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Coping with Complexity in America's Urban Transport Sector

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Complexity rears its head in many forms in America's urban transport sector – in the marketplace, methodologically, institutionally, and technically. One unmistakable outcome has been delays and a certain tentativeness in advancing change and innovation. This is principally because complexity makes problem definition and resource-allocation choices difficult.

As the world's most car-dependent culture, America's ecological footprint is gargantuan by global standards. With just over 4 percent of the world's population, the United States consumes more than 25 percent of petroleum used in the urban transport sector and is responsible for a similar amount of transport-based greenhouse gas emissions. Such disproportionateness raises fundamental questions about ethics and fairness, however as important are the threats posed as other countries of the world continue to mimic U.S. consumption habits particularly with regards to automobile ownership. The ability of planet earth to absorb astronomical increases in greenhouse gas emissions will be pushed to the limits as motorization rates in countries like China and India continue to escalate. If there is any one variable that explains rising car ownership and usage it is personal wealth. All countries aspire to modernize and all people of the world seek prosperity, thus a more modern, affluent world invariably is a world with more cars. To discourage motorization in developing countries is to discourage a modern western lifestyle. In truth, the children of Mumbai and Shanghai watch MTV, play Nintendo games, and queue up for Hollywood movies like the children of Toledo and Milton Keynes. The automobile is a powerful symbol of wealth and prosperity and no amount of sustainable transport policies and plan-making, however well-intended, is about to change this. Lessons can be gained by studying the complex nature of transportation systems in advanced economies of the U.S., not only for framing American-based policies but also for conjecturing about transportation futures in many places around the globe whose land-use patterns and travel habit are mimicking those in America more and more.

This paper explores multiple dimensions of complexity in a U.S. transportation-policy context, discusses the implications of these dimensions for policy change, and to the degree appropriate, suggests strategies that might be pursued to overcome, or at least better “manage”, complexity. Three major spheres of complexity that are addressed relate to mobility markets, problem definition and analysis (technocratic complexity), and decision-making. The paper closes with a review of promising developments in coping with the panoply of complex problems faced in America's urban transport sector, with a particular focus on progress made in better integrating public transport and urbanism in the world's most car-dependent cities.

1. Complexity in America's Mobility Marketplace

Complexity in America's mobility marketplace is a product of powerful megatrends, including shifting socio-demographics, shifting land-use patterns, and shifting economic relationships. Of course, such "shifts" have not been independent of each other, and indeed, it is only by appreciating the endogeneity of relationships and taking a holistic perspective that one can hope to get a handle on the complexity issue.

Shifting Socio-Demographics

America has always been a melting pot of different cultures and heritages, however historically this has been represented predominantly by immigrants from western Europe, the Mediterranean region, and Africa. America's pluralism today reaches all corners of the globe, with each culture bringing with it different lifestyles, familial compositions, and consumer preferences. Cultural pluralism, while it unquestionably blurs our understanding of mobility markets, becomes an opportunity for change when one considers, for example, public transport policy. Many recent immigrants from Latin America, the Caribbean, eastern Africa, southeast Asia, and the Indian subcontinent bring with them a culture predisposition and heritage that is more accepting of small-scale, demand-responsive forms of paratransit, like jitneys, private vans, and micro-buses, even if it means sometimes tattered seats, crowded seating conditions, and not the newest of vehicles. Fixed-route, fixed-schedule buses that run on 30-minute headways are not necessarily competitive modal options to the many-to-many, on-call, flexible service attributes of the private car in the minds of many recent immigrants (not to mention middle-class Anglo-Americans). Similarly, those coming from areas with a rich tradition and spectrum of transit and paratransit offerings might be more receptive toward transit-oriented development (TOD) – i.e., living in compact, mixed-use neighborhoods within convenient reach of public transport. From a policy perspective, the challenge is significantly one of breaking the monopolistic stranglehold that many U.S. public transit agencies and taxi franchises currently have over the mass transportation marketplace through deregulation and open market competition.¹ TOD could be leveraged through changes in traditional zoning standards and property-development codes in keeping with shifting demographic compositions of neighborhoods.

Other examples of socio-demographic complexity and their mobility implications have been well-documented, such as increases in non-traditional households (e.g., singles, childless couples, non-related adults), maturing of the population (e.g., the graying of baby-boomers), and steady feminization of the workforce. (Some projections are staggering – for example, by 2025, there will be 27 states with 20 percent of their populations over 65 or more, higher than Florida today.) Smaller households with more independent members complicate the ability to form carpools and ride-matches. Older Americans might seem like natural candidates for public transport services, however the spread-out nature of many U.S. cityscapes compels many to drive. For widows and widowers, automobility is essential to avoid the social isolation all too often encountered in a spread-out, single-use landscape.

Shifting Economics/Changing Technologies

Intense competition within the global marketplace is today giving rise to modes of economic production with fundamentally different space-time arrangements than yesteryear. Post-Fordist trends toward contingent labor, sub-contracting, and flex-spec/cottage-scale forms of production have given rise to dispersed temporal patterns with profound mobility implications – e.g., unpredictable work schedules, 10-hour compressed work weeks, and flexible hours. Growth in information technologies and brokerage industries has similarly expanded the temporal envelope of commuting. Telecommunities, designed and marketed to software programmers and other “information processors”, are radically changing traditional time-budget theory as we know it. For example, the city of Montgomery far north of Toronto has been designed (eg, laced with fiber optic cable) and marketed as a mixed-use community suited to telecommuters who only need to make the 100-km long trek to their main office in central Toronto once or twice a week. Facing the prospect of commuting to work as little as two to three days a week, telecommuters are willing to trade off occasionally ultra-long commutes for the quality-of-life benefits of semi-rural living. Time budgets are increasingly weighed in weekly, not daily, terms. Between 1990 and 2000, the fastest growing counties in California were not in the big urban centers but rather the foothills of the Sierra Nevada, within several hour commutes of the San Francisco Bay Area or a two-hour plane ride to Los Angeles. While living outside the boundaries of metropolitan planning organizations (MPOs), this growing tide of rural telecommuters has effectively expanded the commutersheds of big urban centers into once-rural domains. There has been an institutional lag in acknowledging this, meaning that today’s geographic boundaries for strategic long-range planning are anachronisms, throw-backs to the era where people commuted five to ten miles each day to a major urban work centers. The entire infrastructure of long-range transportation planning is compromised to the extent that future “O’s and D’s” (origins and destinations) lie outside the jurisdiction of decision-makers who are responsible for programming long-range capital improvements to highway and transit systems.

Tomorrow’s laborsheds can be expected to expand outward even more to the degree that the information-technology revolution continues unabated. Long-term impacts turn on the question of whether cyberspace, while expanding the reach of economic production, effectively shrinks physical mobility. More basically, the debate continues over whether telematics, e-commerce, and the Internet will significantly, over time, substitute for or stimulate physical travel. What is unassailable is that future travel will take on new shapes and forms: international trips (air travel) will increasingly substitute for intrametropolitan trips (car travel); with e-commerce, truck delivery trips will replace personal shopping trips; and real-time information on how to avoid congestion will enhance automobility. E-commerce could prompt the emergence of goods distribution centers in different pockets of the city. Cyber-work will likely exert growing pressures for in-neighborhood shops, services, and “watering holds” for those wanting a break from staring at a computer screen for hours on end. Global-sourcing promises that airports and all the ancillary activities around them will become dominant activity centers and trip

generators, what John Kasarda of the University of North Carolina calls “aerotropolises”, the latest in the historical wave of transport and locational relationships.

Shifting Urbanization Patterns

Another megatrend closely related to shifting economics that adds another layer of complexity to the contemporary mobility market is the atomization of land-use patterns. Thinly spread, segregated land-uses – enabled by rising affluence, telecommunication advances, and a host of other de-concentrating trends -- compel people to drive, particularly in a country like the United States where by global standards petrol, parking, and (broadly-speaking) car ownership and usage are substantially under-priced. Robert Lang’s recent book on the “edgeless city” contends that the drive for corporate autonomy, the location-liberating effects of cyberspace and telematics, and rising affluence in general have conspired to create a new geomorphology for economic production – sprawling corporate enclaves, business parks, power centers, and other “non-nodal” forms of development.² Today, all U.S. metropolitan areas (with the exception of New York and Chicago) have the majority of office space outside of traditional downtowns. While 38 percent of all office space in U.S. metro areas was located in primary downtowns in 1999, nearly the same amount (37 percent) was found in highly dispersed clusters with less than 5 million square feet of space.

Spatially, complexity is witnessed in the widening mismatch between the geography of commuting (many-to-many) and the geometry of traditional transportation infrastructure (radially focused on the CBD, a legacy of the anachronistic monocentric city). Suburban gridlock is today being eclipsed by exurban and even semi-rural gridlock. Between 1990 and 2000, mean commute time rose 14 percent, to 25.5 minutes, casting doubt over the co-location theory (that holds workers and firms adjust their locations to maintain a constant average commute time). Barriers to mobility, like imperfect information, social exclusion, and large-lot zoning, continue to drive a wedge in the widening spatial mismatch of residences and job locations.

The equity implications of these trends continue to be magnified as America’s neediest populations remained concentrated in and around core cities while job opportunities (especially in low-skilled occupations) are mainly in the suburbs and beyond. Many low-income inner-city residents face reverse-commutes via public transit to reach not only jobs but also job interviews, child-care services, and evening adult education facilities. The complexity of travel is seen in the reverse-commute origin-destination patterns of work trips by inner-city residents of Los Angeles. Figure 1 shows the location of low-income jobs and households and Figure 2 reveals the spatial distribution of reverse commutes (based on 2000 journey-to-work census data).³ The typical low-income Los Angeles worker who must reverse-commute takes just over an hour to reach his or her job by public transit, roughly twice as long as the average Southern California commuter. Because low-income workers often have contract, contingent-labor jobs, many end up working non-traditional schedules, such as on-weekends and late-shifts, periods when public transit is sparse or non-existent. The complexity of travel patterns over space and

time calls for non-traditional forms of mobility that mimic the service characteristics of the private car. This is borne out by research showing that access to a private car better explains successful welfare-to-work transitions among low-income workers in California than quality of public transit services.⁴ Clearly, travel complexity raises huge social and environmental justice issues, such as how to best deploy transit. Indeed, the Los Angeles County Metropolitan Transit Authority (MTA) was reprimanded by a circuit judge for concentrating its investment program on high-speed rail systems that would mainly benefit professional-class suburbanites at the expense of inner-city bus users. A consent decree mandates that the agency redirect spending to beef-up traditional bus services, though little progress has been made so far in opening up the marketplace to paratransit competition.

Connections

Of course, the powerful megatrends outlined above do not stand in isolation but rather are usually reinforcing and cross-nurturing. Global competition in a consumer-oriented society has prodded more and more firms to seek out isolated, secluded locations, be it to protect one's business culture, trade secrets, or top talent from corporate raids – thus giving rise to the “edgeless” city. The resulting scatteration has compelled automobile-dependent living most prominently among those least able or willing to walk, bike, or endure the discomforts of public transport usage – such as seniors, one of the fast-growing segments of America's population. Scatteration, coupled with womens' massive labor-force entry over the past two decades and the challenges they face in juggling professional and child-rearing responsibilities, has spawned zig-zag travel patterns that are virtually impossible to serve by any form of mobility than the private car. Land-use segregation has spawn chained trip-making, equally car-dependent in nature.

Transportation statistics reveal the mobility implications of this confluence of events. Despite investing tens of millions of dollars in high occupancy lane (HOV) facilities over the 1990s, carpooling's market share of commutes has been steadily eroding. The share of commuters pooling to work declined from a nationwide average of 13 percent in 1990 to 11.4 percent in 2000.⁵ In metropolitan Washington, D.C., traditionally one of America's strongest vanpooling markets, ridesharing has steadily fallen particularly rapidly over the past decade, rooted in the shift from predominantly government to increasingly high-technology employment. Many of the region's software engineers and Internet-industry workers keep irregular hours and rely on their cars during the midday, making it nearly impossible to share a ride to work. The entry of women into America's workforce, which soared from 26 million in 1980 to 68 million in 2000, has fueled trip-chaining – nearly two-thirds of working women stop on the way home from work, often to pick-up children at day-care centers.⁶ Telecommunication advances continue to diminish the need for spatial proximity, hastening the pace of new growth on the edges of metropolitan areas and in far-flung rural townships. As growth continues to spread out, there is a widening mismatch between the geography of commuting (tangential and suburb-to-suburb) and the geometry of traditional transportation networks, which tend to

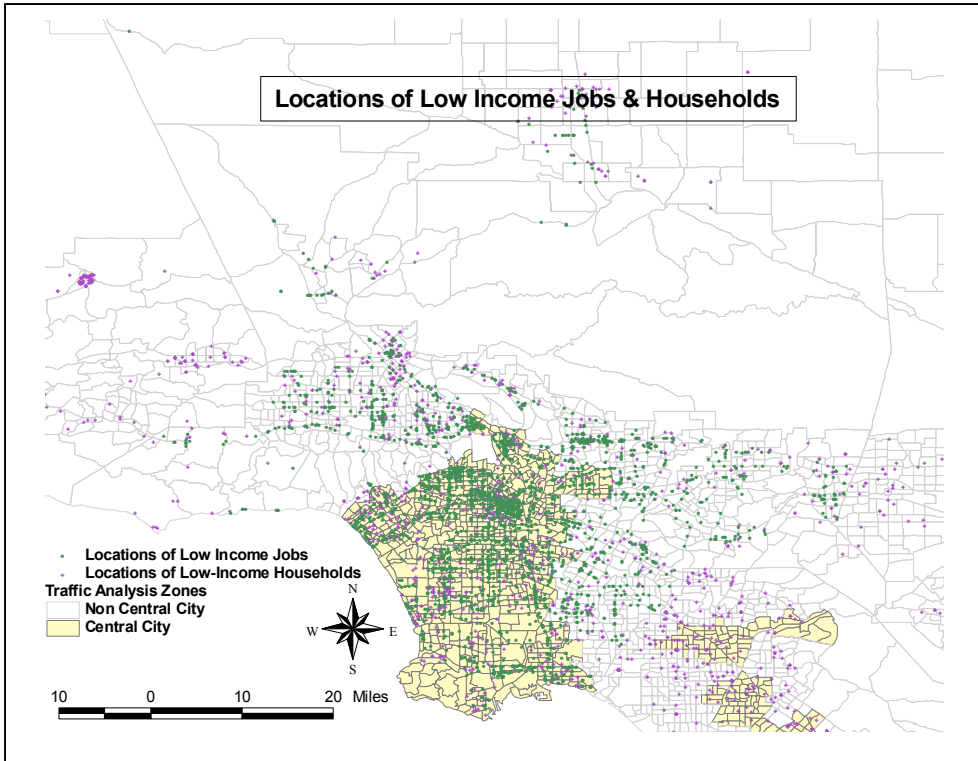


Figure 1. Location of Low Income Jobs & Households in Los Angeles County, 2000

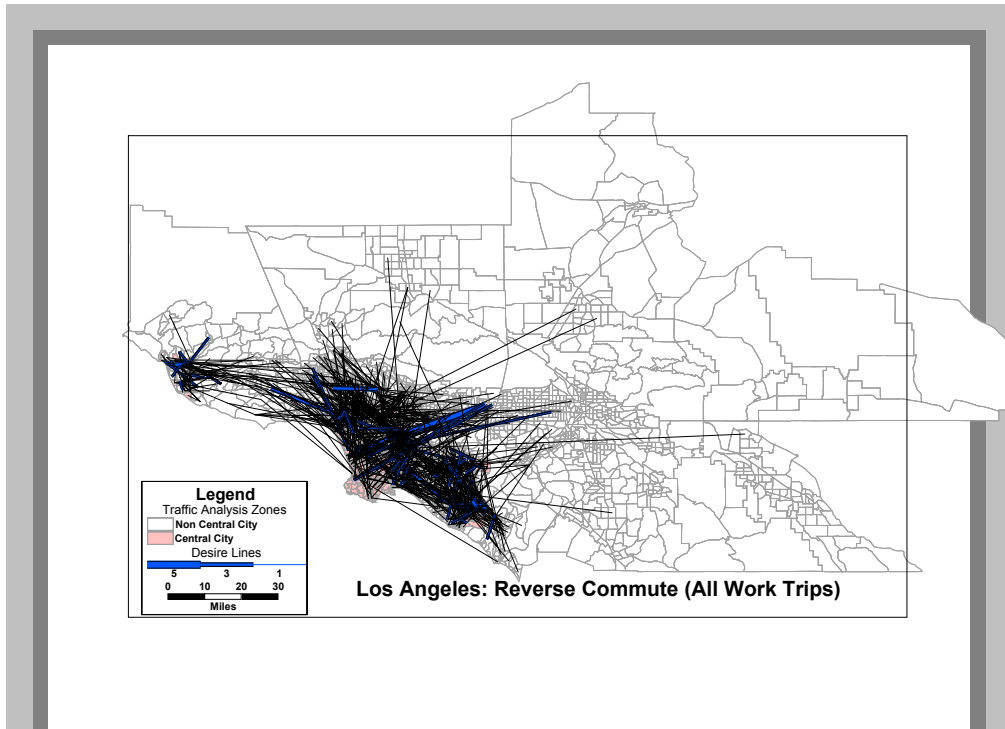


Figure 2. Reverse-Commute Patterns in Los Angeles County, 2000

be of a radial, hub-and-spoke design. Circuitous trip patterns and mounting traffic congestion, especially in the suburbs and exurbs, have resulted.

Collectively, evolving economic, demographic, and urbanization trends have formed new space-time arrangements, conspiring against all forms of movement except the private car. The traditional monocentric city with concentrated activities (e.g., downtowns and 8-to-5 work schedules) supported point-to-point rail services reasonably well. As technology advances gave rise to polycentric settlements and less regular time schedules, more flexible forms of collective-passenger transport, like bus transit and carpools, prospered. As cities and the regions of the future become increasingly “non-centric” and time schedules less certain and predictable, the frontier of space-time possibilities has expanded considerably. An immense challenge faced by the U.S. transportation decision-makers is how to pursue the balanced agenda of mobility, accessibility, sustainability, and livability in light of these protracted, complicating trends.

2. Technocratic Complexity

A complex mobility marketplace underscores the immense challenges in advancing knowledge that objectively and faithfully informs public-policy choices. Quite often, different conceptual frameworks, operational assumptions, methodologies, analytical styles, and modes of interpretation have given rise to sharply contrasting empirical insights. Conflicting research findings, contrasting policy interpretations, statistical malaise, and often-times “paralysis by analysis” have all too often been by-products.

Collectively, these analytical dilemmas represent a form of technocratic complexity. Analytical cross-wiring has been poignantly played out in the debate over “induced travel demand”. Few contemporary issues in the urban transportation field have elicited such strong reactions and polarized political factions in the United States as claims of induced travel demand. Expanding road capacity is said to spawn new travel and draw cars and trucks from other routes. Consequently, road improvements, critics charge, provide only ephemeral relief—within a few year’s time, facilities are back to square one, just as congested as they were prior to the investment. Failure to account for induced demand likely exaggerates the travel-time savings benefits of capacity expansion.

Methodological and interpretative complexities pervade the induced demand policy debate. Emblematic is the issue of causality—might traffic growth induce road investments every bit as much as vice-versa? Some observers point out that for a good century or more road investments have not occurred in a vacuum but rather as a consequence of a continuing and comprehensive effort to forecast and anticipate future travel demand. Accordingly, road improvements act as a lead factor in shaping and a lag factor in responding to travel demand. A study by the Urban Transportation Center at the University of Illinois at Chicago lends anecdotal credence to this position. Using 60 years of data, the study showed that road investments in metropolitan Chicago could be better explained by population growth rates a decade earlier than vice-versa.⁷ For both the Tri-state Tollway (I-294) and East-West Tollway (I-88), the researchers concluded

“major population gains occurred in proximity to the expressways over a decade before the construction of the respective expressways”.

Failure to account for two-way causality between road investments and highway demand has likely led to inflated claims of the induced demand phenomenon and, as a result, distorted highway investment policy. Many other methodological dilemmas faced in studying induced demand – resolution, measurement, and specification – thwart research progress. Road improvements reverberate throughout a road network, including facilities connecting to an enhanced segment. Tracking the source and geographic scope of new demand is exceedingly complex. Conceptually, Figure 3 presents a normative framework for gauging induced demand impacts. The causal chain works as follows: a road investment increases travel speeds and reduces travel times (and sometimes yields other benefits like less stressful driving conditions, on-time arrival, etc.); increased utility, or a lowering of “generalized cost”, in turn stimulates travel, made up of multiple components, including new motorized trips (e.g., latent demand previously suppressed), redistributions (modal, route, and time-of-day shifts), and over the longer term, more deeply rooted structural shifts like land-use adjustments and increased vehicle ownership rates (that in turn increase trip lengths and VMT). Some of the added trips are new, or induced, and some are diverted. While evidence on the induced-growth effects of new highways is limited, roads and prominent fixtures of America’s suburban landscape -- big-box retail, edge cities, and campus-style executive parks – that they serve are clearly co-dependent.

This normative framework was adopted in several recent studies of induced-demand in California. In one, a path-model framework was used to sort out “induced demand”, “induced growth”, and “induced investment” effects.⁸ Recorded traffic increases along expanded freeways were explained in terms of both faster speeds and land-use shifts. Because less than half of the recorded speed increases were statistically attributable to road improvements, a fairly modest long-term induced-demand elasticity of 0.39 was recorded. The longitudinal effects of rising VMT on roadway investments were of a similar order of magnitude. This path analysis produced elasticity estimates considerably below those of earlier studies (that have generally been in the 0.7 to 0.9 range), underscoring the fact that dramatically different results can be produced under different model specifications. Overall, models that have sought to account for two-way causality have yielded lower elasticity estimates (in absolute terms) than those based on simpler, single-equation analyses.

Going from hypo-deductive research to operational transportation modeling and forecasting adds more layers of complexity. Douglas Hunt portrayed the many ways in which second-order induced-demand impacts need to be accounted for within the framework of traditional four-step travel-demand forecasting models.⁹ Figure 4 portrays the full array of spatial activities and relationships encapsulated in traditional four-step models. Figure 5 reflects the pathways in which induced demand – as reflected by route, time-of-day, modal, and land-use shifts – need to be accounted for within the traditional long-range demand-forecasting modeling framework. In practice, lack of empirically

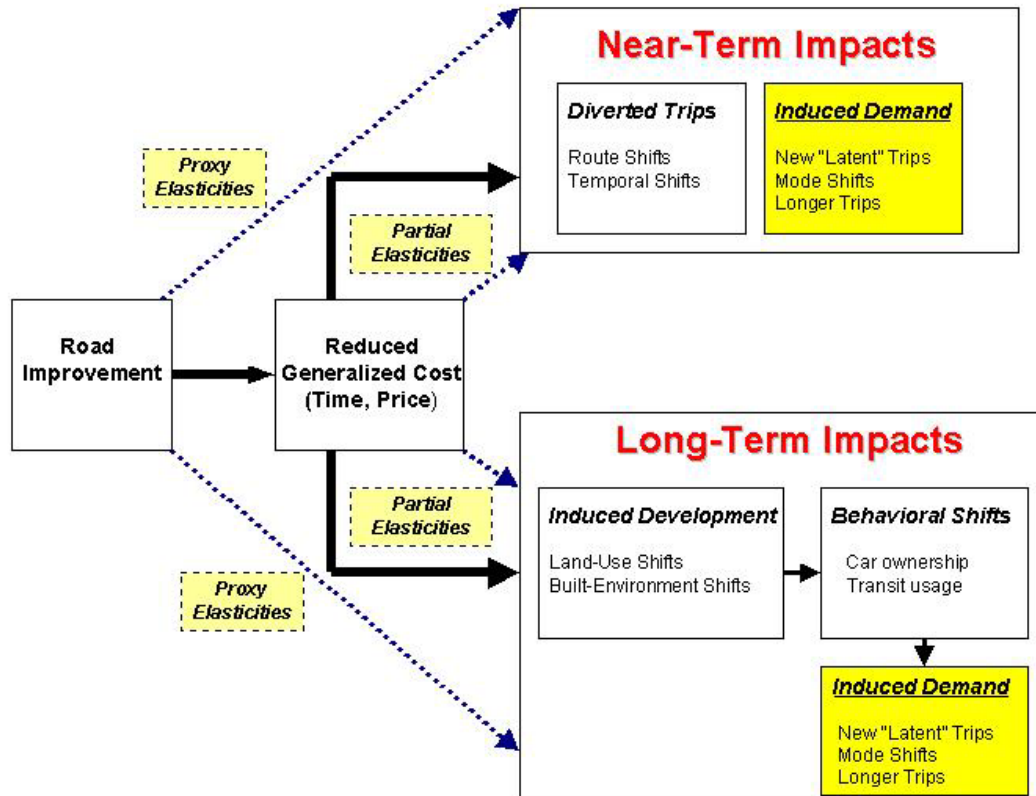


Figure 3. Normative Framework for Studying Induced Travel Demand

demonstrated relationships render operationalizing such adjustments intractable. In viewing such graphic complexities, one is reminded of Douglass Lee’s refrain in his seminal article on “Requiem for Large-Scale Models” – the hyper-comprehensiveness, data-hungriness, vulnerabilities to extreme propagation errors, and “black-box” qualities cast doubt on their usefulness for foretelling transportation future.¹⁰ Nonetheless, Hunt et al. made some headway in their modeling and forecasting of induced-demand effects in investigating various transportation and land-use scenarios for metropolitan Sacramento.¹¹ Models revealed appreciable induced-demand impacts attributed to locational shifts, reflected by feedback mechanisms in dynamic models (with large variations depending upon the specific modeling platform – MEPLAN, TRANUS, DRAM/EMPAL, or SACMET – that was used. For most regional planning entities within the United States, model platforms are nowhere near sophisticated or robust enough to incorporate such complexities. The inability to account for induced-demand within formal modeling frameworks means that, to some degree, road investments unavoidably become more political in nature than they otherwise would be.

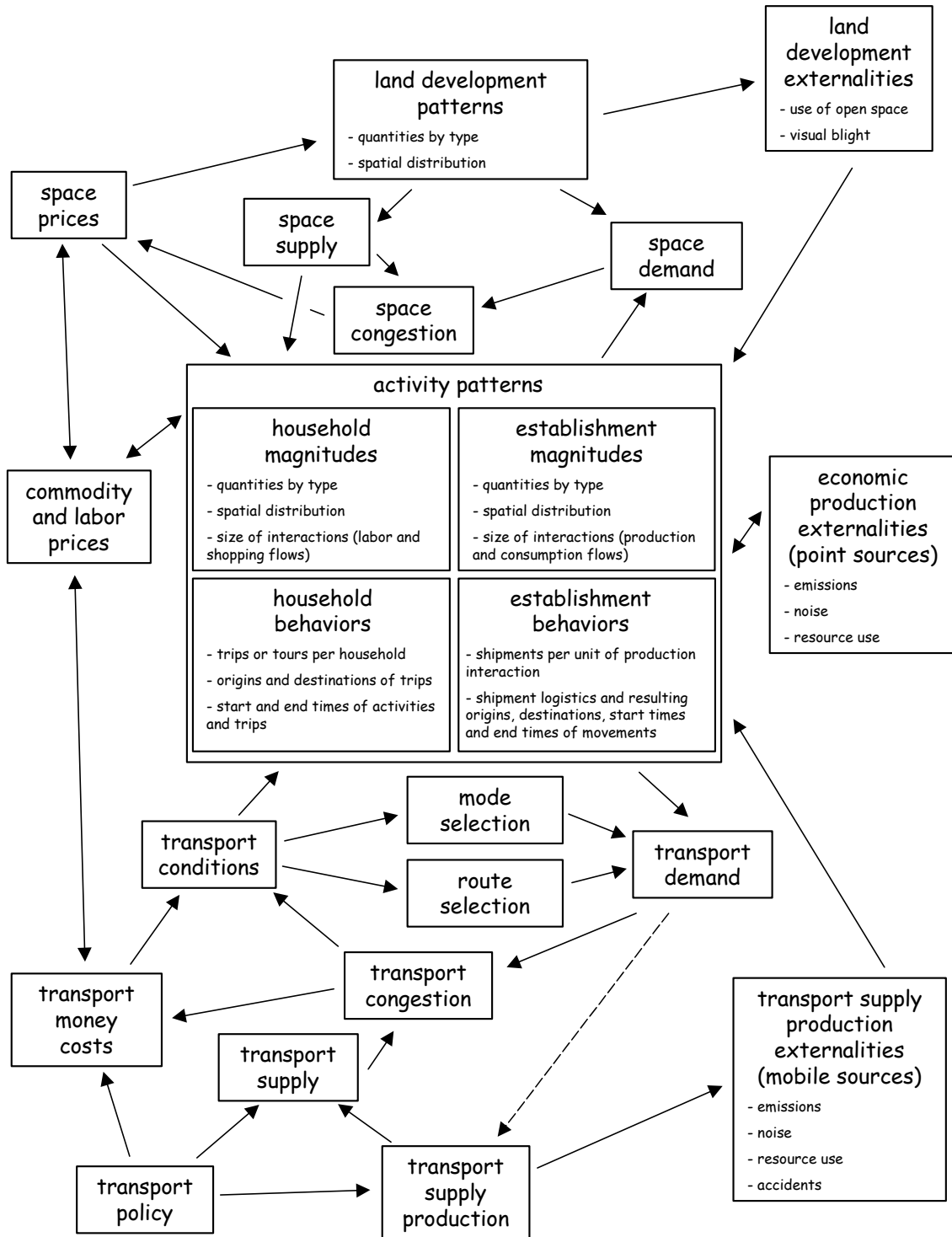


Figure 4. Systems Framework for Modeling Spatial Activities and Travel Demand.
 Source: D. Hunt, Induced Demand in Transportation Demand Models, *Working Together to Address Induced Demand*, Washington, D.C., Eno Transportation Foundation, 2002.

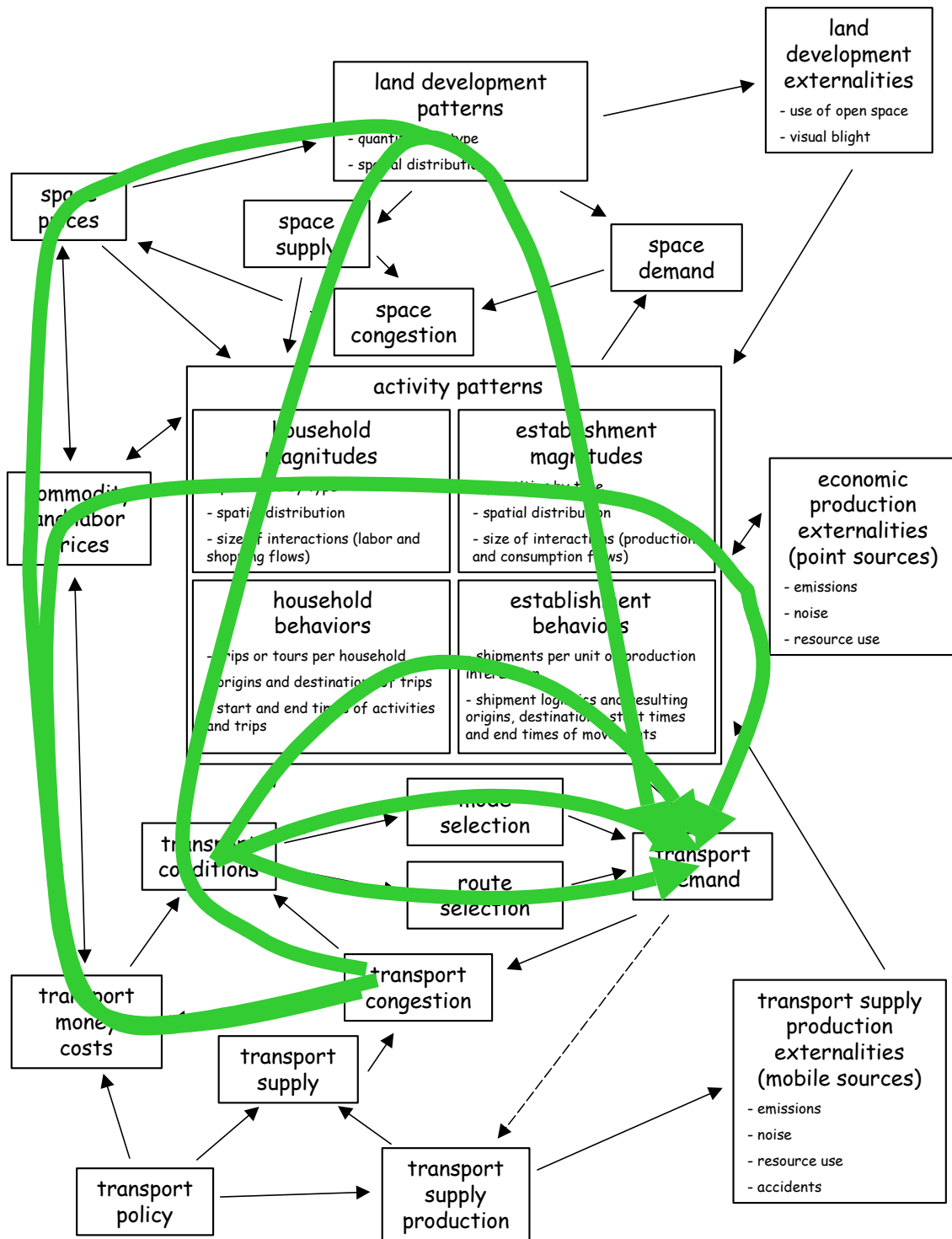


Figure 5. Pathways for Incorporating Induced Demand Effects Within Modeling Framework. Source: D. Hunt, Induced Demand in Transportation Demand Models, *Working Together to Address Induced Demand*, Washington, D.C., Eno Transportation Foundation, 2002.

3. Complexity in the Political and Institutional Landscape

Concerns over sustainability and the high economic costs of serving sprawl has catapulted smart-growth principles to center stage within many regional planning circles of the United States. In America, however, pathways to smart growth are often obstructed by messy institutional landscapes and political detours. Quite often, regional land-use patterns – which set the stage for travel – are the sum product of local, incremental decisions on where to locate a new shopping plaza, whether to rezone a particular land parcel, etc. Rarely do these decisions shape into a coherent vision of the future. One of many institutional impediments to transportation-land use coordination is the mismatch between where decisions on land development are made -- locally -- and the transportation impacts are felt -- regionally. Travel, of course, knows no boundaries. The effects of poor coordination get played out all too often as inefficiencies, negative spillovers, and fiscal disparities. In America, for instance, it is not uncommon for fast-growing communities to place regional trip generators, like big box retailers that fatten local tax coffers, near their boundaries so that surrounding communities absorb much of the traffic burden.

U.S. transportation planning is also mired by bureaucratic inertia and redundancies. Ideally, jurisdiction over transport and land-use matters would match commutersheds -- similar to the regional context in which water resources (watersheds) and air resources (airsheds) planning occurs. In practice, decision-making is fragmented across many jurisdictions and often multiple transportation service-providers (e.g., separate entities involved with public transport, highways, freight, ferry services, etc.).

Another institutional impediment to smart growth is the irregular pace of land-use change. Local and subregional growth often occurs incrementally, in fits and starts. Land-use maps are continuously changing because of zoning amendments, variances, and new subdivisions. In contrast, decisions on regionally important transportation improvements often occur in 2 to 3 year time increments, and are hard to reverse or change in response to unfolding land-use patterns. Thus whereas land use changes are fluid and on-going, large-scale transportation projects tend to be rigid and occur over much longer time increments.

Also hampering coordination is the reality that the benefits of careful transport-land use integration are often not evident until ten or more years in the future. This is inherently at odds with political systems that demand short-term payments, IMTO (“in my term of office”). Elected officials are much more likely to embrace a large-scale road project that immediately relieves congestion and generates lots of jobs and political capital than transit villages, jobs-housing balance, New Urbanism, and other land-use strategies with questionable near-term pay-offs.

An additional institutional impediment is the difficulty in forging any degree of consensus or vision on desirable land-use futures in a highly pluralistic, freely democratic society like the United States. This is magnified by smart-growth initiatives, however well intended. Smart growth planning and development embraces the principle that an

overarching vision should guide the integrated and sustainable transportation planning process, reflecting the fact that travel is fundamentally a “derived demand” – derived by the need to get to and from places or activities. In this sense, transportation is a means to the “land use” end of a trip. Since land use speaks directly to activities that take place over space, normative planning calls for land-use visions to take precedence over transportation visions (with the understanding that transport infrastructure can be a powerful tool for shaping land-use visions). Great examples of cogent land-use visions (based on sustainable urbanism principles) that guided transport investments include Copenhagen (Finger Plan), Stockholm (Planetary Plan), Curitiba (Linear City Plan), and Bogota (Egalitarian City). These communities profited from the presence of visionaries, like Sven Markelius, Jaimie Lerner, and Enrique Penalosa, who could elegantly articulate visions and rally broad-based political support for their visions. In the United States, increasing socio-ethnic diversity and the constitutional protections governing individual freedoms (including personal property rights) means that building any degree of consensus on what constitutes a desirable future is next to impossible. In a pluralist society like the United States, opinions and preferences are scattered all over the map regarding the desirability of compact, mixed-use, pedestrian-friendly development. This all too often has been manifested by U.S. cities aggressively moving forward with light-rail transit investments without any serious thought about the kinds of built environments necessary to sustain these costly outlays. America is littered with examples of clear transportation visions (e.g., modern point-to-point rail systems) absent an articulated land-use vision. This has often meant land development turning its back on rail transit—e.g., lots of campus-style office parks, mega-malls, and big-box retailers and the designation of park-and-ride lots as the dominant land use around rail stops.

4. Promising Developments for Coping with Complexity in America’s Transport Sector

Notwithstanding the complicating effects of megatrends and technocratic-institutional roadblocks, progress is being made in parts of the United States to respond to unfolding market trends, integrate transport and land-use, and institute new institutional arrangements promote efficiency, accountability, and social justice. This section reviews some of these experiences.

Responding to Mobility Markets

Two U.S. examples of responding to emerging mobility markets are car-sharing and client-based mobility initiatives for needy workers. While carsharing has been around for several decades in Europe, only over the past few years has it gained a foothold in American cities, most notably Boston, Seattle, and San Francisco. Besides having fairly high densities and mixed land-use characters, perhaps what these cities most have in common with their European counterparts are limited and expensive car parking. In a recent evaluation of San Francisco’s City CarShare program, I found that vehicle miles traveled (VMT), adjusted for vehicle occupancies and engine-size of automobile trips, generally rose faster for those who joined City CarShare than a control group.¹² Given

that around two-thirds of surveyed City CarShare members come from zero-car household, the sudden availability of cars likely stimulated automobile travel for some. Motorized travel appeared to replace some trips previously made by foot or bicycle. Presumably carshare trips have high value-added in that members pay market-rate prices for use of cars. The majority of carshare trips did not correspond to the peak periods, suggesting many carshare trips did not contribute to traffic congestion. “Judicious automobility” should be looked upon in a positive light since travel desires are being met while keeping the population of private cars lower than it otherwise would be.

As carsharing matures and its membership becomes more mainstream, travel-behavior impacts appear to be changing with time. Evidence from a second-year survey suggests this is indeed the case. Over 70 percent of members had gotten rid of a car or forwent the purchase of a new car by year-two. Also, travel-diary data suggests VMT per capita went down faster for carshare members almost twice as fast as for a control group (for weekday, workday travel). These findings suggest the availability of a shared car has spurred significant numbers of San Francisco households to get rid of a second car within 24 months, and that this in turn spurred more efficient travel and perhaps occasional foot and bicycle trips for in-neighborhood convenience shopping. These results suggest that as new members are drawn from the ranks of car-owning households, the relinquishment of private cars will eventually suppress motorized travel. Innovative, market-oriented car-based strategies like carsharing (along with station cars) hold considerable promise in good part because they respond to shifting demographic and urbanization trends.

In response to welfare-to-work concerns, some U.S. cities and regions have aggressively pursued client-based strategies. A leader in this arena has been San Cruz County, California. There, social-service professionals work with newly employed individuals recently weaned from welfare to custom-design mobility programs tailored to their particular commuting needs. A host of options are available including fairly expensive door-to-door shuttle service (for outlying areas poorly served by public transit), emergency rides home, carpool incentives, work-related emergency payments, mileage reimbursement, and bus passes. The shuttle program not only *connects* needy people to jobs, but also *creates* jobs. Notably, welfare-recipients are trained and hired to drive vans, enabling them to gain firsthand experience in the van business. Evidence suggests custom-tailored programs, which costly on a per capita basis, better achieve hoped-for outcomes than provider-side, transit-based programs – namely, greater success at inducing welfare-to-work transitions.

Also successful has been the family loan program, practiced in Santa Cruz and several other northern California counties, that provides small loans to welfare recipients and low-income parents for purchasing cars. The loans are serviced by four local banking partners that are able to access low-interest federal funds under the Community Reinvestment Act (CRA). Through car ownership, clients are getting to work more quickly and on-time: 18 months into the program, loan recipients reported a 93 percent average reduction in time spent getting to work and a 90 percent decline in work time missed. Additionally, there was a 26 percent increase in attendance at job-related educational activities. Perhaps of most importance are “outcome” measures – i.e., to

what degree did the loans achieve their its intended purpose of promoting welfare-to-work? The best indicator is that average gross incomes rose after loans were issued: by 23.8 percent within the first 6 months of receiving a loan and by 36.9 percent at the end of the loan term.

There are other signs of adaptability to changing mobility markets, such as the launching of station cars and operation of laissez-faire paratransit (from microbus-jitneys in Miami to shared-ride taxis in Berkeley to pedicabs in Manhattan). A market-oriented initiative on the highway side has been high-occupancy toll (HOT) lanes. HOT lanes have been in operation for several years in Orange County (the SR91 Express Lanes) and San Diego County (converted HOV lanes on I-15). A 2001 survey found 91 percent of motorists traveling the I-15 HOT-lane corridor supported choice afforded by HOT lanes.

TOD and Adaptive Re-Use

Transit-oriented development (TOD) has gained currency as a means of curbing sprawl, reducing traffic congestion, and expanding housing choices. Research underscores the mobility and land-development benefits of TOD: if well designed, concentrated, mixed-use development around transit nodes can create a ridership bonus of 200 to 300 percent (above comparable development away from transit) and a land-price value-added as high as 100 percent.¹³ Ridership gains, research shows, are significantly a product of self-selection, with those with a lifestyle predisposition for transit-oriented living conscientiously sorting themselves in apartments, townhomes, and single-family units within a easy walk of a transit node. For the San Francisco Bay Area, nested logit modeling revealed that upwards of 40 percent of the ridership bonus associated with TOD is a product residential self-selection. This finding underscores the importance of introducing market-responsive zoning in and around transit nodes – zoning that acknowledges that those living near transit tend to be in smaller households with fewer cars. Flexible parking standards are one initiative introduced in some U.S. settings. Also promising are Location Efficient Mortgage (LEM) programs that make it easier for someone to purchase a home near transit stations (reflecting the fact they will likely spend less money on automobility as a result).

Currently, over 100 examples of TOD exist in the United States. Most impressive has been the Rosslyn-Ballston corridor in Arlington County, Virginia – since Washington Metrorail’s opening in the late 1970s, some 14 millions square feet of office space and 25,000 housing units have been built within a quarter-mile of rail stations. Seven times the land area would have been necessary to accommodate this growth (which today accounts for 52 percent of the county’s tax base) if built at suburban standards. Portland, Oregon is another successful U.S. example of TOD, a product of several decades of revitalizing the downtown, ramping up transit services, and targeting infill housing development (and master-planned projects, like Orenco) to station areas. Portland’s share of work trips by mass transit rose 18 percent during the 1990s, bucking a trend toward declining transit market shares in many other parts of the United States. While some critics charge urban containment policies and TOD have increased housing prices,

most serious studies of the situation suggest demand to be in a well-planned and highly livable U.S. city like Portland explain rising prices more than restricted land supplies.¹⁴

One of the more efficient land-use changes occurring in the United States has been the adaptive re-use of superfluous surface parking lots at transit stations. Car parks are proving to be a blessing in disguise for they provide large swaths of conveniently located, pre-assembled land with great regional accessibility. Most attractive are surface parking lots at train stations. Many were originally overbuilt, thanks to generous federal funding for rail development. As areas have matured and surrounding land values have increased, market pressures are prompting U.S. transit agencies to sell off at least portions of them as a means to both create a ridership base and to reap windfalls in the form of value capture. Often, the profits earned are more than enough to cover the cost of replacement structured parking, freeing up land for infill development. Surface parking conversion, then, is a back-door form of land-banking, which in many European cities, including Stockholm, has been a principle means of leveraging transit-oriented development.

The city of San Jose, California and the Santa Clara Valley Transportation Authority (SCVTA) recently joined forces in designing a mid-rise, mixed-use project on the park-and-ride lot at the Ohlone-Chynoweth light rail station. Historically, the region's light-rail system has struggled to build a ridership base in large part because much of its service territory is the Silicon Valley, a landscape of sprawling office campuses and car-oriented shopping plazas. However, as the demand for affordable housing with good access to the Silicon Valley has intensified, local policy-makers have come to the realization that parking-lot infilling was too good of an opportunity to pass up. At the time of project development, only 30 percent of the 1,140 original parking spaces at the Ohlone-Chynoweth station were used. Already, 500 parking spaces have been converted to 195 units of two and three story town homes, a retail plaza, a child-care facility, and a community recreation center.

Another promising area is to smartly re-use antiquated and dysfunctional shopping centers. The trend in retailing toward warehouse-shopping, e-commerce, and mega-entertainment malls has led to the closure of many out-dated 1960s and 1970s shopping centers across the United States. Like rail parking lots, one of the biggest assets of dying shopping centers is their huge amount of pre-assembled real estate. One of the more successful adaptive re-uses of a shopping center and integration with rail transit is The Crossings project in Mountain View, California. The Crossings is an 18-acre compact, mixed-use, and walkable neighborhood near a commuter rail line some 30 miles south of San Francisco. It replaced a slowing dying shopping center and movie theater that were surrounded, in big-box fashion, by a huge, underutilized surface parking lot. The project's 540 housing units have commanded a rent premium, partly because of proximity to rail and partly because of the high-quality of urban design. Many well-paid young professionals with jobs in downtown San Francisco and the nearby Silicon Valley have opted to buy into The Crossings, drawn by its ambience and exceptional accessibility to transit. Generous landscaping and public spaces punctuated by an internal pathway network have created a highly attractive urban milieu, notwithstanding residential densities of 30 units per acre, fairly high by suburban California standards.

Zero-lot lines and rear-lot parking have allowed such densities to be achieved. As a gateway to the Mount View CalTrain station, The Crossings stands as one of the few transit villages oriented toward commuter rail.

New Institutional Arrangements

As noted earlier, traffic congestion in much of the U.S. stems, in part, from ineffective institutional structures that lead to a discordance between regional land-use and growth-management planning and regional transportation investments. While some states like Florida and Maryland have made progress in advancing concurrency laws that mandate land-use and transportation infrastructure be harmonized, for the most part ineffective institutional arrangements have resulted in mismatches between urbanization and infrastructure development. The state of Georgia has made a bold departure in this regard by forming an all-powerful regional transportation authority that is well-positioned (with purse-string powers at its side) to coordinate mobility planning and land-use development. Called the Georgia Regional Transportation Authority (GRTA), the organization not only oversees the planning and expenditure of funds for all urban transportation improvements in the state, but also has broad control over regionally important land uses, like shopping malls, industrial parks, and sport stadia. Local land-use decisions must conform to broader regional transportation and development goals, otherwise GRTA can effectively veto the decision by threatening to cut off all state infrastructure funds. GRTA's formation was largely in reaction to decades of poorly planned growth in metropolitan Atlanta, matched by ever-worsening traffic congestion. The announced plan of a large high-technology employer to relocate out of Atlanta because of unsustainable traffic congestion and a declining quality of life was a political wake-up call. The region's new planning philosophy — one of balancing urbanisation and transportation investments — aims to enhance mobility while also placing the region on a smart-growth pathway. The ability of GRTA to leverage the mix-use transformation of an in-city brownfield site abandoned by the Atlantic Steel company into a mixed-use village has been an important victory for smart growth. For purposes of securing federal infrastructure funds currently frozen because of Atlanta's violation of air quality mandates, GRTA and others successfully argued that infill development would be less harmful to Atlanta's air basin than comparable growth on the car-dependent edges.

5. Close: Expanding Choices in a Complex World

While complexity in America's mobility marketplace and institutional landscape has stymied efforts to move forward with bold transportation initiatives, it has also given rise to a mindset that calls for more flexibility, market-responsiveness, and variety in the transportation/land-use arena. Although critics of smart-growth planning equate it with social engineering, in truth anything that widens choices in where to live, work, and shop as well as how to travel is inherently in society's best interest. Clearly, living in compact, mixed-use, easily walkable communities is not for everyone. Middle-class and well-to-do households with several or more children and a preference for privacy and seclusion will continue to reside mostly in the suburbs and beyond. Back-office functions will continue to flock to outlying and far-flung places where real estate prices are cheaper.

Big-box retailers and multi-plex cinemas will continue sprouting on the outskirts. Smart-growth initiatives in no way intervene in such free-market locational choices as long as those making the choice pay something which comes reasonably close to reflecting true social costs. Rather, smart growth – whether in the form of an infill housing project on a former transit parking lot or an edge city with a balance of jobs-to-housing and roads-to-busways – is mainly about expanding choices and offerings in a free market context. More variety in housing choices, in particular, is an adaptation to the steady growth in single-person households, childless couples, and empty-nesters, many of which prefer in-city, small-lot living in attractive environments that are well-served by public transport and easy to get around by bike and foot. Variety and choice is something that finds broad political and ideological appeal. It is precisely for this reason that integrated transport and urbanism – despite the many barriers that must be overcome -- is likely to prevail as America’s dominant paradigm of community-building in the twenty-first century.

Notes

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