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The University of California Transportation Center, founded in 1988, facilitates research, education, and public service for the entire UC system. Activities have centered on the Berkeley, Davis, Irvine, Los Angeles, Riverside, and Santa Barbara campuses.



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Front cover: Paris

Traditions and Neotraditions

A long-standing tradition has city planners in the role of creative designers of towns and cities. Perhaps that role is best illustrated in the new town plans of Great Britain with their carefully designed settings for modern life, complete with decent housing, spacious parks, nearby job sites, and high-quality public facilities and services. The basic idea holds that good physical settings make for good living. In that context, one of America's most eminent sociologists once described city planning as the last stronghold of utopianism.

That image of city planners has been in abeyance in recent decades. Once city planners got mixed up with public administrators, engineers, and economists, they seem to have lost the utopian self-image. They then saw themselves as practical doers rather than as big-thinking urban architects. They became administrators of zoning laws, builders of infrastructure, analysts of costs and benefits, and designers of simulation models. Hard stuff.

But the old tradition has come alive again. As in the early days of the 20th century, architects and urban designers are now advocating self-styled avant-garde city planning. Under banners labeled "New Urbanism" and "Neotraditional Planning," some contemporary urban designers are promoting a renewed vision of livable cities. Harking back to 18th and 19th century models, the New Urbanists are nostalgically calling for a return to physical town patterns of earlier times.

Their ideal has medium-density housing close to jobs, retail shops, and civic institutions clustered in town centers. Walking is a dominant mode of access, and automobiles play greatly reduced roles. Rail transit is a key ingredient: residents will prefer to travel by train, and stations will become the magnets attracting activities to the town center. In turn, village life will make for cohesive social communities.

Early physical designs for Neotraditional towns have been handsome. As alternatives to the drab, if not ugly, physique of many contemporary American suburbs, they hold great promise of pleasant living environments. It's scarcely any wonder they've attracted enthusiastic responses in many quarters.

Several UCTC researchers have been examining prospects for New Urbanism. This issue of ACCESS reports on

a few of them. They describe changing commute patterns as jobs move from central cities to suburbs. They ask how rail transit might affect land use patterns. In turn, they ask how Neotraditional land use patterns might affect daily travel behavior—how they might promote walking to shops, transit riding to work, and fewer trips by car.

In general they find empirical evidence on effects of Neotraditional designs to be weak or nonexistent. As one of our authors puts it, that's "a wobbly foundation indeed for current transportation policy." The findings emerging from this evaluation research suggest that New Urbanism may be promising more than it's likely to deliver. Expectations of greatly reduced traffic congestion seem unduly optimistic. Not many suburbanites are ready to abandon their cars in favor of either light- or heavy-rail transit. Indeed, trend lines everywhere portray persistently declining transit riding, even where new rail lines have been installed. And then, as suburban dispersion extends further, so too does demand for cars. That turns out to be true among black workers commuting from central cities to suburban jobs, as it has been for white suburban workers commuting to suburban jobs.

These studies suggest that, despite attractive promises of New Urbanism, new rail-transit systems, and even new Internet links, near-term revolutions are unlikely. I find that discouraging, for I remain addicted to city planning's visionary tradition, still wishing we could redesign our urban environments. But I know, of course, that behavioral changes do not follow directly from changes in physical environments. I know, too, that cause-and-effect relationships must be demonstrated through systematic empirical observation, not merely by voicing a creative idea.

So, until better evidence turns up, I expect we'll be building more suburbs in the present models and driving more cars over more miles. Nevertheless, I hope we'll continue to search for ways to build better environments than we've so far achieved. However prosperous the contemporary suburbs have been as a setting for modern life, our long-standing tradition insists we can surely do much better.

Melvin M. Webber

Travel by Design?

BY RANDALL CRANE

Over the past few decades, most questions about land use/transportation linkages have dealt with the influence of transportation infrastructure on development patterns. Analysts have examined how highways and mass transit contribute to urban sprawl, how they affect the local balance of jobs and housing, or how they affect population density. There also exists a long, if less traveled, history of viewing these linkages from the opposite direction: examining how land use influences urban travel.

Recent work of the latter sort goes well beyond estimating the number and types of car trips that various land uses generate. The so-called New Urbanists and Neotraditional planners are much more ambitious. Among other things, they argue that higher residential densities, more-open circulation patterns, and mixed land uses will remedy many traffic problems.

The appeal of such outcomes is hard to deny, but can these designs deliver? We don't know. There's surprisingly little knowledge about how urban patterns influence travel patterns. Existing evidence is either mixed, contrary, or difficult to interpret. The potential traffic benefits of New Urbanism reflect an interesting set of hypotheses, but they remain a weak basis for current transportation policy.

URBAN DESIGN AS TRANSPORTATION TOOL

The proposed urban and suburban developments—alternatively described as either Neotraditional (based on the look and feel of “traditional” small towns and neighborhoods) or New Urbanism (essentially Neotraditional plans with a somewhat more explicit social agenda)—are easy on the eye and self-consciously familiar. Their renewed emphasis on front porches, sidewalks, and common community areas, as well as the half-mile wide “village scale” of many such plans, are perhaps the most

visible examples. The Florida resort town of Seaside, designed by Duany and Plater-Zyberk, is justly noted for the clapboard nostalgia of its houses and its weathered old-town style, although barely ten years old. Recent developments in Southern California and Portland also successfully feature side-garages, big front porches, fewer cul-de-sacs, and nostalgic building designs.

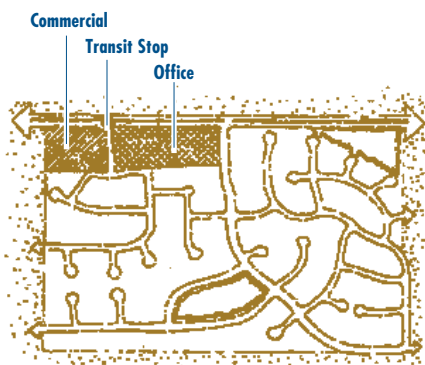
In addition to these aesthetic architectural elements, the new developments often feature a substantial transportation agenda. As Ruth Steiner notes in this issue, New Urbanists want residents to walk more and drive less. Few would quarrel with the idea of reducing traffic problems. Progress by traditional traffic engineering has seemed elusive; and, although planners are intensely receptive to new ways of reducing car use, their options are limited. The cost of mass transit is ballooning out of proportion to expected benefits, and conventional strategies, such as HOV lanes and higher parking fees, have not changed most people's driving habits.

The problem, New Urbanists argue, is that these incentive strategies ignore the more fundamental facts of how urban developments are spatially configured. They say the treatments attack the symptoms, not the disease. Their solution? Higher density, mixed land use, and grid-like circulation patterns that will discourage driving, shorten trips, and aggressively encourage walking and transit use. Although deceptively simple in many respects, the rationale and method of these proposals have found wide acceptance within the planning community. The idea that auto travel will decrease with more-compact land-use has proven so appealing that almost all discussions of the new designs report it as though it were a proven fact.

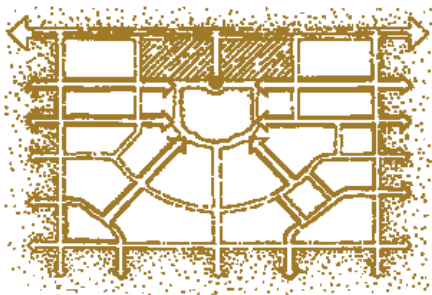
These and related ideas are finding their ways into many public policy documents aimed at improving air quality, reducing traffic congestion, and improving “sense of community.” ➤

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Suburban cul-de-sacs



Neotraditional grid design

Source: Calthorpe Associates, 1992

Recent plans for Los Angeles, Sacramento, and San Diego, among others, incorporate New Urbanist motifs. Prominent architect and Neotraditional planning evangelist Andres Duany recently claimed, in *Consumer Reports*, that the transportation benefits of these designs are their most important outcomes. The strong appeal of New Urbanism, then, is that it promises to achieve two very attractive objectives with one stroke—to create improved living environments and to reduce traffic. Unfortunately, research supporting the latter argument is both weak and flawed.

WHAT DO WE KNOW?

How *does* urban form affect travel behavior? The available evidence is difficult to interpret because the literature commonly addresses aesthetic, social, and transportation topics simultaneously. Only a few actual New Urbanist developments are fully built out at this time, and there are even fewer studies of their effects. Hence, even careful quantitative evaluations tend to be based either on hypothetical environments, as with engineering simulations, or on data obtained from older “traditional” communities that share some characteristics with proposed “Neotraditional” communities.

Simulation studies have asked whether grid-like street patterns lead to fewer vehicle miles of travel (VMT) than curvilinear patterns, essentially by reducing potential trip distances. Peter Calthorpe’s assertions regarding the transportation benefits of his suburban designs depend heavily on a simulation by Kulash, Anglin, and Marks. Their study found grid streets make for 57 percent less VMT for trips within the neighborhood than do conventional suburban networks because grids bring origins and destinations closer together. So, for a given number of shorter trips, would people then drive fewer miles? The obvious answer is “yes.” But what about secondary behavioral responses, such as changes of mode or changes in trip frequency? Most simulations assume away such responses, even though they promise to predict what will actually happen.

Empirical studies, in contrast, can’t assume away behavior. They must explain it. The research strategy in most empirical analyses is to search for correlations among neighborhood features and observed travel—sometimes controlling for other relevant factors, sometimes not. Even then, Susan Handy and others report that outcomes are



Picket fences and front porches mark Seaside, Florida

indeterminate—that traditional grid-based neighborhoods may be associated with either fewer or more automobile trips than neighborhoods with modern “loopy” street patterns, so that overall VMT might also either fall or rise.

Interpreting the range of results in any one case is also problematic because causal theory is not clearly established. What can we generalize about the factors that generate more car trips in one environment and less in another? While some studies based on observed behavior do attempt to control for different trip purposes (e.g., shopping versus commuting), trip lengths (e.g., neighborhood versus region), and demographic variables likely associated with trip demand (e.g., income, gender, and age), the approach is typically *ad hoc* and hence idiosyncratic. Further, the wide range of outcomes found in this work reveals little about whether Neotraditional designs can deliver the transportation benefits they promise.

One obstacle for planners and researchers alike is that travel behavior is extremely complex. It is difficult to explain even a quarter of the variation within either aggregate or individual travel data. This difficulty reflects the lack of a strong conceptual framework that would allow empirical results to be compared or interpreted in a standard manner. While recent studies (e.g., Cervero and Kockelman) make great strides in measuring and characterizing land use variables, they rarely possess even rudimentary behavioral foundations. Instead they employ various measures, such as accessibility, pedestrian friendliness, and density as control variables in *ad hoc* regression specifications.

Nearly all empirical studies also ignore the truncated nature of the data. People who live in one type of neighborhood (defined by street pattern, density, or level of access) cannot reliably be directly compared with people who live elsewhere. They are self-selected, and their choice of residence reflects their travel preferences as revealed by the travel options available to them at that site. People who want to walk, bike, drive, or travel by train seek houses where they can do that. For example, those who live near commuter rail stations may take the trains more often than others, perhaps because they deliberately chose to live near a station. The fact that station-area residents ride trains is not evidence, by itself, that additional station-area residential development would improve rail ridership. Sample data reported in comparisons of this kind are systematically biased.

In sum, given the problems with available data and the generally weak behavioral content of otherwise careful empirical studies, credible information on the effects of Neotraditional planning is quite rare.

NEW EVIDENCE

In recent articles and a forthcoming book, Marlon Boarnet and I contend that we can overcome many of these problems by systematically isolating the separable influences of urban design characteristics on travel. We try to clarify which results directly follow from the designs and which may or may not. We want to know how confident our forecasts can be and to check exactly which hypotheses are to be tested against the data. We then seek more-reliable tests of these hypotheses.

Any analysis of trip frequency and mode choice requires a discussion of the *demand* for trips. Nevertheless, even rough estimates of demand are typically absent from planning and land use studies. Demand analysis permits us to ask behavioral questions, such as whether differences in trip distance influence an individual’s desire and ability to make trips by any particular mode. ➤



Individuals make choices based on their *preferences for the benefits* obtained by travel and on the *relative costs* of making different trips and of taking different modes. Preferences reflect attitudes and tastes that vary with the purpose of the trip and with the experience of driving versus walking. They probably also correlate with demographic and with idiosyncratic personal characteristics. But the decision whether to take a trip to the coffee shop by car or by foot depends not only on how one feels about those options, but also on external factors, including the cost of using one mode versus another. One may prefer to drive, but if gasoline or parking expenses are high enough, walking may be preferable. Thus the demand for walking trips is explained not only by one’s preferences across modes but also on the cost of walking relative to the cost of driving. Remarkably, past empirical work about the influence of neighborhood design on travel has neglected the role of costs in choosing among trips and modes.

This simple framework has several direct and immediate implications for our study. In particular it suggests that while introducing some design elements, such as traffic calming (i.e., slowing cars down by narrowing lanes, adding speed bumps, and eliminating through traffic), probably does reduce car travel, such changes may also produce unknown effects. Some may even *increase* driving in these settings. For example, an open circulation pattern that makes for short trip distances can also stimulate trip taking; shorter trips take less time and therefore cost less. For example, people may shop more often if stores are nearby, and they may make so many shopping trips that they drive more miles. This bears repeating, since this outcome is rarely recognized: *Shorter car trips can mean more trips and more miles.*

Table 1 summarizes this range of plausible results of different neighborhood design features on travel behavior. The first two columns restate the results just summarized for shorter trips in a grid-type or more-open street network, or for slower trips through

TABLE 1
Qualitative Effects On Car Travel
of Different Neighborhood
Design Features

TRAFFIC MEASURE	DESIGN ELEMENT			
	Grid (Shorter trips)	Traffic Calming (Slower trips)	Mixing and Intensifying Land Uses	All Three
Car trips	Increase	Decrease	Either Increase or Decrease ²	Either Increase or Decrease ³
VMT	Either Increase or Decrease ¹	Decrease	Either Increase or Decrease	Either Increase or Decrease
Likelihood of walking rather than driving	Either Increase or Decrease	Increase	Either Increase or Decrease	Either Increase or Decrease

¹ Depending on how sensitive trips by each mode are to trip length

² Depending on trip purpose, trip length, and induced congestion

³ Depending on relative mix of elements

traffic calming. The third column considers the range of effects from mixed land use. Owing to their countervailing effects on the relative costs and benefits of each trip, these also have ambiguous net effects on travel. With the exception of traffic calming, Neotraditional design features have unknown outcomes for car travel, either alone or in combination. Their actual outcomes depend on the specific details of their implementation in each location, not on their intrinsic traffic-affecting properties.

Thus we can understand the ramifications of Neotraditional planning only by observing actual behavior. Many problems associated with empirical studies can be corrected or otherwise statistically finessed. To see the specific effects on neighborhood travel behavior of street configuration and land use variables, Richard Crepeau and I looked into detailed travel-diary and street-pattern data. The travel data for over 2,000 individuals are from the 1986 Travel Behavior Surveys developed jointly by the San Diego Association of Governments and the California Department of Transportation. We added several measures of land use near each residence in the study, as well as data on the local street network.

Our model hypothesized that trip frequency and mode are explained by several carefully identified price, taste, and land use variables. This attention to straightforward behavioral factors remains unique in this literature. Following a regression analysis of these data for nonwork travel, we found *no evidence that the neighborhood street pattern affects either car-trip generation or mode choice*. This is true whether we consider only short trips or long trips, or only trips for specific purposes such as for shopping.

In a separate study, Boarnet and Sarmiento deal with the self-selection problem by explicitly modeling the set of joint choices: where to live and how to travel. Correcting for this bias, they also find that land use variables do not influence travel in their Southern California sample. Our forthcoming book integrates these approaches and data, again finding no evidence that land use patterns explain individual travel patterns when data on other relevant factors are statistically controlled.

Results in other regions may vary, and that is exactly our point: Transportation benefits of Neotraditional designs are neither certain nor self-evident.

CLOSING COMMENT

I find much to like in New Urbanist designs, and regret I lack the space here to elaborate why. In brief, they offer a generally thoughtful and attractive alternative to what many consider ugly or banal about conventional suburban development. However, there is no convincing evidence that these designs influence travel behavior at the margin. They remain a wobbly foundation indeed for current transportation policy.

We have much to learn. Improved understanding of how, and if, urban form affects individual and aggregate travel could help transportation planners immensely. Better measures of land use, supplemented by statistical specifications relating those measures to travel costs and benefits, are key to improving empirical work on these questions. Meanwhile it's prudent to recognize that neither every component of New Urbanism, nor every claim, is necessarily a good idea—a possibility largely ignored in the literature. We must strive to avoid new urban and suburban developments that, although pretty and ambitious, might unintentionally cause more traffic problems than they solve. ♦



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Traditional Shopping Centers

BY RUTH L. STEINER

“The alternative to sprawl is simple and timely: neighborhoods of housing, parks and schools placed within walking distance of shops, civic services, jobs and transit—a modern version of the traditional town. The convenience of the car and the opportunity to walk or use transit can be blended in an environment with local access for all the daily needs of a diverse community. It is a strategy which could preserve open space, support transit, reduce auto traffic and create affordable housing.”

—Peter Calthorpe

The New Urbanist goal to create pedestrian-friendly transit villages is hard to criticize. Transit villages promise reduced traffic congestion and heightened quality of life. Their formula is simple: Create clusters of houses, shops, jobs, and social services amidst neighborhoods where transit riders and pedestrians outnumber drivers.

Proponents’ assert that such districts will change travel behavior and enhance daily activities, ultimately reducing traffic. First, they expect neighborhood retail shops will meet most shopping and service needs of nearby residents. Second, they expect higher density residential developments will attract enough people living within walking distance to support a variety of businesses. Third, they expect people living and working in such neighborhoods will make fewer and shorter automobile trips—that they’ll choose walking, cycling, or transit riding more frequently than do residents of lower-density neighborhoods. New Urbanist designs attempt to recreate elements of traditional neighborhoods built prior to World War I. These are typically marked by mixed land use, grid street pattern, and higher than usual density. If possible, they are located at rail-transit stations.

As New Urbanists have become more vocal, so have their critics. They suggest that most people don’t wish to live in high-

density neighborhoods or near commercial areas. They observe that forecasts of rail-transit riders have been highly exaggerated. They note that where people do use transit, they do so mostly when going to and from work, seldom for routine shopping. Furthermore, they say that people choose to shop where they can readily find their preferred goods at acceptable prices, not simply at the nearest store. Finally, they contend, higher-density residential development will not eliminate traffic congestion because people will still own and use cars.

In an attempt to assess whether the New Urbanist predictions are plausible, I studied six shopping districts located in established, traditional San Francisco Bay Area neighborhoods that exemplify New Urbanist ideals. The districts incorporate the basic design attributes they deem important. Each has a variety of community services and office employment, and each is within walking distance of a neighborhood built on a grid-street pattern. With the exception of an old suburban shopping mall located adjacent to a Bay Area Rapid Transit (BART) station, each has continuous sidewalks fronting clusters of retail shops. Together, they represent the array of sizes and activities considered appropriate to transit villages or main street shopping areas. Each is surrounded by medium-density residential development >

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(thirteen to twenty-one persons per gross acre) with households having incomes near the regional median. Four centers are within a half mile of a BART station, offering a test of the transit-village model.

While each shopping district offers grocery stores, restaurants, and convenience services such as banks and pharmacies, they vary in scale and character. The smallest, Kensington, is a classic neighborhood center with twelve retail businesses, including a hairdresser and a video store, along with small medical and other offices. The largest, El Cerrito Plaza, is an old 1960s-style shopping mall directly across from a BART station, but separated from it by a large parking lot. The mall has deteriorated in recent years, especially following the closure of its only department store.

Between those extremes, Market Hall is an upscale neighborhood center immediately adjacent to a BART station. Lining a busy two-lane commercial street, it offers a variety of clothing, antique furniture, and specialty food shops, along with trendy restaurants and many convenience services. Apartments and offices are located on the floors above many of the retail stores. Less than half a mile away, the Alcatraz area is equally bustling, offering similar retail outlets, restaurants, large supermarket, and convenience services. There is no BART station in the immediate vicinity.

Slightly smaller, Elmwood has a quaint, old-town feel, offering a mix of folk art, gifts, clothing, convenience services, and casual restaurants. There is also a movie theater and a post office. The Hopkins area is similar in size, but contains a well-known produce market, specialty food shops, and a horticultural nursery that attract many visitors from outside the area.

I drew data describing the shops and offices and their users from a land-use inventory, formal surveys, open-ended interviews with merchants, and an intercept survey of 1,000 customers in the six shopping areas asking about travel and shopping behavior on the day of the survey. These were followed by a more specific survey that provided demographic and socioeconomic details, descriptions of usual travel patterns, and attitudes towards the shopping district. In addition, users of the BART stations near these shopping areas described their modes of access to BART and their uses of the adjacent shopping areas.



SOME SHOPPERS DO WALK

Consistent with New Urbanists' expectations, I found that significant numbers of customers in each of these shopping districts did indeed walk there. Excluding the old suburban shopping center, to which only about 10 percent of customers walked, 25 to 50 percent of customers reached the other five shopping districts on foot. Residents living within a mile of the shops were most likely to walk; almost 66 percent of residents of three neighborhoods did so. The average walk was a third of a mile; the longest, about two miles; 75 percent walked less than half a mile.

These numbers somewhat understate walking frequency, however, because they include visitors from outside the surrounding neighborhood who obviously couldn't walk. In five of the districts over 85 percent of these outsiders drove. About 15 percent of visitors to Market Hall came by BART, in conjunction with their commute trip; the station is only a crosswalk away. Two shopping areas selling goods primarily for residents' daily needs (Kensington and Alcatraz) attracted a majority of customers from the surrounding neighborhoods. But two others (Elmwood and Hopkins) attracted almost equal percentages from the adjacent neighborhood as from outside. In Elmwood, residents and nonresidents had distinctly different shopping patterns: residents stopped for convenience goods (dry cleaners, pharmacy, hardware) while nonresidents stopped at clothing and gift shops. Patrons at Hopkins were both residents and nonresidents, and primarily shopped for specialty foods. The two shopping areas attracting most of its customers from outside the neighborhood (El Cerrito Plaza and Market Hall) are adjacent to BART stations—even though one is a rundown shopping mall and the other, a trendy commercial center.

Despite the popularity of walking, a significant percentage of each neighborhood's residents drove to the adjacent shopping area. This was especially true in the two areas with adequate parking, where there were more than twice as many drivers as walkers. For those living within a half-mile of the shopping districts without adequate parking, up to 30 percent drove, especially if they were shopping at grocery stores or at several specialty food shops.

TRANSIT RIDING AND USE OF THE SHOPPING AREA

Over a third of BART riders walked to the train from adjacent neighborhoods. However, even though they walked to BART, they didn't stop at shops near the station. Less than 20 percent of BART riders stopped in the adjacent shopping area in conjunction with the transit trip.

Surprisingly few customers came to the shopping districts by public transit, and they made these trips mostly in the late afternoon and evening commute hours. Overall, only about 5 percent of shoppers used any form of transit, evenly split between bus and BART. On weekday afternoons about 20 percent arrived at Market Hall by BART, but BART riders didn't walk long distances after that. Only about 3 percent of customers arriving at Alcatraz had arrived by BART, less than half a mile away.

At El Cerrito Plaza, within a quarter of a mile of the BART station, only 2 percent came by BART on weekday afternoons and crossed the large parking lot. Transit users were unlikely to stop in the shopping district even after they arrived on transit and despite the large number of low-rise apartment buildings surrounding El Cerrito Plaza. It seems people are unwilling to walk across extensive parking lots. ➤





TRAFFIC AND PARKING

Thus New Urbanist claims are only partly fulfilled in these six traditional shopping districts. On one hand, a significant percentage of customers walk to these centers. However, because half or more the customers at four of the centers come by car from outside the neighborhood, overall traffic and parking effects are less clear. To estimate these effects, I computed trip-generation rates and hourly parking demand for each shopping area.

These trip-generation rates, based on formulas and categories comparable to those of the Institute of Transportation Engineering (ITE), are based on the square footage of shops in each area and are calculated for weekdays and Saturdays. When these results are compared to numbers of pedestrians actually walking around in these shopping districts on an average weekday, I find more shopping activity in four of these six shopping districts than the ITE method predicted. The other two districts, which show less activity than predicted—El Cerrito Plaza (the declining shopping mall) and Kensington (the small neighborhood center)—mostly serve adjacent residents during a short commute period each day. When trip generation rates are adjusted to account for persons who do not drive, the level of shopping activity more closely resembles the activity level predicted by the ITE method on weekdays. On Saturdays, the trip generation rates resemble the activity predicted by ITE in two of these four shopping areas. In the two other shopping areas, Market Hall and Hopkins, the level of activity is almost twice the comparable ITE trip-generation rates.

I then calculated parking requirements, based on the observed level of shopping activity and the turnover rate of parked automobiles. I compared calculated parking requirements with the ITE standards and with standards advocated by New Urbanists. The ITE standard recommends between four and five parking spaces per 1,000 square feet of retail floorspace. Many New Urbanists consider the ITE standards to be excessive and thus recommend three parking spaces per 1,000 square feet. In three of the



shopping areas (Hopkins, Elmwood, and Market Hall), average hourly parking demand exceeds the minimum recommended by New Urbanists. In one area (Market Hall) demand on Saturdays exceeds even the so-called excessive standards recommended by ITE's method. Interestingly, the number of parking places in each of these three shopping areas is currently at or below the minimum level advocated by New Urbanists. Two other shopping areas (El Cerrito Plaza and Kensington) generate fewer trips than expected. Alcatraz, with a high percentage of visitors from its neighborhood, has sufficient parking spaces.

These results are not surprising when one identifies the customers. Areas with high demand for parking not only attract a large number of customers, they also attract a high percentage of customers from outside the adjacent neighborhoods. Further, the type of shopping in these areas leads a customer to stay in a parking place for a longer time; customers shopping for comparison goods such as clothing, furniture, gifts tend to shop more leisurely than those buying food and other necessities.

CONCLUSION

As New Urbanists suggest, traditional shopping areas generate more walking than is usually associated with shopping trips. However, they also attract a significant number of customers who don't live in the adjacent residential area and who drive there. Even those living in adjacent residential areas may drive, especially if they're grocery shopping.

Despite this high frequency of walking, the promise of less automobile traffic is not realized. Counts and surveys taken during average (not major) shopping days reveal levels of traffic and parking demand in excess of comparable standards for peak demand. Simply put, some of these shopping areas have become popular largely in response to the quality of their goods. Crowded streets and frenetic purchasing contribute to a carnival atmosphere that, in itself, serves to attract even more customers. In turn, large crowds and high quality induce high levels of traffic. Customers come from outside the neighborhood, some from many miles away—in cars that must be parked.

Justification for revitalized Main Streets or transit villages may reside in the sheer physical attractiveness of their urban design in contrast to that of the commonplace shopping mall or retail strip. The transit village's advantage may lie not in reduced traffic, but in its improved retail environment. High density residences may be necessary if the objective is more walking, because people seem willing to walk only short distances.

Investors in shopping areas can't rely exclusively on walkers. So they face a dilemma: To pursue pedestrian-friendly urban design that will entice local residents into walking, they may install just a few parking spaces. But to attract customers from outside the neighborhood, they must provide ample parking. However, a design that incorporates large asphalt areas for cars might deter some from moving into the neighborhood because it would then seem uninviting—and uncondusive to walking.

Of course, every shopping center developer and every shopkeeper is eager to attract lots of customers. They don't care whether they come by foot or car. But to attract large numbers they must provide plenty of parking. The New Urbanists's challenge is to incorporate enough parking into the site plan to attract customers without making the physical design unattractive. To design a shopping center only for walkers, or even primarily for walkers, might doom the investment from the start. ♦

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Simulating Highway and Transit Effects

BY JOHN D. LANDIS

Transportation investments and land developments are opposite sides of the same coin. Urban historians and planners have long recognized the power of highway and transit investments to shape metropolitan development patterns. Likewise, transportation planners have long realized the importance of development densities and patterns in shaping the demand for transportation facilities and services. While these relationships may be clear in hindsight, they're usually cryptic in foresight.

The difficulty of predicting exactly how particular transportation investments will affect development patterns (and vice versa) has inflamed debate. Here in California, environmentalists committed to slowing suburban development regularly target proposed highways projects, contending they will induce growth or sprawl. Meanwhile, central city and transit advocates push for additional transit investments—especially rail transit—expecting that they will help revitalize central city neighborhoods and contain urban sprawl. The difficulty of empirically evaluating these claims adds to the rancor of the debate.

Urban simulation models offer a way out of this dilemma. They enable planners and policymakers to reveal potential effects of proposed transportation investments *before* they are authorized or constructed. Until recently, most urban simulation models either functioned at too low a level of resolution (that is, they could evaluate zonal but not site effects) or were insufficiently sensitive to some types of highway or transit. Fortunately, however, improved state-of-the-art models are now improving our ability to evaluate these relationships. Here I want to show how

one such model, the California Urban Futures Model, can be used to anticipate land use and development effects of two potential transportation projects—a tollroad and an extension of the Bay Area Rapid Transit (BART) system.

Reintroducing the CUF Model

ACCESS readers were introduced to the first generation of the California Urban Futures Model in 1994. That version, CUF I, coupled a geographic information system (GIS) with a profit-maximizing model of developer behavior to project where and when new urban development would occur. Unlike other urban simulation models, CUF I could predict the *site-specific* effects of alternative growth policies and regulations. It could also analyze potential displacement or “spillover” effects—what happens to development when it is prohibited at particular sites. But CUF I could not deal with multiple land uses or simulate the development effects of transportation investments.

CUF II remedies these shortcomings. It allows different urban land uses (e.g., single-family residences, apartments, retail shops, offices, and industrial plants) to bid against each other for preferred sites. It also allows previously developed sites to be *redeveloped* for different uses.

The heart of CUF II is the Land Use Change Model—a series of statistical equations relating observed land use changes between 1985 and 1995 to various market, environmental, locational, and policy factors that influence development. Separate equations are calibrated for each county and for undeveloped and previously developed land.

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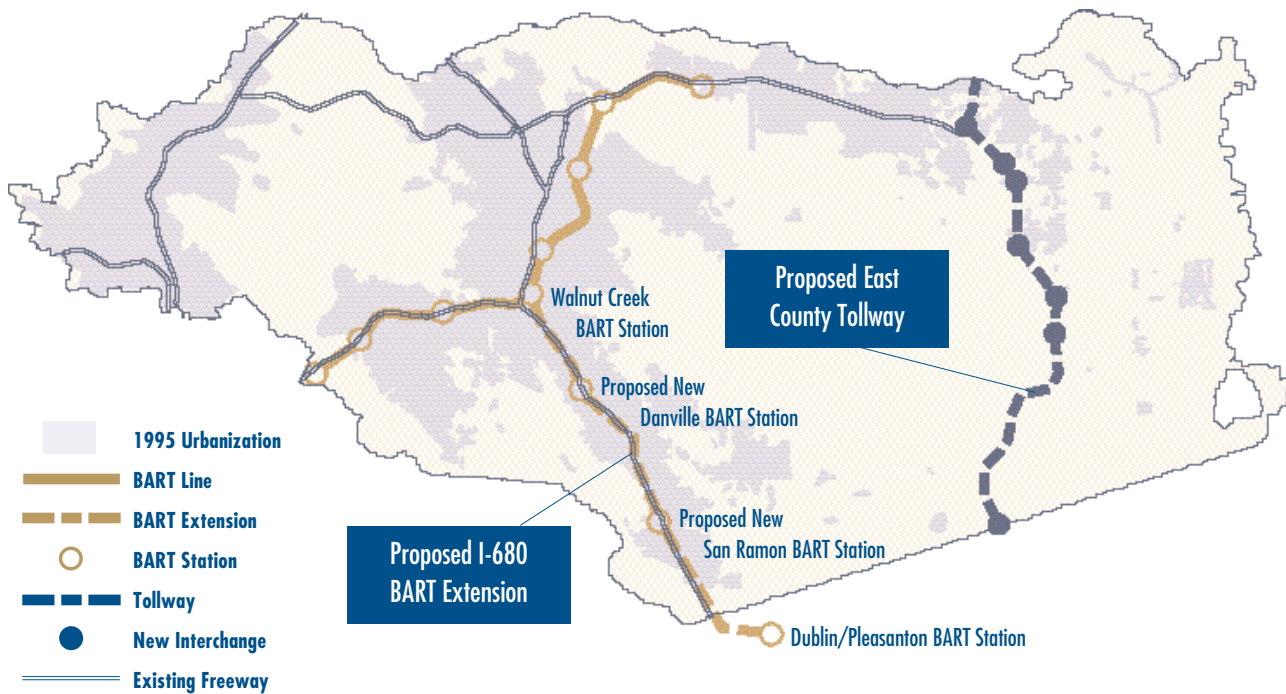
Freeways, Transit, and Land Development: The View from Contra Costa

To demonstrate CUF II's capabilities, we used it simulate how alternative highway and transit investments would effect future land development patterns in Contra Costa County, California. Why choose Contra Costa? First, the county will experience tremendous growth during the next fifteen years. The Association of Bay Area Governments projects the county and its constituent cities to add 240,000 new residents and 115,000 new jobs between 1995 and 2010. Second, growth there is likely to be highly malleable. Development precluded from one part of the county will be readily displaced to other parts. Conversely, development attracted to a particular location, such as a freeway interchange or BART station, may be drawn from locations throughout the county. Put another way, local transportation investments could have county-wide effects.

Consider three scenarios: The first, *Baseline: No New Freeway or BART*, assumes considerable population and job growth, but no change in current local development policies.

The second scenario, *East County Tollway*, assumes the same level of population and job growth, along with construction of a limited access tollway running for 75 miles north to south. This very facility was proposed in 1992 by a consortium of land developers, property owners, investors, and construction interests. Proposed as a tollroad, it was to bypass congested facilities in the central and western parts of the county. Environmental interests strongly opposed the proposal, arguing it would induce growth and promote low-density sprawl; that it would encourage conversion of thousands of acres of prime farmland; and that it would threaten precious habitat areas. The tollway's promoters countered these criticisms, claiming that any negative environmental effects could be >

FIGURE 1
Contra Costa County (with Proposed Transportation Investments)



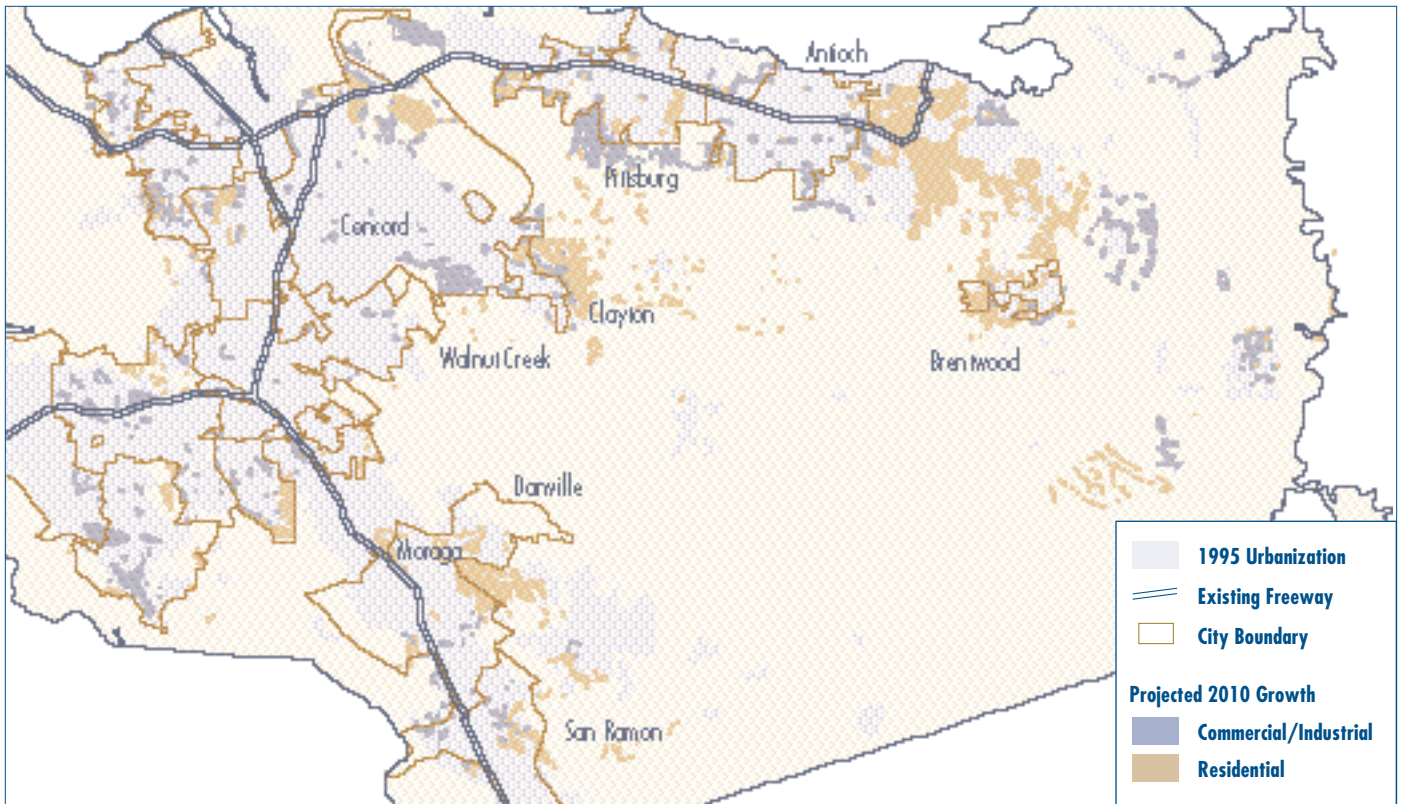


FIGURE 2
2010 Development Scenarios: No New Freeway or BART

mitigated by siting interchanges judiciously. The tollroad proposal ultimately fell through for financial reasons so the validity of these claims and counterclaims was never tested. Figure 1 shows the location of the proposed tollway and key interchanges.

The third scenario, *I-680 BART Extension*, supplements freeway capacity with rail capacity. Specifically, it would extend the Bay Area Rapid Transit system south along the median of Interstate I-680 from the existing Walnut Creek BART station, to the new terminus at Dublin. Two new BART stations would be constructed in Danville and San Ramon. This proposal is purely hypothetical. It has never been suggested either to or by anyone at BART. Its purpose here is solely to predict how development might respond to a main rail transit line in a highly congested freeway corridor rich in both jobs and housing.¹ Figure 1 also shows the proposed BART alignment.

The Importance of Historical Experience

As noted earlier, the CUF II Model is calibrated using actual historical experience. This is both a strength and weakness. It means the model’s predictions are empirically grounded in history, i.e., the period between 1985 and 1995. It also means the model will have difficulty predicting results when there is no historical precedent.

¹ The logic behind recent BART extensions has been to serve existing population centers better, rather than to guide future population or job growth explicitly. This scenario adheres to that rationale.

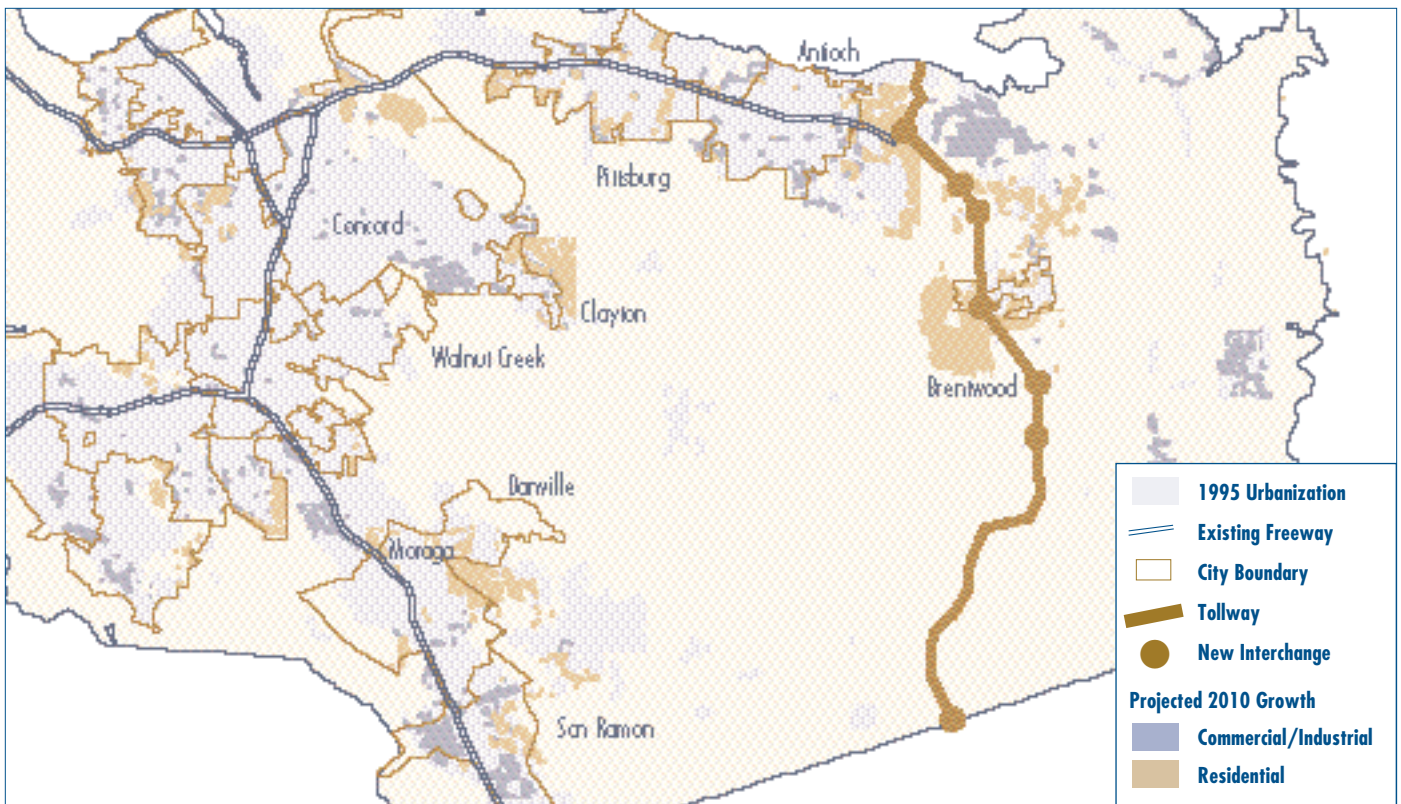


FIGURE 3

2010 Development Scenarios: East County Tollway

Consider the past effects of freeway interchanges and BART stations on development in Contra Costa County—between 1985 and 1995. Among undeveloped sites in 1985, proximity to a freeway interchange exerted a strong and positive influence on single-family and commercial development, but had a negative effect on apartment and industrial development. Vacant sites near freeway interchanges *were much more likely* to be developed for single-family residential use or commercial use than were more distant sites. Conversely, vacant sites near freeways *were much less likely* than more distant sites to be developed as apartments or industrial areas. Proximity to freeway interchanges served to discourage residential redevelopment at previously developed sites, but had no effect on commercial or industrial redevelopment. Proximity to a BART station served to discourage all types of new development and had no effect on redevelopment.

These effects were different for different land uses and locations. In neighboring Alameda County, for example, proximity to a BART station served to discourage most forms of new development, but to encourage certain types of redevelopment. In other counties, sites near freeway interchanges were less likely—not more likely—to be developed for housing.

Simulation Results

Assuming no change in current city and county development policies, projected growth will consume approximately 7,950 hectares (about 20,000 acres) of undeveloped >

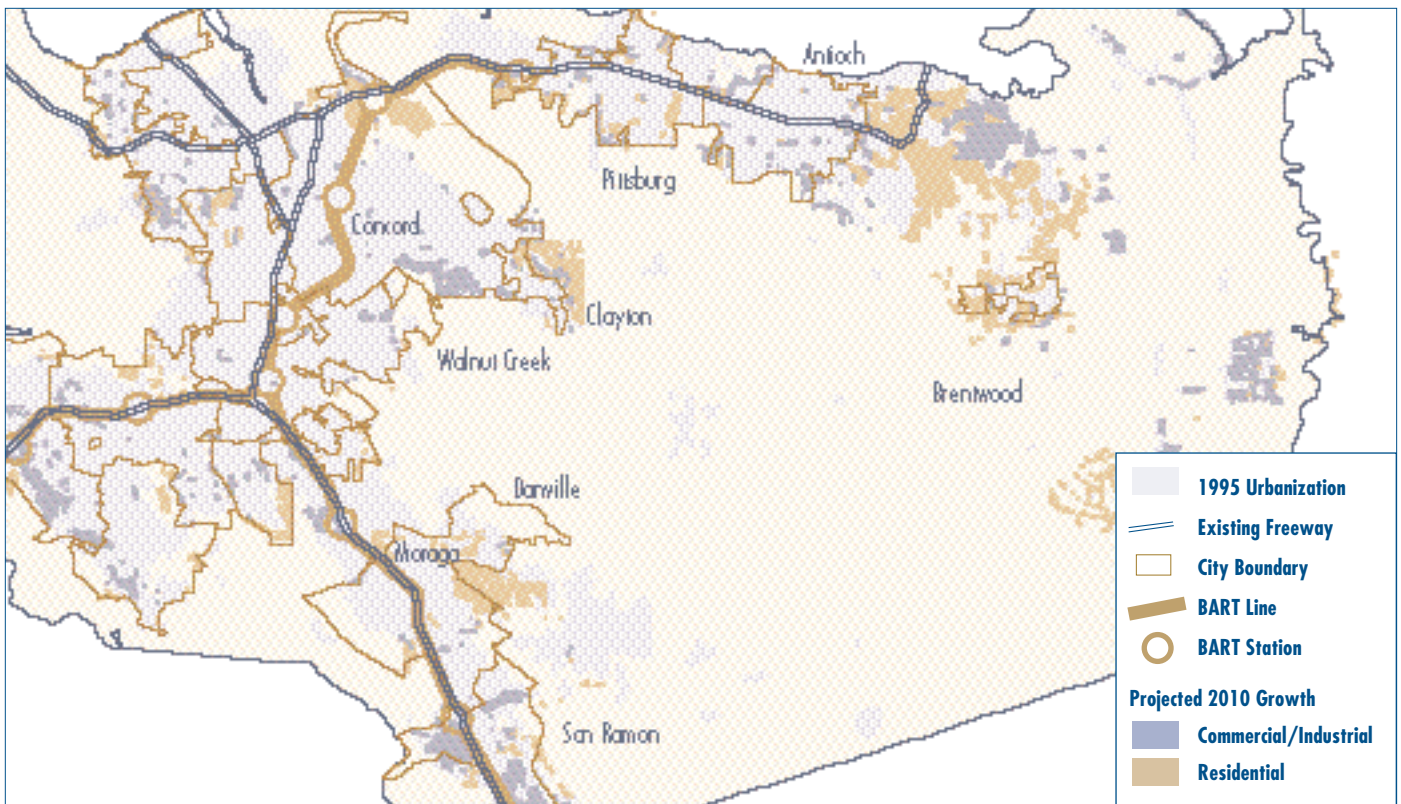


FIGURE 4
2010 Development Scenarios: I-680 BART Extension

land between 1995 and 2010 (see Figure 2). An additional 1,600 (about 4,000 acres) hectares will be redeveloped. Construction of the East County Tollway would reduce the amount of currently undeveloped land required to accommodate future growth to 7,810 hectares (about 19,000 acres), and increase the level of redevelopment to 2,900 hectares (about 7,200 acres). Extending BART service down I-680 would have no significant effect on aggregate land consumption.

At first glance there seems to be little difference among the three scenarios. Regardless of the scenario, most new residential development will occur in the eastern part of the county, where land and housing are relatively inexpensive and where the development-approvals process is less onerous. An additional increment of residential growth is likely to occur east of Danville. Commercial and industrial development is likely to disperse throughout the county, favoring available sites near freeways and existing population centers.

A more detailed look at the results, however, reveals some significant differences, particularly between the *Baseline* and *East County Tollway* scenarios (Figure 3). Allowing for continuation of *current* growth policies, much of the projected residential growth will sprawl outward, directly east and adjacent to Antioch city limits. Smaller increments of

residential development would extend outward from Brentwood in all directions, and eastward from the city of Clayton.

The primary effect of building the East County Tollway (with interchanges as shown), would be to shift residential growth southward from the Antioch area to the western edge of city of Brentwood, where it would most likely take the form of an entirely new community. This outcome reflects the still-potent ability of freeway interchanges to attract and organize new development. Construction of the East County Tollway would also affect patterns of commercial development. Instead of occurring willy-nilly at the edge of existing urban development, new commercial and industrial growth would be concentrated in a single major cluster between Antioch and Brentwood and directly to the west of the proposed tollway.

Extending BART down Interstate 680 from Walnut Creek to Dublin would have little effect on the overall location and pattern of new development in Contra Costa County (Figure 4). Indeed, with respect to residential growth, there is almost no difference between the Baseline and BART Extension scenarios. With respect to commercial development, the primary effect of extending BART would be encourage a small measure of clustering around the hypothetical Danville and San Ramon stations.

All of these results should be regarded with caution. They are based on statistical models of Contra Costa growth patterns as they occurred between 1985 and 1995—models which, with respect to commercial development, do not fit historical experience particularly well. To the extent that future development patterns follow different dynamics and/or respond to different forces, future development patterns could be quite different.

Policy Lessons and Further Reflections

Overall, these results suggest that major highway investments still have significant power to redistribute urban development at the subcounty level. Properly located, freeway interchanges can help order new residential and commercial development and, in doing so, reduce sprawl and development fragmentation. Of course the converse is also true: carelessly located, freeways and freeway interchanges may contribute to sprawl. The ability of major transit investments to shape development, at least in suburban counties like Contra Costa, is much more limited.

This analysis also suggests that while new highways may channel growth from one area to another, they do not generate it. Rather than focusing on potential growth-inducing effects of transportation investments, land use and transportation planners are well-advised to pay close attention to site planning and development regulation at key transportation nodes.

The real contribution of simulation models like CUF II lies in their ability to make complex urban development processes understandable to policymakers and laypersons alike. In doing so, they foster informed discussion of the effects—intended and unintended—of public infrastructure investments, especially transportation investments. They help us to look beyond simplistic questions, such as whether growth is good or bad, and to focus instead on desirable and undesirable growth forms. They also provide a sort of chalkboard upon which different interests can begin to structure tradeoffs and experiment with new approaches. ♦

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Cars for the Poor

BY KATHERINE M. O'REGAN & JOHN M. QUIGLEY



Urban jobs continue to migrate away from central cities, while workers are moving to the suburbs. With each passing decade, the commute from home to work has become more dispersed. The historical division of function between central city and suburbs—the central city providing jobs, the suburbs providing residences—no longer holds.

Between 1970 and 1990 the percentage of white workers with central city jobs declined by more than half, from 50 to 20 percent, and the percentage of black workers with central city jobs declined from 61 to 37 percent. The decentralization of residences was even more dramatic. The proportion of white workers living in the central cities of US metropolitan areas declined by 29 percentage points, while the proportion of black workers declined by 42 percentage points. By 1990, only about one out of eight white urban workers was living in a central city.

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The ratio of jobs to workers in the central city declined from 1.2 to 1 for whites, while for blacks the ratio declined to 0.7, indicating that a sizable fraction of black workers are reverse commuters—that is, they live in central cities and work in the suburban ring.

Note that the pattern of changes over time is similar for white and black workers, but the absolute level of centralization is much higher for blacks. The proportion of blacks working in the central city is almost twice as large as the proportion of whites, and the proportion of blacks living in the central city is almost triple the proportion of whites.

This decentralization of worksites and residence sites has radically changed the commuting patterns of the “typical” worker. Figure 2 summarizes some of these changes. The number of nonpoor workers commuting from city residences to city jobs has plummeted. Among white workers, this commuting pattern declined from 33 to 12 percent; among blacks it declined by 30 percentage points. There has been less change in the incidence of commuting from suburban residences to central city jobs.

The big increase, however, has been in the “other” commuting patterns, from suburban residences to suburban worksites or from central city residences to suburban worksites. The incidence of these commutes has increased by 28 percentage points among both white and black workers, almost doubling among black workers. Of course, it is precisely these “other” kinds of worktrip commutes—from dispersed origins to dispersed destinations and “reverse commutes” to the suburbs—where the advantage of auto commuting is most apparent. Public transit systems have the most difficulty supplying service competitively along these low-density routes.

The right panel of Figure 2 summarizes the commuting patterns of workers in poor households (for example, four-person families with total incomes less than about \$12,700 in 1990). Although these urbanites, the working poor, are somewhat more likely than the nonpoor to commute between city homes and city jobs, they are also more likely to commute within suburbs and to commute from central city to suburb. Poor white workers are now as likely to make these kinds of commutes as are nonpoor >

FIGURE 1
Centralization of Metropolitan Jobs and Workers

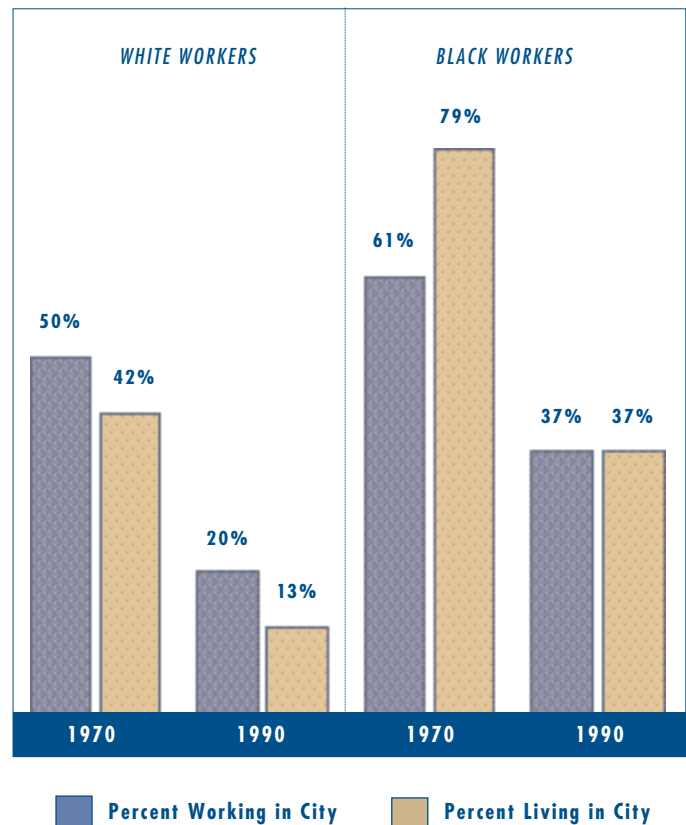
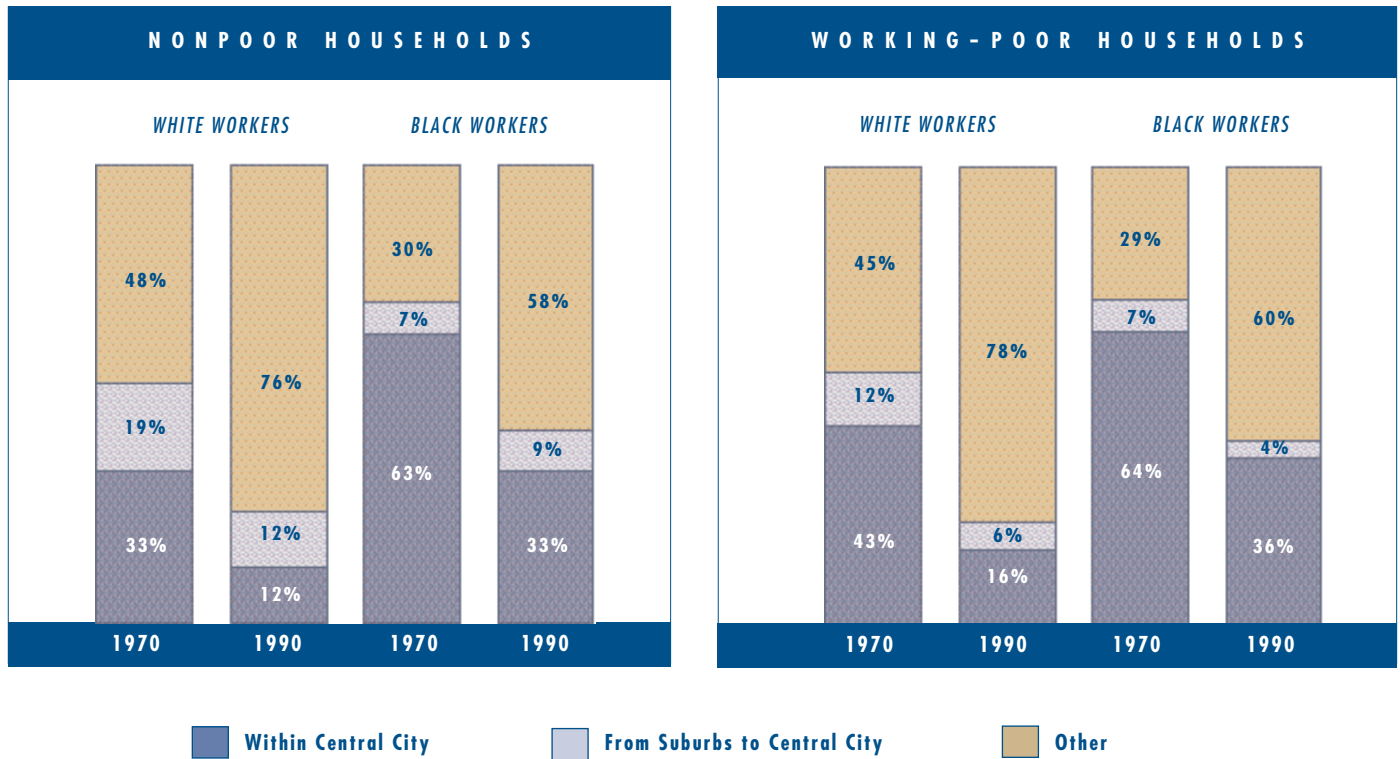


FIGURE 2

Percent Distribution of Commute Trips of Metropolitan Workers



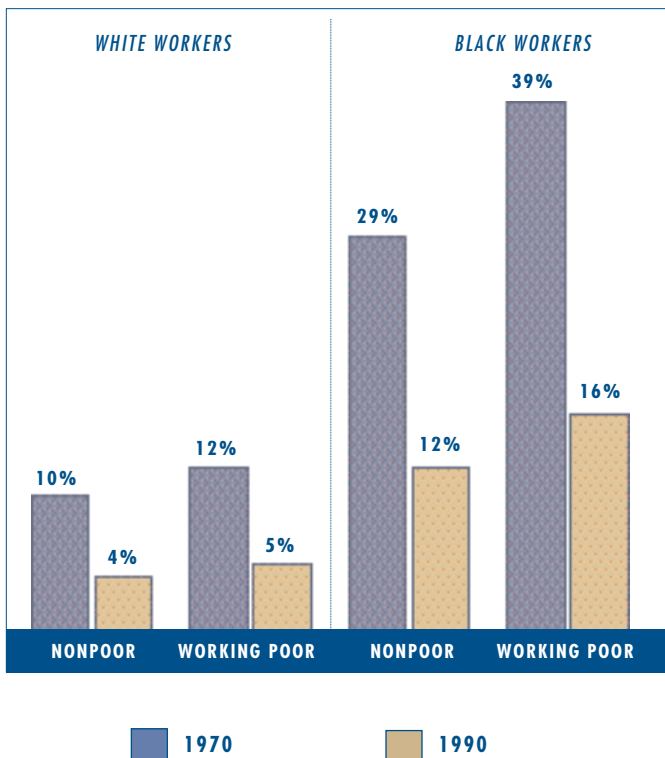
white workers are (78 percent compared to 76 percent). It is also true that poor black workers are as likely to make these kinds of worktrips as are nonpoor black workers (60 percent compared to 58 percent).

Of course, it is precisely among the group of poor workers that auto ownership is lowest. In 1970, 18 percent of US households did not own autos; by 1990, this figure was less than 12 percent. However, based on the 1990 National Personal Transportation Survey, the Department of Transportation estimates that 24 percent of poor households do not own autos, compared to 2 percent of nonpoor. Moreover 62 percent of all those US households who do not own autos can be considered poor or “near poor.” Consider the working poor: 45 percent of black workers living in central cities have no access to cars, and 26 percent of black workers living in the suburbs don’t either.

Thus, a substantial fraction of the working poor must use public transit, even though their commutes might be better served by private autos. Figure 3 compares transit riding over time. Changes in origins and destinations have reduced transit usage by more than half among all workers, but the working poor are more

FIGURE 3

Percent of Metropolitan Workers Riding Public Transit



likely to commute by public transit. Among black workers, the incidence of public transit usage is a third higher for poor workers than for the nonpoor (16 percent compared to 12 percent).

Together, these factors point to somewhat longer commute times for poor households, particularly workers in poor black households. The averages, reported in Figure 4, are indications of these differences. Among blacks, the working poor commute about eight minutes longer each day than the nonpoor. These differences are significant, especially when considering that commute distances typically increase with income.

The averages are also misleading, however, when comparing commutes of those poor having access to autos and those who rely on public transit. Figure 5 suggests that for poor workers most of the commute differences are associated with auto access. The table presents the average difference in commuting times (transit minus auto) for those who take private autos and those who take public transit. The time differentials are large for all types of trips. However, the differences are more than twice as large for blacks who take the most circuitous trips, intra-suburban worktrips or “reverse commutes.” >



FIGURE 4

Average Journey to Work for Metropolitan Workers, 1990
(One-way Commute in Minutes)

RACE	NONPOOR	WORKING POOR
White	25	26
Black	26	30

FIGURE 5

Time Advantage of Private Auto Versus Public Transit for Working Poor
(Difference in Commute Time in Minutes)

	WHITE WORKERS	BLACK WORKERS
Within central city	20	20
Within suburbs	9	19
Suburbs to central city	12	15
Central city to suburbs	9	19

No Car, No Job?

Of course, comparisons of commuting patterns among the nonpoor and the working poor ignore one potentially important aspect of the availability of transportation alternatives: their effects on getting a job in the first place. For example, in a recent survey of lower-skilled workers in the Detroit area, researchers analyzed the job-search behavior of unemployed workers, finding large differences between the patterns of those who owned cars compared with those who did not. Those with cars searched for work over a wider area and range of neighborhoods, and this increased breadth was reflected in the number, type, and character of job opportunities discovered.

Differences in auto ownership also seem to have affected success in a recent program intended to improve employment outcomes for noncustodial fathers of welfare-recipient children. Participants in the program were offered extensive job and training assistance. An analysis of program attrition was conducted by the Manpower Demonstration Research Corporation (MDRC). The MDRC report concluded that auto ownership was an “important prerequisite” to participation in the program, to completion of the job-training program, and ultimately to getting jobs.

Studying how unemployed persons search for jobs and how the working poor commute to urban jobs may help clarify potential problems in reforming the welfare system to increase work incentives. If potential commute patterns of people coming off public assistance are similar to those of people currently in poor working households, government policy must pay more attention to auto ownership opportunities. Under the old welfare system, the federal government had imposed strict asset limitations upon welfare recipients, limiting their ability to own cars. Now design and enforcement of these regulations are left to the states. So programs that help job takers obtain a used car—a secured loan for purchase, a leasing scheme, a revolving credit arrangement—may offer real promise, particularly in less dense and less centralized urban areas.

It is hard enough for those without high levels of skill and without extensive work histories to find jobs that can pay for child care and leave enough left over for survival. We should facilitate a reduction in their transport costs, promoting the mass transport system that works so well for the nonpoor—the private auto. ♦



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Will Electronic Home Shopping Reduce Travel?

BY JANE GOULD & THOMAS F. GOLOB

Home shopping is not a novelty. Our parents may have received milk at the front door, or invited the Avon lady or an encyclopedia salesman to step inside. Nowadays we pick up the phone to order pizza or to buy clothing from catalogs, or we receive weekly deliveries of organic produce. Today's home shopping orders are usually transmitted by mail or telephone. Most people shop from home only occasionally, for example, if they can't find items locally or if the items are discounted. However, the new electronic media may be the impetus for a wave of online rather than in-store shopping. In 1996 about \$300 million worth of merchandise—from holiday gifts to software to wine—was sold via the Internet.

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WAVE OF THE FUTURE?

Interactive media seem well-suited to future shopping because they combine the searching and computing power of the computer, the real-time interaction of the phone, and the visual richness of television—all in the privacy of one's home. Projections for electronic home shopping range from \$5 billion to \$50 billion by 2005. Forecasts vary so widely because expectations are uncertain, both for the speed and capacity of home-based broadband communication technology and for public perceptions about the security of online payment.

Hardware prerequisites alone will not determine the scale of future home shopping. The telling factor is how people will choose to use their time among the activity choices available to them. Historically, there has been a close relationship between growth of the retail sector and available forms of transportation and communication. About 150 years ago tandem development of rail transit and the telegraph facilitated growth of large central stores, allowing customers to make purchases and shopkeepers to maintain inventories. Development of the automobile and other factors later led stores to choose suburban locations, while shoppers enjoyed conveniences like free parking. Today about one trip in five involves shopping. But will the growth of the Internet arrest this trend and lead to new retail options that do not rely so heavily on travel?

Electronic home shopping eliminates travel to a store, but not the need for home delivery of goods. During this century home delivery of basic items such as milk has gradually declined because consumers find it more convenient and cost-effective to shop for these goods at stores. Catalog shopping, which depends on home-delivery providers such as UPS and the postal service, still represents only about four percent of total retail sales. But with delivery services providing a significant advantage to people with limited mobility, shopping from home may become more common.

Most electronic home shopping is done by people with high incomes and limited time—for example, upwardly mobile working women with children. Busy professionals increasingly might choose electronic home shopping because it can save both travel time and time spent in stores. But there lurks a mismatch between electronic home shopping and this group: Since they are so busy, they are also less likely to be home to receive deliveries.

Several solutions have been proposed for home delivery, like retrofitting the exterior of homes with refrigerators or having customers pick up goods at a local or regional commercial center. The latter solution may meet with customer resistance, however, because it would require a special trip to a town center, where parking may be hard to find.

Many people enjoy shopping in stores for its recreational advantages. Shopping trips do not necessarily involve spending money, for people go to stores to learn about new products, to follow fashion trends, to compare items or prices, to see what other people buy, or simply to socialize outside the home.

These social aspects of in-store shopping might discourage people from shopping online. Some analysts predict that online shopping will be more likely for routine, >

inexpensive purchases like laundry detergent and light bulbs, rather than for clothing or jewelry. Perhaps expensive, nonstandardized purchases require that consumers be able to touch the goods and look the retailer in the eye.

Still, many services and products can be delivered digitally to households. Airline tickets, newspapers, CD music, and software can be transmitted as digital bits. Consumers may prefer to shop for these products online because doing so eliminates trips, offers a wide selection, or provides at-home convenience and instantaneous delivery. Our studies in London suggest that many suppliers there prefer to sell online because it reduces their cost of retail transactions. They may be able to reduce the costs of building leases, employee salaries, and commissions for agents. The selling procedure can be fully automated, akin to the way ATM machines have automated many of our personal contacts with banks.

Our research into transportation and telecommunication interactions finds that shopping patterns differ with buyers' age, gender, and available time. Retired persons without scheduled work spend more time shopping. We also find surprisingly few differences between the UK and the US in terms of total time spent each week shopping and traveling to shopping, although the time spent in travel and actual shopping is different: US

shoppers spend more time traveling to stores; UK shoppers spend more time in stores.

We wondered whether there are segments of the population that find traveling to stores burdensome, and what would happen if people did not have to travel to shop? Might a travel-free option encourage development of electronic home shopping? The answer: It depends.

ACTIVITY ANALYSIS

Time spent traveling to and from shopping is just one component of the total time a person spends away from home on any given day. So we ask whether time spent for shopping travel competes with other out-of-home activities. For example, if people can shop from home and do not have to travel to stores, will they use part or all of this saved travel time for other out-of-home activities, such as recreation, errands, or even more shopping? Further, to what extent will participation in other activities generate new travel?

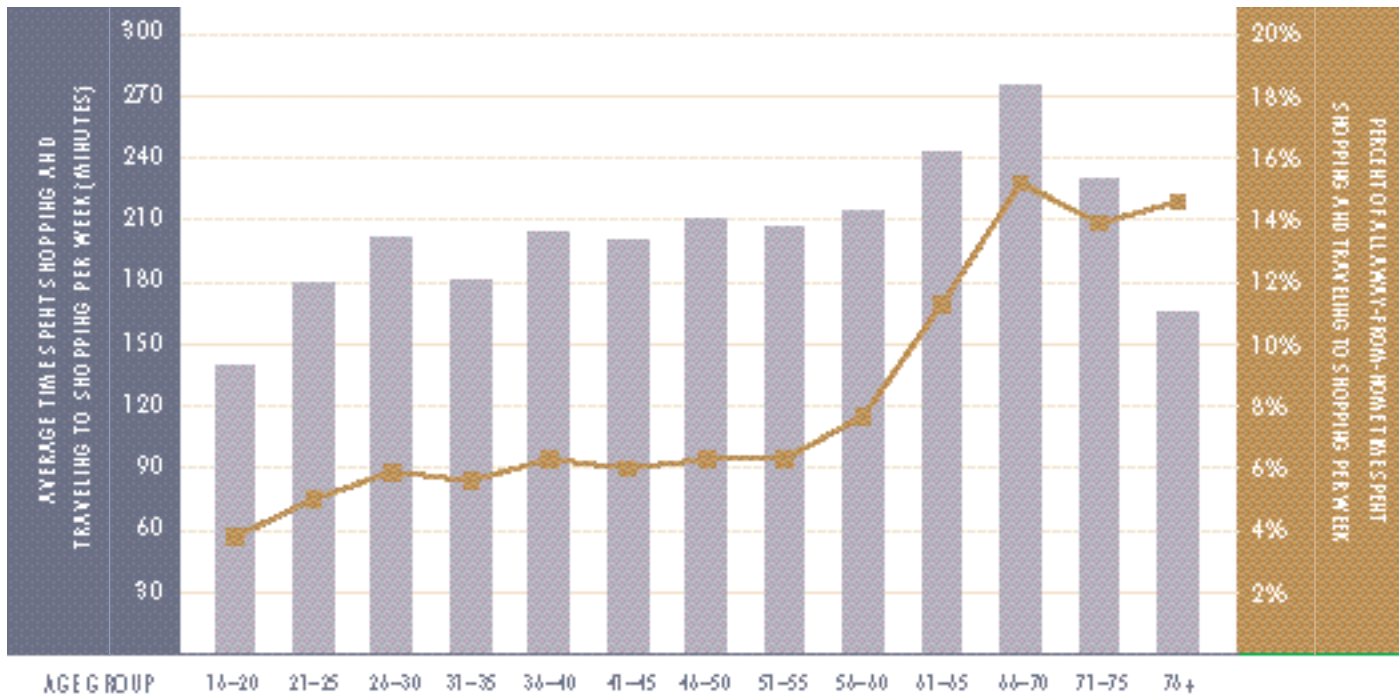
Data from an activity and travel survey conducted by the regional planning authority in Portland, Oregon, reveals how people use their time away from home. The 1994-1995 survey is based on activity diaries for almost 7,000 persons in 4,000 households. The diaries comprise information on all out-of-home activities and travel



FIGURE 1

Shopping Activities by Age, Portland Metropolitan Area

Statistics based on two days of observation per person



over a two-day period. When analyzing trade-offs between activities, it is instructive to categorize activities hierarchically, on a scale from compulsory to elective, with subsistence activities (e.g., work) followed by household-maintenance activities, followed by discretionary activities (e.g., sports, recreation, and social visits).

Traditionally, activity models have classified shopping as a maintenance activity, but we recognize that it has both maintenance and discretionary components, depending on the shoppers and the items they seek. A weekly trip to the grocery store may be viewed as a maintenance activity, whereas an afternoon spent browsing at the mall may be a discretionary, recreational activity. Accordingly, we classify shopping trips as a hybrid activity, combining both maintenance and discretionary components. We also identify time spent traveling to stores in order to compare activity patterns of people with short shopping travel time to those of people with long shopping travel time.

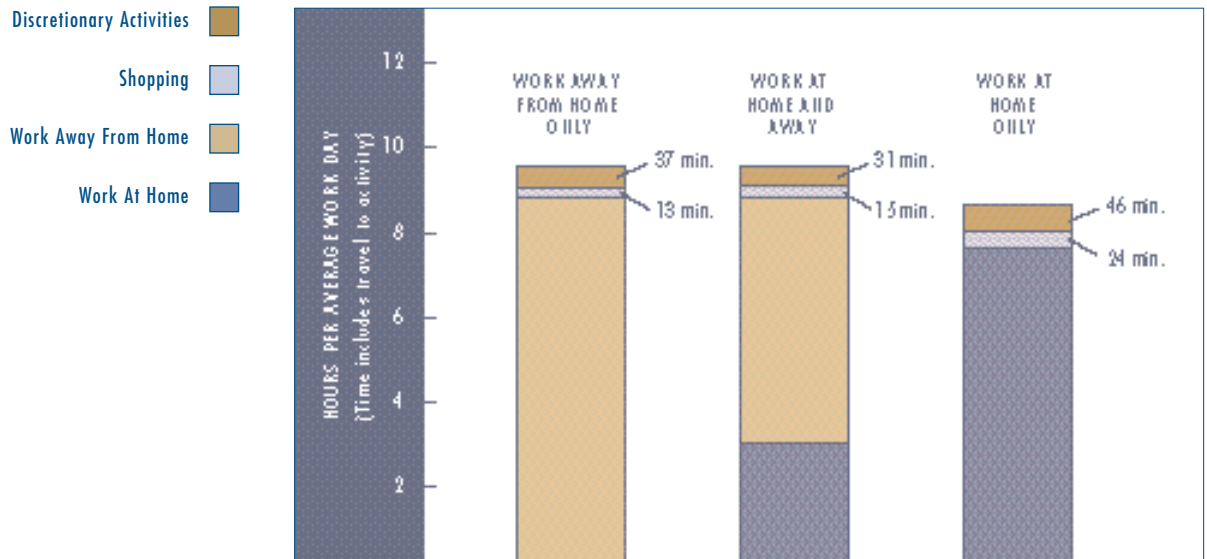
We built a statistical model to forecast the extent to which saved shopping travel time will be converted into one of the following:

- more out-of-home maintenance activities
- more out-of-home discretionary activities
- more out-of-home shopping activities
- more in-home activities, of all types

Our model also incorporates statistical controls for the number and ages of household members, number of drivers in the household, income, and car ownership. We know, for example, that households with many family members have to shop often, >

FIGURE 2

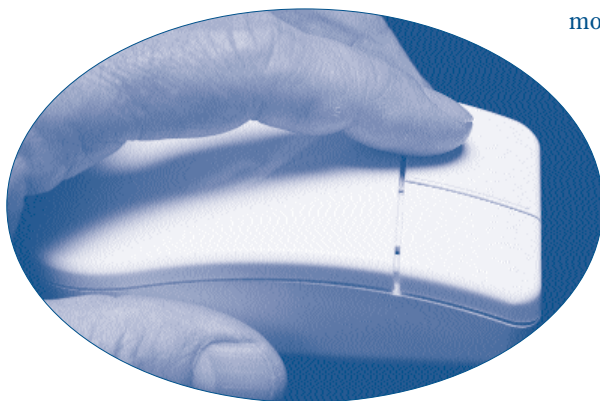
Average Activity Duration on Work Days for Three Types of Workers



so we statistically control for this effect.

We are interested in comparing people who work four or more hours at home with those who work for a similar period at nonhome job locations. Our hypothesis holds that in-home workers shop more because they have flexible schedules and more time available from saved commuting time. Further, shopping may provide recreation and opportunities for socializing outside the home. We find at-home workers spend significantly more time shopping than do away-from-home workers or those with mixed at-home and away-from-home schedules. Those who work away from home spend only 35 percent of their discretionary time shopping, while those who work at home shop during 52 percent of their time. While this suggests that at-home workers shop as a diversion, we cannot rule out the competing hypothesis that in-home workers spend more time traveling to and from shopping because they can't chain their shopping trips with the commute to and from work.

We hypothesize that working women will favor home shopping, because it would let them redirect saved travel time toward other out-of-home household tasks that generally fall on women: additional shopping, chores such as visits to post offices and dry



cleaners, and chauffeuring children to and from school and activities. It seems that busy working women struggle to find enough time for all their household errands. Our model predicts that working women will choose to engage in additional maintenance activities if they are able to save time by doing some shopping from home.

The growth of home shopping is not occurring in isolation. As it grows, so will concomitant online activities, such as household maintenance activities like home banking. New electronic services can reduce time spent in maintenance activities, produce time savings for busy people, and influence when and how busy people choose to travel. Our results present something of a paradox for the growth of future home shopping. On one hand, people currently at home during the day enjoy a variety of activities, including shopping outside the home. Although they may be an ideal market for home shopping, being at-home to receive deliveries, they may not favor home shopping because they seek diversions outside the home. Working women, on the other hand, favor home shopping because of the time pressures they face, but they find it difficult to schedule package deliveries.

Given these obstacles, consumer home shopping will probably remain a small niche market for the next few years. Still, when projecting the market for home shopping, we must consider the benefits of this option: no hassles with traffic or parking, instantaneous information on current stock, a wide selection of items, and often lower cost. In many ways, electronic shopping holds advantages over in-store shopping. But only time will tell whether future consumers will commence shopping trips with keyboards or car keys. ♦



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Correction:

In the Fall 1997 issue of ACCESS, the graph on page 28 ("Tracking Accessibility," Robert Cervero) is mislabeled. The more-accessible standardized scores should have been designated as positive numbers.

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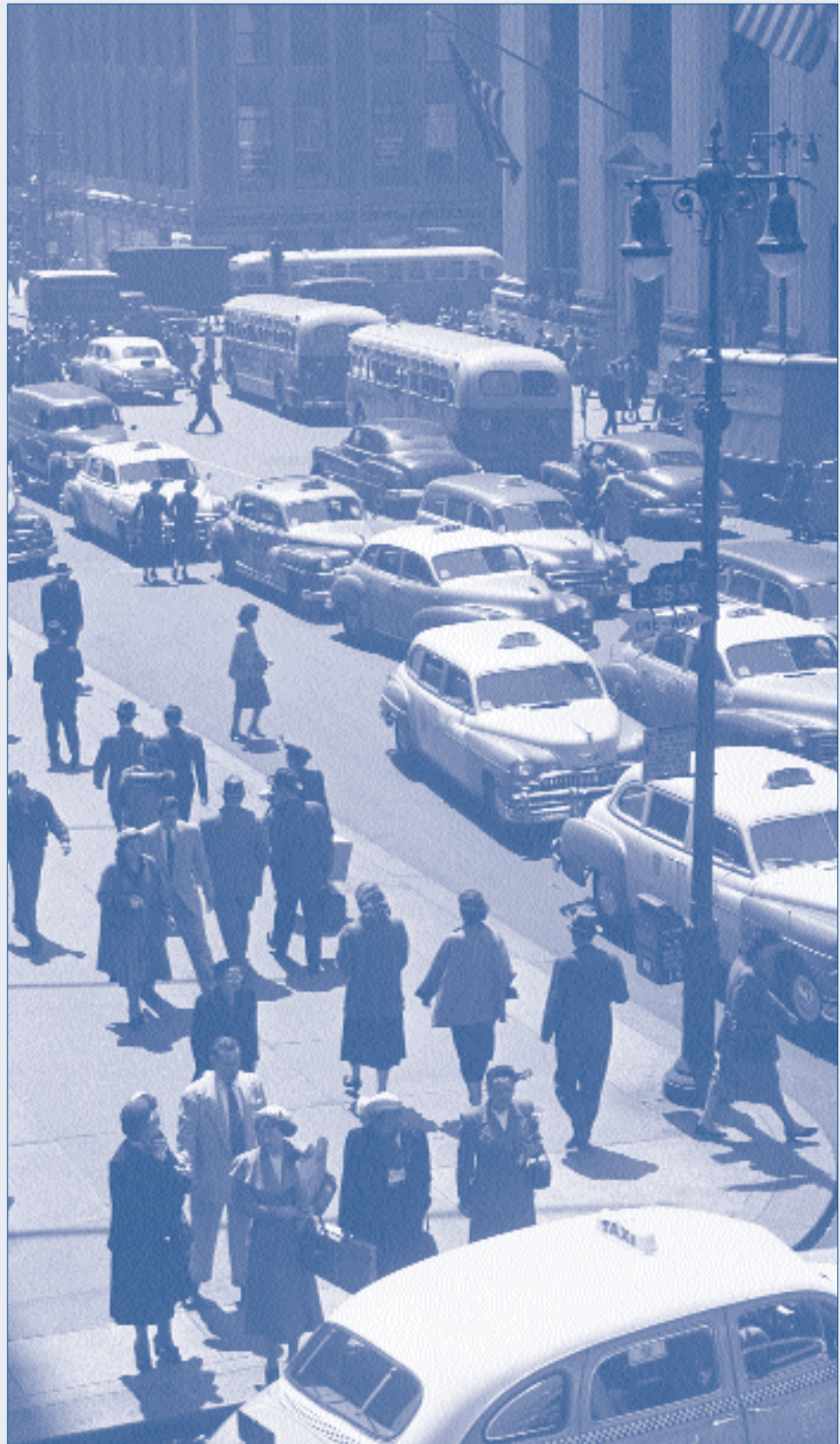
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