustrations associated with congestion. Otherwise they would reorganize their lives to reduce their exposure to it.

The fact that our systems are not operating at an optimal engineering level of service may be frustrating to engineers. That they do not appear to maximize consumer surplus may frustrate economists. But travelers may be making choices on the basis of other considerations that fall outside of the frameworks (Levinson 2003). Indeed, some travelers report enjoying their commutes as periods of privacy, reflection and relaxation between home and office.

Yet experience such as those with HOT lanes in Los Angeles and San Diego suggest that travelers will exercise an option to pay for a premium service when it is available, a clear indicator that they view such options as improving their wellbeing.

A second observation is that the policies that led us to where we are unfolded across more than a century, beginning in the streetcar suburb era and continuing to the present (Adams et al. 1999). Our urban congestion “problem” is not going to be solved overnight. Much of the stock of facilities and buildings is already in place. Our options are to add new stock, or to modify or retire existing stock. It is a problem that is faced by almost all of America’s large cities. Major change at the national level is unlikely, given the nature of Washington politics and the momentum of programs. The strongest trend seems to be toward earmarking of projects, which is a threat and opportunity that the Twin Cities have no doubt already recognized.

Whatever policy remedies we decide to adopt must be sustainable for many decades. Structural market incentives are in a way much more sustainable than tax-funded initiatives. Coercion and public taxation have sharply limited potential, and much of the public resource is already spoken for, for the foreseeable future (Johnson 2003). Sustaining a publicly funded program over the span of decades is extremely difficult, especially without its becoming diluted with political earmarks.

Expectations play a key role. “The relative attractiveness for investment (of time or money) in a location is influenced as much by the expectation of future change in the value of the capital stock as it is by the current value of the capital stock” (Ward 2003).

A third point is that in large part our dilemma is a product of enormous wealth. As a synthesis paper from Minnesota’s Transportation and Regional Growth Study observed, “The decentralization of jobs and population are, in large measure, the consequences of increasing affluence. Decentralization will continue as long as income levels increase and current incentives are in place” (Ward 2003).

Our error, then, was a failure to adequately anticipate increasing affluence and – not a separate issue – entry of women into the workforce. So we might think about the problem as affluence management, rather than congestion management. The problems posed by affluence are similar but slightly different. Reducing affluence is not a winning strategy. Rather, the challenge is managing the consequences of affluence, including distributional impacts on those unable to access a car. A similar point can be made about female labor force participation, that is, that managing the consequences of female labor force participation is well within the scope of policy objectives, but reducing it is not.

Furthermore, while cross-subsidies are clearly present in the urban transportation domain, in the highway case most costs are borne by highway users. Drawing again from the Minnesota Transportation and Regional Growth synthesis paper, “Eighty-four percent of known transportation costs are internal costs, borne by the people who travel. Nevertheless, the absolute size of governmental and external costs, plus a likelihood that external costs are considerably underestimated, calls for public and policy makers’ attention” (Ward 2003).

A fourth point relates to the so-called “non-correspondence” problem (Gifford and Pelletiere 2002). While it is sometimes appealing to wish for strong regional governments that are well-matched to the scale and scope of transportation problems, the logic of technical systems will rarely correspond to the structure of our governmental institutions. And why should they? Technical systems are transient, and governmental institutions, at least those embodied in constitutions, are meant to abide indefinitely. Moreover, while many would not agree (Peirce, Johnson, and Hall 1993; Rusk 1993), there is a credible argument that the coexistence of distinct city and suburban entities provides citizens and businesses a choice of jurisdictions within a region, leads jurisdictions to compete, and improves welfare (Tiebout 1956).

It would be naïve to design our technical systems with the assumption that our governmental institutions will yield to their internal logics. Rather, we must conceive and implement our transportation systems and policies in recognition of our constitution, and the powers and responsibilities it allocates.

These observations suggest that our discontent with congestion should be tempered by a recognition that its causes are at least in part healthy ones: robust communities competing for residents and businesses, and individuals and businesses using the transportation system to afford them the locational amenities they desire. Indeed, the diversity of our modern metropolitan communities affords and extraordinary range of choice of where to shop, worship, study, work and live (Fishman 1990). We can do a better job of developing our communities and transportation systems so as to reduce the level and duration of congestion. HOT lanes and other forms of congestion charging, in conjunction with efficient system operations and demand management, hold a great deal of promise.

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