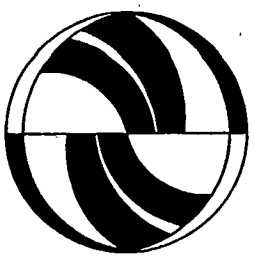

Jobs-Housing Balancing and Regional Mobility

Robert Cervero

Reprint
UCTC No. 50

The University of California Transportation Center

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Berkeley, CA 94720

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Reprinted from
APA Journal
Spring 1989, pp. 136-150

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Despite the steady migration of jobs to the suburbs over the past decade, many suburban residents commute farther than ever. In this article I attribute the widening separation of suburban workplaces and the residences of suburban workers to several factors: fiscal and exclusionary zoning that results in an undersupply of housing; rents and housing costs that price many service workers out of the local residential market; and several demographic trends, including the growth in dual wage-earner households and career shifts. Case studies of metropolitan Chicago and San Francisco confirm the displacing effects of high housing costs and housing shortages. In addition, data from over 40 major suburban employment centers in the United States show that suburban workplaces with severe jobs-housing imbalances tend to have low shares of workers making walking and cycling trips and high levels of congestion on connecting freeways. I argue that inclusionary zoning, tax-base sharing, fair-sharing housing programs, and a number of incentive-base programs could reduce jobs-housing mismatches and go a long way toward safeguarding regional mobility for years to come.

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The 1980s have witnessed what has been called America's third wave of suburbanization—the mass arrival of jobs, in particular white-collar office and service jobs, to the suburbs (Orski 1986; Leinberger and Lockwood 1986). The first wave involved the steady flow of residents to the outskirts of cities over the past century. This was followed by the second wave—the migration of retail activities to the suburbs, epitomized by the opening of massive indoor shopping malls in the 1950s and 1960s. The third wave, highlighted by the emergence of business parks and office towers, has fundamentally changed the face of America's suburbs. No longer are they simply origins of commuter trips each weekday morning. They are major destinations as well.

One benefit that might be expected from the relocation of jobs to the suburbs is a shortening of journeys to work and, correspondingly, an overall improvement in regional traffic conditions. Evidence suggests, however, that this generally has not been the result. For the nation as a whole, work trips made wholly within suburbs, the fastest growing commuting market, actually increased in length by around 15 percent during the 1970s (Fulton 1986; Pisarski 1987). From 1977 to 1983, moreover, the mean journey to work for suburban Americans (defined as people residing outside a central city but within an urbanized area) increased from 10.6 miles in length to 11.1 miles, despite the mass migration of jobs to the suburbs during this period (Klinger and Kusmyak 1986). Evidently, then, more suburbanites are farther from their workplaces today than a decade or more ago when the preponderance of jobs were confined to inner cities.

If public opinion polls are reliable barometers, traffic congestion certainly does not appear to be easing in most major metropolitan areas as jobs decentralize. In Houston, Atlanta, San Francisco, Phoenix, Washington, D.C., and perhaps as many as a dozen other urbanized areas around the country, residents have cited traffic congestion as the number one urban menace. National statistics also suggest that regional thoroughfares are becoming more clogged. From 1975 to 1985, the share of rush-hour freeway traffic in urbanized areas that flowed under 35 miles per hour (the minimum speed used by traffic engineers to signify freeway congestion) increased from 41 percent to 56 percent (Lindley 1987).

Part of the reason for the continuing lengthening of commuter trips and the marked deterioration of traffic conditions, I believe, is a widening jobs-housing imbalance in many metropolitan areas across the country. The spatial mismatch between the location of jobs and the location of affordable housing, I will argue, is forcing growing numbers of Americans to reside farther from their workplaces than they would otherwise choose and, consequently, is intensifying congestion.

What benefits would accrue from balancing job and housing growth? For one, commute distances would be shortened and the share of nonmotorized trips, namely those made by walking and cycling, would increase. In addition, the number of miles logged on areawide roads

each day would fall, as would energy consumption and the emission of vehicle pollutants. Perhaps equally important, jobs-housing balance would produce well-defined commutersheds wherein local neighborhood traffic is segregated from regional through-traffic. Bringing people and jobs closer together would reduce the number of cars entering regional traffic streams, since larger shares of motorists would never have to leave the local street network. Local streets have considerable untapped capacity, constituting around 80 percent of lane miles of roadway nationwide, yet carrying only about 15 percent of vehicle mileage (Federal Highway Administration 1986). With shorter journeys, neighborhood streets would handle a greater share, albeit not necessarily a greater volume, of work trips while removing some cars from already over-burdened regional thoroughfares. Last, jobs-housing balance could promote larger social objectives. The provision of affordable housing closer to suburban job centers would vastly increase the residential opportunities of America's working class and would help reduce housing discrimination. In sum, many of the nation's most pressing and persistent metropolitan concerns—congestion, energy depletion, air pollution, sprawl, and class segregation—would be relieved by balancing job and housing growth.

This article focuses principally on the link between jobs-housing balancing and regional mobility. It first examines some of the possible causes of growing jobs-housing mismatches, highlighting jobs-housing imbalances in the San Francisco Bay Area and metropolitan Chicago. The effects of such factors as rising housing prices and exclusionary zoning practices on the spatial proximity of suburban workplaces and the residences of employees of these workplaces are empirically tested using 1980 journey-to-work data. This discussion is followed by an analysis of the influence of jobs-housing levels on commuting behavior and local traffic conditions around some of the largest suburban employment centers in the nation. The article concludes with a discussion of various institutional and zoning initiatives that offer promise for synchronizing metropolitan job and housing growth.

The Scope of Jobs-Housing Mismatches

A "balanced" community is generally thought of as a self-contained, self-reliant one, within which people live, work, shop, and recreate (Burby et al. 1976). "Balance," however, is a fairly abstract notion that resists measurement. Margolis (1973) adopted the rule of thumb that communities are "balanced" when the ratio of jobs to housing units lies within the range of 0.75 to 1.25. Given the increase in dual wage-earner households, potentially fewer nearby houses are needed to accommodate a local workforce, especially when one of the persons is a secondary wage-earner inclined to look for nearby work—stereotypically, a married woman entering the labor force. Nationwide, the percent of households with two or more wage earners rose from 42.7 percent in 1960 to 68.5 percent in 1984, underscoring the ongoing feminization of America's work force (U.S. Bureau of the Census 1984). Assuming that 90 percent of working adult Americans live in cohabitant households and that 70 percent of these are made up of two or more wage earners, a more reasonable ceiling for signifying "balance" is around 1.5.[1] Any jobs/housing ratio above this suggests that there is an insufficient supply of available housing to meet the needs of the local work force, resulting in a predominant pattern of in-commuting of workers in the morning and out-commuting in the evening.

Many of the fastest growing suburban communities have jobs-housing ratios that far exceed this 1.5 threshold. For instance, in the Golden Triangle area of Santa Clara County, California, known more popularly as the Silicon Valley, the communities of Santa Clara, Sunnyvale, and Palo Alto all have jobs-housing ratios of above 2.5 (Association of Bay Area Governments 1985). Along central New Jersey's booming Route 1 corridor, disparities are even greater. Two of the fastest growing municipalities along Route 1, Cranbury and Lawrence, have jobs-housing ratios exceeding 3.5 (Delaware Valley Regional Planning Commission 1986). In greater Atlanta, the two hottest office markets—Midtown and Perimeter Center—have more than five times as many jobs as housing units in census tracts encompassing these centers as well as in tracts within a two-mile radius of both (Atlanta Regional Commission 1986).

Job-housing ratios only indicate the potential for greater balance. The degree to which that potential is realized is reflected by the share of jobs in a community actually filled by residents, and conversely the share of workers finding a place to live in that community. Besides numerical parity in jobs and housing, there must also be a match-up between the skill levels of local residents and local job opportunities as well as between the earnings of workers and the cost of local housing.

Popular accounts suggest that many of the nation's largest suburban work centers have fairly small shares of workers residing locally, but studies and data on this question are quite limited. One can estimate the degree to which workers are residing locally using 1980 census data. This was done for the 22 largest communities (50,000 or more residents) in the San Francisco-Oakland-San Jose standardized consolidated statistical area (SCSA). Table 1 lists the ratio of jobs to housing units in these cities in 1980, approximated by the ratio of workers to employed residents in each community. While the 22 communities combined have roughly the same number of jobs and estimated housing units, the ratio of jobs to housing varies tremendously among jurisdictions. Some places, like Daly City, are predominantly bedroom communities, while others, like Palo Alto, stand out as employment hubs.

To explore the extent to which workers find nearby housing, Table 1 is ordered by column 5, from the city with the highest to the city with the lowest share of "local workers"—people who reside in the community where they work. Only in seven of the twenty-two Bay Area

TABLE 1: Residence and employment location in San Francisco Bay Area Cities, 1980

City	(1) Employed residents	(2) Workers	(3) Resident workers	(4) Jobs-housing ratio	(5) Local workers (%)	(6) Local employed residents (%)
San Jose	301,769	200,791	128,578	0.67	64.0	42.6
Napa	23,559	17,405	10,950	0.74	62.9	46.5
Fairfield	25,558	23,024	13,698	0.90	59.5	53.6
Fremont	63,879	33,982	19,624	0.53	57.7	30.7
Vallejo	34,683	29,859	17,174	0.86	57.5	49.5
San Francisco	333,762	458,745	252,407	1.37	55.0	75.6
Santa Rosa	35,680	39,655	21,218	1.11	53.5	59.5
Concord	51,260	35,071	14,738	0.68	42.0	28.8
Alameda	33,200	22,354	9,006	0.67	40.3	27.1
Oakland	140,114	166,102	65,374	1.19	39.4	46.7
Berkeley	49,767	58,995	22,192	1.19	37.6	44.6
Redwood City	29,267	24,568	8,230	0.84	33.5	28.1
San Mateo	41,383	33,484	11,198	0.81	33.4	27.1
Daly City	38,775	13,603	4,391	0.35	32.3	11.3
Hayward	44,608	50,238	14,503	1.13	28.9	32.5
Richmond	28,662	31,518	8,940	1.10	28.4	31.2
San Leandro	30,767	38,676	9,230	1.26	23.9	30.0
Sunnyvale	60,526	90,603	20,484	1.50	22.6	33.8
Walnut Creek	25,194	29,970	6,183	1.19	20.6	24.5
Mountain View	35,732	47,160	9,644	1.32	20.4	27.0
Palo Alto	30,550	61,912	12,190	2.03	19.7	39.9
Santa Clara	48,262	83,067	13,946	1.72	16.8	28.9
Mean	68,498	72,308	31,541	1.05	38.6	37.3
Standard deviation	82,437	95,816	54,913	0.39	15.3	13.8
Coefficient of variation	1.20	1.33	1.74	0.37	0.40	0.37

(1) Number of residents in the community who are employed.
(2) Number of workers in the community.
(3) Number of workers in the community who reside locally.
(4) Ratio of jobs to housing, approximated by ratio of workforce to employed residents, (2)/(1).
(5) Percent of workers who reside locally, (3)/(2).
(6) Percent of employed residents who work locally, (3)/(1).
Source: U.S. Bureau of the Census (1982).

communities did over one-half of the workforce reside locally. Of particular note is the moderately strong negative correlation ($r=-0.57$) between jobs-housing ratios and locally residing workers. In all Bay Area communities where less than 30 percent of the workforce live in the city, the number of jobs exceeded the number of employed residents, in several cases by substantial amounts. Clearly, communities with substantially more jobs than housing preclude many of their workers from residing nearby.

Column 6 of Table 1 suggests the degree to which there are employment opportunities for those residing in a community. In only 3 of the 22 cities did over half of employed residents work in their home community. It is noteworthy that there is no discernible relationship between the estimated jobs-housing ratio (column 4) and locally employed residents (column 6). That is, in some places where the number of jobs matched or exceeded the number of employed residents, such as San Francisco and Santa Rosa, a majority of residents worked in their home community. However, in other localities, like Mountain View and Walnut Creek, jobs and housing were roughly in balance, but the share of residents who were locally employed was only 20 percent. Clearly, in striving to provide employment opportunities for local residents, a community has to do more than achieve a comparable count of jobs and housing units. There also has to be a match-up between skill levels of local residents and local job opportunities.

Forces behind Jobs-Housing Imbalances

The principal reason for jobs-housing mismatches is that ad hoc market forces have generally shaped suburban growth in most U.S. metropolitan areas. Localities typically make decisions to accept or reject housing and employment with little regard for the regional consequences of these decisions. The lack of regional land use planning, however, is only partly to blame. Underlying the jobs-housing imbalance problem are at least five powerful economic and demographic forces that have impeded the ability of Americans to reside in the com-

munity where they work. These forces are discussed below.

Fiscal and exclusionary zoning. The practice of zoning land predominantly for high-revenue-generating and low-services-demanding land uses, such as commercial and industrial development, has limited the supply of housing in many areas and driven housing prices upward (Windsor 1979; Rolleston 1987). As fiscal pressures mount, more and more communities are actively competing for attractive high-tech developments and the tax dollars they generate (Wasylenko 1980). At the same time, many communities are snubbing housing proposals, viewing the demands that housing additions place on schools and public services as drains on already strained public treasuries. The spatial consequences of jurisdictions vying for high-tech projects has been an uneven distribution of industrial and residential growth. The "winners" of the competition have frequently become prosperous corporate centers (i.e., communities with high jobs-housing ratios) while some of the "losers" have ended up as dormitory communities, consigned to house the workers of the well-to-do job centers.

Growth moratoria. Moratoria on building permits and downzoning also have depressed housing supplies in many suburbs. In response to mounting growth pressures, for instance, Nassau and Suffolk Counties, east of New York City, placed a minimum one-acre restriction on new housing permits in 1982. More recently, at least a dozen communities along Boston's Route 495 "high-tech" corridor have taken steps to halt new housing construction by capping the number of building permits, increasing minimum lot sizes, or imposing growth moratoria. In addition, within suburban job centers themselves, there are at least two precedents where new housing starts were either restricted or banned. At Bishop Ranch east of San Francisco, developers originally intended to transform their entire 585-acre vacant parcel into a planned unit development (PUD) with a mixture of office, industrial, and housing components. A groundswell of citizen opposition to commingling uses forced the developers to eliminate the residential portion of their plan (Cervero 1986b). Just six miles to the south at the 860-acre Hacienda Business Park, developers initially proposed building 3,500 rental housing units on-site. However, citizen complaints forced this number to be lowered to 650 units.

Worker earnings/housing cost mismatches. By restricting housing supplies, fiscal zoning and growth ceilings have unavoidably increased suburban housing prices (Dowall 1984; Ley 1985). Many moderate-salaried clerical and service industry workers cannot afford the executive-priced, single family homes near many office parks and centers. In California's two fastest growing nonrural counties, Contra Costa and Orange, average home prices exceed $170,000 (1986 dollars). To qualify for this amount requires roughly a $50,000 annual income, yet the average worker in both counties earns less than $27,000 (Cervero 1986a). Priced out of the local housing market and forced to live in neighboring counties, more and more of those who work in Contra Costa and Orange Counties are commuting 100 or more miles round trip each day. Many suburban areas, moreover, are experiencing serious labor shortages; increasingly, businesses are finding it necessary to operate special shuttles to transport inner city residents to such job sites as hotels and fast-food restaurants. Class segregation has also been widened by these mismatches. Leinberger and Lockwood (1986) note that, at Atlanta's booming Perimeter Center, one of the premier corporate addresses in the region, many black employees can be seen walking through parking lots on their way to bus stops every evening. Most of these workers live fifteen to twenty miles to the south of the center and must endure one-to-two-hour bus rides twice a day.

Two wage-earner households. The trend toward multiple wage-earner households has also contributed to jobs-housing imbalances. Where there is a clear distinction between primary and secondary wage-earners, most families could be expected to locate with reference to the breadwinner's workplace, with the other spouse finding work close by. Where couples earn comparable salaries, however, the residential location choice is less likely to be one-sided in favor of a single spouse. In such households, families could be expected to live somewhere in between the workplaces of both wage-earners in order to balance out commuting distances. Unless a region has a large share of households where both wage-earners work in the same vicinity, a certain degree of jobs-housing imbalance is inevitable. In the case of California's Silicon Valley, most members of dual wage-earner households do not work near each other—57 percent work in different cities (Communications Technologies 1987).

Job turnover. A second demographic trend influencing jobs-housing relationships is increasing job turnover rates. Today's workers are changing jobs and careers more frequently than in years past, for a host of reasons, including the effects of postindustrialization, growing numbers of corporate mergers, and widespread plant closings. For example, in fast-growing Naperville on the western edge of the Chicago area's I-88 corridor, a recent survey found that corporate executives average a job change every three years (Church 1987). Thus, even if someone is able to buy a home within walking distance of the office, that person may end up commuting long distances if he or she switches jobs, particularly given today's high cost of financing new home mortgages.

In sum, a number of factors beyond the absence of regional planning appear to be contributing to widening jobs-housing imbalances in the United States. To explore the effects of these economic and demographic forces, I present both a qualitative case summary and a statistical analysis below. In the next section I focus on jobs-housing imbalances around several suburban centers of the greater Chicago area and the forces that have seemingly led to these imbalances. This discussion is followed by a statistical testing of the influences of housing prices and

zoning practices on the residential location choices of suburban workers in the San Francisco Bay Area.

Jobs-Housing Imbalances in Suburban Chicago

The jobs-housing imbalance issue has received considerable attention in the Chicago area in recent years. Much of the region's imbalance can be attributed to the shortage of housing suited to the earnings of local workforces. In DuPage County, for instance, there are an estimated 6,400 more service jobs than service-industry residents. Local officials estimate that at least several thousand service industry workers are residing outside the 332-square-mile county because housing within the county tends to be inaffordable (DuPage County Development Department 1986).

Perhaps the most serious mismatches are at the eastern edge of the county in and around Oak Brook. This area is job-rich but housing-poor. Oak Brook's 1985 employment count was around 35,100, compared to a residential population of only 6,600—roughly five jobs for every resident (Sachs 1986). Figure 1 shows where Oak Brook workers are coming from. Workers' residences fan out

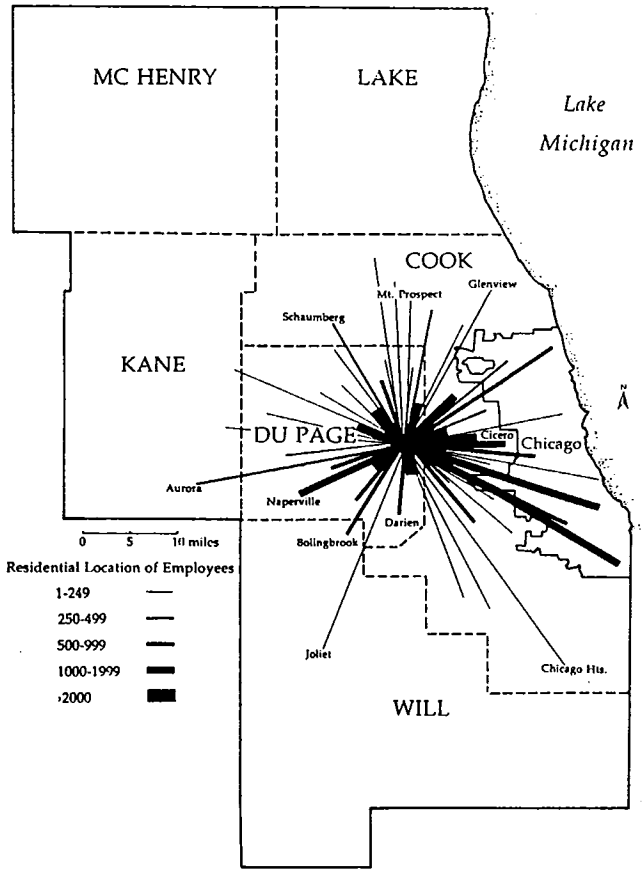

FIGURE 1: Residential locations of Oak Brook, Illinois, employees, 1985. Source: Northeastern Illinois Planning Commission (1986).

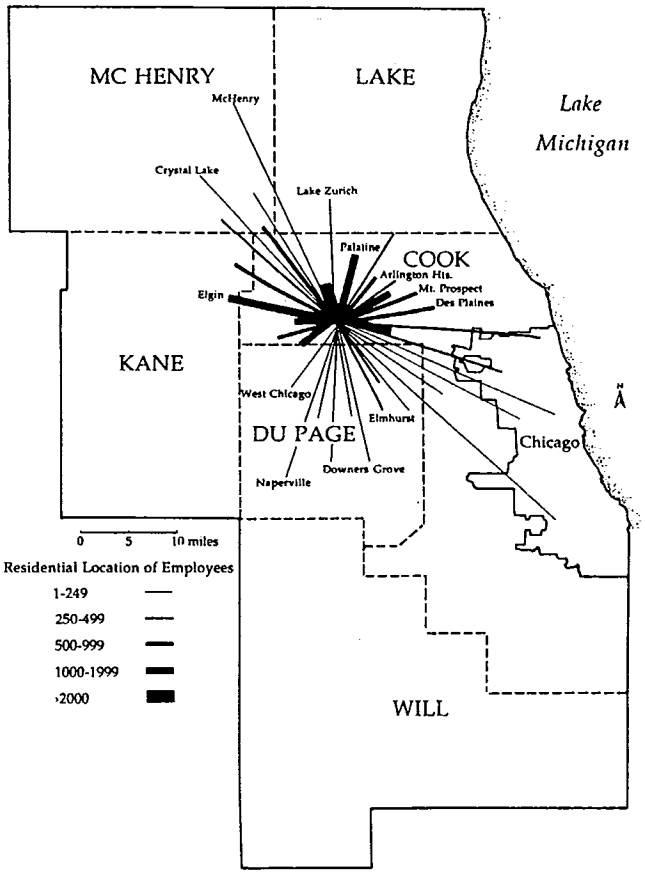

FIGURE 2: Residential locations of Schaumburg, Illinois, employees, 1985. Source: Northeastern Illinois Planning Commission (1986).

in all directions, with the majority of workers residing three or more municipalities away from Oak Brook. The laborshed is so expansive that freeways serving the Oak Brook area are becoming jammed as workers converging on the area merge with traffic heading elsewhere. For instance, appreciable numbers of workers reverse-commuting from Chicago to the burgeoning community of Schaumburg mix with Oak Brook-destined traffic along major suburban freeways like Interstate-294. Figure 2 shows Schaumburg's laborshed, whose southern portion clearly overlaps Oak Brook's. Thus, while the individual laborsheds of such suburban communities might appear reasonably well circumscribed, when one considers that there are dozens and dozens of other overlapping laborsheds in the Chicago area, the congestion problems posed by thousands of workers sharing the same limited freeways to commute long distances becomes evident.

Suburban Chicago's jobs-housing dilemma is further revealed by a recent survey on the percentage of employees who live and work in the same municipality (Sachs 1986). The survey showed that only 18.1 percent of Schaumburg's workforce of 32,000 resided in the community in 1985. In Oak Brook, just 2.5 percent of the 35,100 workers lived there in the same year. The

survey further showed that two-thirds of Schaumburg employees resided more than ten miles from their workplaces (a distance corresponding to Chicago's regional average). In Oak Brook, over 60 percent of workers commuted farther than ten miles each direction. The survey also revealed that employees in traditional lower-paying manufacturing and service jobs in both places averaged longer commutes than those working in finance and administrative positions (Sachs 1986). Clearly, part of the jobs-housing mismatch problem in the Chicago area is rooted in the shortage of nearby affordable housing for moderate-salaried workers.

Besides creating traffic problems, these mismatches apparently are retarding economic development and restricting the job opportunities of unemployed residents of poor Chicago neighborhoods. In a survey of employers in suburban Chicago, 30.6 percent of respondents felt that clerical jobs were the hardest to fill, compared to 21.8 percent who felt that management and professional positions were the toughest to fill (Sachs 1986). The same survey found that the highest job vacancies were in clerical-support positions, which comprised 31.7 percent of total vacancies. Another study has demonstrated the inaccessibility of suburban employment areas to Chicago's poor. For the 35 quartersection zones in the city with the highest unemployment rates, the average zone-to-zone travel time to major suburban employment centers was estimated to be around 45 minutes in 1980 (Northeastern Illinois Planning Commission 1984). This travel time was found to be double the regional average for access to suburban job centers. The analysis concluded that "individuals in high unemployment areas are already spending more than the average amount of time traveling to work; many major job sites are, for all practical purposes, inaccessible to residents of high unemployment areas by reason of excessive travel times" (Northeastern Illinois Planning Commission 1984).

In the case of the Chicago area, then, the lack of affordable housing near suburban job centers lies at the heart of the region's jobs-housing imbalance problem. The cumulative effects of predominantly corporate communities zoning for office and commercial development at the exclusion of apartments and moderate-priced housing have given rise to a serious mismatch problem that promises to lengthen commutes and aggravate congestion over time.

Factors Affecting Residential Location in Bay Area Suburbs

To further investigate the effects of the hypothesized factors on the residential location choices of suburban workers, data were gathered for the 28 census tracts outside the cities of San Francisco, Oakland, and San Jose that had the largest number of employees in 1980 (Cervero 1986a). Figure 3 shows the approximate locations of these 28 tracts, which are clustered in the Silicon Valley (northern Santa Clara County), Livermore Valley (eastern Alameda County), central Contra Costa County, northern

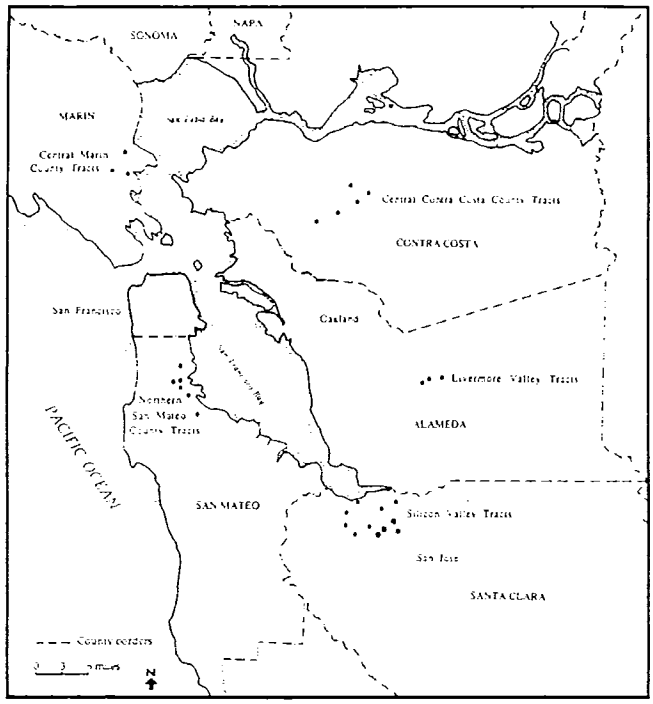

FIGURE 3: Case study census tracts in the San Francisco Bay Area.

San Mateo County, and central Marin County. All of these tracts have large concentrations of white-collar workers and, particularly in the case of the Silicon Valley, a significant share of the tract's employment growth had taken place by 1980. The Bay Area is particularly suited for studying the effects of housing costs on residential locations since its housing stock has been among the most expensive in the nation over the past decade (Dowall 1984).

This analysis sought to identify what factors (e.g., high housing costs) were most closely associated with Bay Area suburban workers residing outside their immediate employment area. In the analysis, the 1980 census tape on journey-to-work was merged with the housing census tape (U.S. Bureau of the Census 1983). Each data observation constituted a distinct interchange between one of the 28 employment tracts and all the remaining tracts in the Bay Area that comprised residential ends of trips. Thus, the 28 case study tracts represented "zones of work" and the other ends of interchanges were "zones of residence." In all, 2,874 sets of zone-to-zone interchanges (comprising a total daily work trip volume of 222,000) were made to the 28 suburban tracts in 1980. Over three-quarters of all interchanges and trips in the analysis were linked to the 11 tracts in the Silicon Valley.

For each census tract, data were also compiled on housing cost and availability, work force occupations, household socioeconomic characteristics, and land use zoning, for both the tract of residence and tract of employment. All housing variables were expressed not only in terms of the data for a particular tract, but for contig-

uous tracts as well. In most instances, this provided a three-to-four-mile radius for capturing information on the cost and availability of housing at each end of the interchange.

Methodology

Because a multiplicity of factors bear on the residential location choices of suburban workers, I used a model that simultaneously accounts for the influences of various push and pull factors. The well-known gravity model offers such a framework. The "basic" gravity model specifies the amount of interaction (I_{ij}) between points i and j to be a function of $K \cdot P_i^{\alpha} \cdot P_j^{\beta} / T_{ij}^{\gamma}$, where K is a constant, P_i and P_j are the respective populations of the origin i and destination j, T_{ij} is an impedance factor, and α, β, and γ are coefficients that are empirically estimated. The model states that, all things equal, the amount of interaction will increase when the origin and destination are large and the travel time between them is short.

This basic structure was expanded to incorporate the effects of various push and pull factors in describing jobs-housing relationships. I employed a multiplicative structure to account for the joint influences of housing cost and zoning practices on locational choice similar to that used by Guest and Cluett (1976). Rather than expressing scale factors simply in terms of employed residents and workforce size, I defined these variables in terms of the number of management-professional persons relative to the number of nonprofessional workers in zones r (place of residence) and w (place of work). This enabled income effects to be controlled.[2] The expanded model took the following form:

$$I_{rw} = K \cdot P_r^{\alpha_1} \cdot S_r^{\alpha_2} \cdot P_w^{\beta_1} \cdot S_w^{\beta_2} \times R[R_r^{-\omega}] \cdot R[R_w^{-\psi}] \cdot A[A_r^{\phi}] \cdot A[A_w^{\theta}] \cdot T_{rw}^{-\gamma} \quad (1)$$

where P=number of management-professional persons; S=number of service and clerical persons; R[R]=vector of repellent, or push, factors that push people from living near places of residence and places of work w; A[A]=vector of attractive, or pull, variables that attract persons to zones of residence r and work w; r=zone of residence; w=zone of work; and α_1, α_2, β_1, β_2, ω, ψ, ϕ, θ, and γ are empirically derived coefficients. By comparing the explanatory power of this expanded model with the basic gravity model, I could assess the incremental explanatory power of these additional factors.

Empirical Results

This section presents the results of applying the expanded gravity model to explain jobs-housing relationships for the chosen suburban employment tracts in the Bay Area. In the analysis, observations were omitted for those interchanges that began and ended in the same zone (i.e., intrazonal trips) since, in these cases, the push-pull characteristics of origin and destination would be identical. This omission also provided a basis for determining which factors contributed the most toward suburban workers choosing a residence outside their area of employment—the focus of the analysis. In addition, travel time was used instead of straight-line distance because it offered the most statistically significant measure of impedance.

While I initially included a number of explanatory variables in the analysis, I have presented below only those that were statistically significant and entered the stepwise model. Among 33 variables measuring housing, demographic, and zoning characteristics of zones of residence and workplace that I initially used in the analysis, only a handful entered the best-fitting equation (Cervero 1986a).

The "basic gravity model," derived using least squares estimation, was

$$I_{rw} = (.034)[\underset{(***)}{WORKERS_r^{.579}} \cdot \underset{(***)}{WORKERS_w^{.524}}] \times \underset{(***)}{TIME_{rw}^{-.805}} \quad (2)$$

$R^2 = .267$ $F = 242.8$ $p = .0001$ $n = 2{,}802$

The best-fitting "push-pull" model was

$$I_{rw} = (.422)[\underset{(**)}{SERVICE_r^{.142}} \cdot \underset{(**)}{PROF_r^{.106}} \times \underset{(*)}{HOUSCOST_r^{-.212}} \cdot \underset{(***)}{VEH_r^{.310}}] \cdot [\underset{(***)}{SERVICE_w^{.265}} \times \underset{(***)}{PROF_w^{.229}} \cdot \underset{(*)}{HOUSCOST_w^{.189}} \cdot \underset{(*)}{RESZONE_w^{-.069}}] \times \underset{(***)}{TIME_{rw}^{-.89}} \quad (3)$$

$R^2 = .307$ $F = 278.7$ $p = .0001$ $n = 2{,}633$

where

I_{rw} = interaction (journey-to-work volume) between zone of residence r and zone of employment w
$WORKERS_r$ = number of employed residents in zone r
$WORKERS_w$ = number of employees in zone w
$SERVICE_r$ = employed residents in zone r working in service occupations (including clerical, operations, labor, farming, sales, etc.)
$PROF_r$ = employed residents in zone r working in professional, specialty, and technical occupations
$HOUSCOST_r$ = median cost of single family house (in $10,000s) in zone of residence
VEH_r = households in zone r with 2 or more vehicles
$SERVICE_w$ = employees in zone w working in service occupations (including clerical, operations, labor, farming, sales, etc.)

$PROF_w$ = employees in zone w working in professional, specialty, and technical occupations
$HOUSCOST_w$ = median cost of single family house (in $10,000s) in area of work
$RESZONE_w$ = ordinal rating of degree of zoning for residential uses in area of work, where 0 = no residential zoning, 1 = 1%–25% of land area residentially zoned, 2 = 26%–50% of land area residentially zoned, 3 = 51%–75% of land area residentially zoned, and 4 = 76%–100% of land area residentially zoned
$TIME_{rw}$ = travel time (in minutes) between zone of residence r and zone of work w
(***) = statistically significant at .01 probability level
(**) = statistically significant at .05 probability level
(*) = statistically significant at .10 probability level
R^2 = proportion of variation explained
F = F statistic
p = probability value of F statistic
n = sample size

Comparing the goodness-of-fit statistic, the push-pull gravity model out-performed the basic model, explaining 4 percent more of the variation in home-work interchanges (an appreciable increase considering the large sample size used in the analysis). All variables were statistically significant at the .10 level and their signs matched a priori expectations.

The push-pull model confirmed what was hypothesized: the amount of residentially zoned land and the cost of housing in areas of suburban employment were significant locational determinants in the Bay Area in 1980. The negative sign on $RESZONE_w$ indicates that, when the amount of land that is residentially zoned in a work area increases, *ceteris paribus*, fewer workers will locate their residences outside their work area—i.e., there will be relatively little interaction between work zone w and other residential zones r.[3] The positive sign on $HOUSCOST_w$ indicates that interactions between workplaces and residential areas (outside emploment areas) increase as housing costs in and near employment zones rise.[4] This confirms that housing costs around Bay Area suburban employment centers were a significant push factor in 1980, inducing many workers to live at least four or more miles away from their workplace.[5] The availability of residentially zoned land near place of work, on the other hand, was an equilibrating factor, pulling employees closer to their workplace. Finally, the negative sign on $HOUSCOST_r$ indicates that interchanges decline as housing costs in residential zones increase, lending further support to the argument that housing affordability is an important locational factor.

The push-pull model also taps an occupational dimension. The differentiation of workers and employed residents by service and professional occupations increased the model's explanatory power and offered improvements to the basic gravity model. Given the similar signs and sizes of the occupational variables' coefficients, the push-pull model suggests that home-work interaction increases when the numbers of service and professional persons are comparable between any zone of residence and zone of employment, (i.e., the number of service wrokers in the employment zone roughly equals the number of employed residents in the service sector in the residential zone). As control factors, moreover, these occupational variables indicate that $RESZONE_w$, $HOUSCOST_w$, and $HOUSCOST_r$ have significant locational influences irrespective of whether someone works in a service or professional occupation. Additionally, equation 3 indicates that interaction tends to increase as the number of households with two or more vehicles rises, suggesting that Bay Area residents with high levels of mobility are most apt to live away from their area of employment.

In sum, cost and availability of housing are among the most important factors that have shaped the residential locational choices of suburban workers in the Bay Area. The results of this analysis suggest that workers will be forced out of suburban employment areas where single family homes are costly and residentially zoned land is in short supply. These findings indicate that secular and market forces affecting the supply and cost of housing, along with restrictive zoning practices, are indeed contributing to the rift between where people live and where they work in suburban labor markets.

Jobs-Housing Balances and Transportation Choices and Conditions

The analysis so far has concentrated on factors that have given rise to the widening gulf between where Americans are living and working within metropolitan areas. Equally important is the question: how have jobs-housing imbalances affected levels of regional mobility? This section addresses this question by empirically examining how jobs-to-housing ratios at major suburban employment centers (SECs) in the United States are related to travel behavior and local traffic conditions. The analysis is drawn from a larger study recently completed on the effects of land use patterns on commuting choices in suburbia (Cervero 1989). In this study, I gathered data in late 1987 on the land use activities of 42 of the largest suburban employment centers in the nation—i.e., centers with at least one million square feet of office floorspace and 2,000 or more workers. Included in the study were such notable suburban job centers as Post Oak and Greenway Plaza near Houston, Bishop Ranch and Hacienda Business Park east of San Francisco, Warner Center and South Coast Metro near Los Angeles, Tysons

Corner outside Washington, D.C., the Denver Technological Center, and the North Dallas Parkway.

Housing Provisions at Suburban Employment Centers

Table 2 reveals some of the characteristics of housing within and near the employment centers surveyed. On average, the centers had around 1,400 on-site units, with a substantial degree of variation among cases. The master-planned development with the largest on-site housing component that was studied is the Woodlands, a new town north of Houston, which has 9,600 units (and is still growing).

Among the on-site housing units, on average, around 70 percent are multifamily townhouses, condominiums, and apartments. Projects such as the Perimeter Center in Atlanta, Greenway Plaza in Houston, Warner Center in Los Angeles, and the Hacienda Business Park in the Bay Area have multifamily units exclusively. In most cases, these units are inhabited by families who do not work in the complex. In the case of the Warner Center, a 1985 survey of the tenants of on-site townhouses indicated that only 8 percent of the heads of households worked in the center itself (Cervero 1986b). In several cases, on-site housing units serve mainly as company condominiums for out-of-town visitors and business entertainment. Company condominiums obviously do little to provide workers with nearby housing opportunities.

Of course it is not imperative that suburban employees live on a site to achieve the benefits of jobs-housing balance. More important is a match-up of housing within a subregion, say, within a three-to-five-mile radius of the workplace. Table 2 indicates that the estimated amount of housing within three miles of the workplace averages around 11,000 for the sites studied, with substantial variation among cases. Of these areawide units, only around 35 percent are multifamily.

In Table 2 the upscale character of nearby residences is suggested by the high average estimated purchase price ($148,000) and monthly rent ($600) of units within a three-mile radius of sites. In every instance, estimated mean purchase prices and rents were higher than metropolitan averages. Given that over 40 percent of the employees of the surveyed centers work in clerical, manufacturing, and other nonprofessional occupations, one could infer that there is an acute mismatch between the earnings of employees and the cost of nearby housing at many of the nation's largest suburban employment centers.

Walking and Cycling Work Trips

It has been argued that jobs-housing balances would invite more foot travel and cycling trips in suburban work settings. While fewer than 3 percent of employees at all of the suburban centers studied walked or cycled to work, it is nonetheless instructive to explore whether jobs-housing balances are associated with higher than normal rates of nonmotorized commuting. Shaving the share of motorized trips just by a few percentage points, after all, can mean the difference between stop-and-go traffic and more tolerable flow conditions in many congested corridors around the country.

Table 3 presents the best-fitting stepwise regression model derived for explaining the dependent variable WALKBIKE, the percent of work trips by walking or cycling, for 18 of the case sites.[6] The sign on JOB/HOUS is consistent with expectations. In general, where there are many more jobs than on-site housing units, the share of commutes made by foot or bicycle falls.[7] Although the relationship is not very strong, the equation does suggest that one of the marginal benefits of jobs-housing balancing is the encouragement of more foot travel and cycling.

Freeway Traffic Conditions

A stepwise model was also run to examine how jobs-housing ratios at suburban employment centers were related to freeway traffic conditions. Freeway congestion is normally gauged in terms of level of service, wherein A represents free flow conditions and F indicates volumes that have reached capacity, with B through E repre-

TABLE 2: Housing provisions within and near large suburban employment centers, 1987

Housing provisions	Mean	Standard deviation	Minimum	Maximum	Number of cases
On-site					
Total units	1,408	2,377	0	9,600	42
Multifamily units (%)	69	65	0	100	42
Employees/housing unit[a]	30.9	35.8	3.6	113.3	28
Off-site (within a 3-mile radius of SEC)					
Total units[b]	11,100	18,400	0	83,100	41
Multifamily units[b]	35.0	25.0	0	99	41
Estimated purchase price of single family unit ($1,000s)[bc]	148.4	56.6	65	300	41
Estimated monthly rent of multifamily unit ($)[bc]	593.5	143.5	325	900	41

a. This ratio is only for the 28 cases with some (at least one) housing units on-site (i.e., cases with zero values in the denominator were excluded).
b. Includes the housing units within the suburban employment centers that were surveyed.
c. In 1987 dollars.

TABLE 3: Stepwise regression results of factors influencing walking and cycling trips

Dependent variable: WALKBIKE

Variable	Beta coefficient	Standard error	t Statistic	Probability
EMP/VAN	0.00011	0.00003	4.507	.0009
JOB/HOUS	−0.01757	0.00963	−1.825	.0885
RETAIL	0.05486	0.02739	2.007	.0622
Intercept	0.70761	0.78366	0.903	.3859

Summary Statistics:
Number of observations = 18
R-Squared = .693
F Statistic = 8.271
Probability = .0037
Variable Definitions:
WALKBIKE = Percentage of work trips by walking or cycling.
EMP/VAN = Employees per on-site company-sponsored van in operation.
JOB/HOUS = Employees per on-site housing unit.
RETAIL = Percent of total floorspace in retail use.

senting gradations between these two extremes (Transportation Research Board 1986).[8] Since level of service is measured on an ordinal scale, using a regression framework to account for variation in service quality can be problematic. In particular, since cases were assigned values of 1 for level of service A, 2 for B, and so forth, the normality assumption of least squares estimation is violated when the dependent variable, level of service, is estimated. Regression analysis, however, can still provide useful insights into factors affecting ordinal variables like level of service, since reasonably reliable estimates can be obtained when there are five more discrete ordinal values, such as in this case (Blalock 1979).

Table 4 summarizes the stepwise results from estimating the variable FWYLOS—peak-hour service level on the primary freeway serving surveyed suburban employment centers. Three work site variables entered the model. In interpreting these variables, it should be kept in mind that high values of FWYLOS denote congested service quality (i.e., levels of service D, E, and F). Thus, major connecting freeways tend to be most congested around suburban centers with large amounts of office-commercial floorspace, high employment densities, and large jobs-housing imbalances. Clearly, size, density, and land use composition appear to be working in tandem to influence service levels on nearby freeways. In sum, suburban centers that are big, dense, and housing-free in character tend to suffer the worst nearby freeway conditions, all things equal.

Balancing Jobs and Housing Growth in Suburbia

This article has argued that the inaffordability of much of suburbia's housing and restrictive zoning have contributed to a widening jobs-housing imbalance in suburban labor markets, giving rise to increased long-distance commuting, larger commutersheds, and worsening traffic conditions. Experiences in Chicago and the San Francisco Bay Area appear to bear this out. In addition, extreme jobs-housing imbalances have been shown to be associated with high levels of motorized trip-making and congested freeway conditions at the nation's largest suburban employment centers.

What initiatives, then, might be taken to link more closely employment and residential growth in America's suburbs? In this section I discuss a number of possibilities.

Zoning and Tax Incentives

Among the instruments available to local governments for closing the jobs-housing gap, those that produce zoning and tax incentives would likely yield the most lasting mobility and environmental dividends. While in the industrial era there was a logic to separating homes from smokestacks, slaughterhouses, and other nuisances, in today's environment of pollution-free offices, the rationale for separating homes and job sites by ribbons of superhighways is less clear. In fact, one could argue that since the congestion produced by jobs-housing imbalances is one of the most serious public nuisances today, zoning should be "turned on its head" to encourage the integration rather than the segregation of uses. For instance, inclusionary zoning might be introduced to encourage the joint development of offices, housing units, and retail services in all master-planned projects. The Edinborough project in Edina, the hottest suburban office/retail market in the greater Minneapolis area, is a good example of inclusionary zoning—392 moderately priced condominium units, a 203-unit apartment structure, and a 7-story office tower were recently erected on the 26-acre site. A survey of those buying condominiums

TABLE 4: Stepwise regression results of factors related to level of service on main freeways

Dependent variable: FWYLOS

Variable	Beta coefficient	Standard error	t Statistic	Probability
FLOORSPC	0.03638	.01301	2.796	.0072
EMP/ACRE	0.01792	.00694	2.581	.0127
JOB/HOUS	0.01279	.00713	1.794	.0872
Intercept	3.36931	.25909	13.005	.0000

Summary Statistics:
Number of observations = 26
R-Squared = .335
F-Statistic = 6.492
Probability = .0030
Variable Definitions:
FWYLOS = Numeric index of peak period level of service on primary freeway serving SEC, wherein ordinal values are assigned to level of service as follows: A = 1; B = 2; C = 3; D = 4; E = 5; F = 6. Thus, a low value represents a high, or free-flow, level of service. A high value for FWYLOS, on the other hand, represents a low, or forced-flow, level of service.
FLOORSPC = Total commercial-office-industrial floorspace, in millions of square feet.
EMP/ACRE = Employees per acre.
JOB/HOUS = Employees per on-site housing unit.

in the mixed-use project showed that half are from or employed in Edina (Bachman 1987). Another option is conditional-use zoning, wherein conditions are set to allow land uses normally prohibited from a zone. Conditions might include allowing a new office project only if it is located within a specified radius of an existing high-density residential area. Multifamily and moderate-income housing could also be promoted by allowing developers to increase densities, granting tax credits to mixed-use projects, or issuing tax-exempt municipal bonds to finance housing additions. Higher densities are key to providing affordable, nonsubsidized suburban housing, since only then can fixed land costs be spread over more units (Bookout and Wentling 1988).

Incentive zoning could also be used to synchronize job and housing growth. In downtown Bellevue, Washington, a "floor area ratio incentive system" allows developers to build four additional square feet of office space for every square foot of housing provided. This provision seems to be paying off. A 15-story residential tower was recently erected in downtown Bellevue and a number of other large-scale residential projects are in various stages of completion. Through this bonus system, Bellevue officials aim to create a lively, mixed-use core that is active 24 hours around the clock.

Another approach to diversifying land uses is through zoning swaps. Through this technique, the zoning classifications of two different parcels within a community are switched to create a richer mixing of activities. The city of San Jose, California, for instance, recently instituted a zoning-swap policy by rezoning an industrial area as residential at the northern end of the city while rezoning an equivalent-size residential land parcel to industrial usage. The intent of this and other zoning swaps is to scatter employment growth, balance jobs and housing, and relieve the city's overtaxed freeway network.

Growth Phasing

Building permits could also be regulated to ensure that job expansion and housing production occur at the same pace. This is done in several California communities, including Costa Mesa and Santa Ana, where the amount of commercial and industrial floorspace for which building permits are issued in any one year is set according to how much housing was built the previous year. In addition, both places require large office developers to build or contribute to the production of residential units within city limits that will house at least 20 percent of their tenants' employees.

Office-Housing Linkages

Several cities around the country require office developers to build or contribute funds toward new housing. In both San Francisco and Boston, linkage programs were introduced because new office construction was physically replacing housing. This rarely is the case in suburbia (Porter 1985; Hausrath 1988). At least one suburban county has linked new office construction to affordable housing. In Orange County, California, developers are required to provide 25 percent of all new units in unincorporated areas of the county at prices affordable to low- and moderate-income families. Density bonuses and below-market financing raised through revenue bonds have been introduced to ensure that jobs and housing growth occur in synch.

Negotiations

Localities are in a position to bargain for jobs-housing linkages as part of the development review process. Credits against exactions and impact fee obligations, for instance, could be granted in exchange for developers agreeing to build affordable housing units within office complexes (since in theory jobs-housing integration re-

Jobs-housing integration in suburbia. Moderately priced rental units are interspersed among mid-rise office towers in the Galleria area of the North Dallas Parkway corridor in Texas. (Photo by the author)

Jobs-housing segregation in suburbia. Large-lot ranch estates surround the Greenwood Plaza complex twelve miles southeast of downtown Denver, Colorado. (Photo by the author)

duces the need to widen streets). Where no impact fee ordinance exists, jurisdictions could negotiate for such linkages as part of the permit approval process. Several California communities have taken noteworthy steps in this direction. The cities of Novato and San Rafael in Marin County, for instance, not only require that all developers of large-scale office projects build on-site housing but also that they give employees who work in these places the "right of first refusal"—i.e., the chance to purchase market-rate units before they are opened to the general public. In Burlingame and Menlo Park in San Mateo County, moreover, city officials routinely negotiate with developers and employers during project review to give hiring preference to local residents as a means of reducing commuting and increasing local employment. Several other California communities sponsor skill-training and referral programs to match residents to jobs.

Regional and State Initiatives

Higher levels of government could also play important roles in balancing employment and housing growth. Regional governance is an oft-cited prescription for coordinating growth and dealing with problems, like traffic congestion, which transcend municipal boundaries. Stiff resistance to any form of governance that weakens local autonomy over land use matters, however, renders most regionalism arguments academic. Two legislative initiatives, however, could accomplish many of the objectives of regional governance by reducing fiscal disparities and competition among communities and promoting jobs-housing integration. These are tax-base sharing and fair-share housing programs.

Regional sharing of municipal tax revenues could remove much of the fiscal incentive communities have to zone for commercial growth at the expense of residential development. Under tax-base sharing, certain tax revenues would be pooled at the regional level and redistributed according to a community's ratio of workers to employed residents. In principle, tax-base sharing would force municipalities made up predominantly of industrial and commercial uses to reimburse those communities that end up housing their workers. The only U.S. metropolitan area practicing tax-sharing is Minneapolis-St. Paul, where local jurisdictions share about 28 percent of the region's property tax base. Under this program, jurisdictions share tax bases, not tax dollars. Each community in the Twin Cities area must contribute 40 percent of the increase in its commercial and industrial property tax base to a metropolitan pool, which is then redistributed according to population and tax base. As a result, many more affluent communities have stopped zoning out low-tax generators like small houses (Fulton 1987; Reschovsky and Knaff 1977).

Statewide requirements imposed on communities to provide a fair share of a state's affordable housing needs could also narrow the jobs-housing gap. New Jersey's affordable housing program represents a model for other states. There, the Council of Affordable Housing was formed in response to the Mount Laurel II court decision, which found that most municipal zoning ordinances discriminated against low and moderate income families, de facto, by precluding affordable housing. The council subsequently set an affordable housing quota for each municipality based on a formula that fairly distributes the responsibility of meeting the state's estimated need of 145,000 new affordable units by 1993. If other states were to follow New Jersey's lead, progress could be made in ensuring that at least some suburban housing additions are targeted to the earnings levels of workers.

It is no coincidence that, in both of these cases, state government took the initiative to launch these programs. Only states can prod municipalities into coordinating their growth policies. Extraterritorial sharing of tax resources likewise requires state enabling legislation. States are also in a position to tie funds to local housing policies. In Massachusetts, for instance, Executive Order 215 denies state development assistance to any community found to be unduly restrictive of housing growth. Some state initiatives have been less peremptory. Connecticut distributes handbooks explaining the benefits of affordable housing to local officials. California, moreover, has passed legislation that allows local governments to create zones where accessory units can be developed in existing single-family sites. Any significant step toward subregional land use planning and resource-sharing must clearly begin in our state capitols, be it through the passage of enabling legislation or through strong leadership.

Private Sector Initiatives

Since developers have as great a stake in the quality of suburban growth as anyone, we can expect greater attention to jobs-housing integration from the development community and private employers in coming years. Many suburbs have business associations already in place that could serve as a vehicle for coordinating land use programs. Local chambers of commerce and trade associations could also encourage their members who develop and build offices and housing to coordinate their respective projects. Individual company initiatives can also encourage closer jobs-housing balances. In the San Francisco Bay Area, for instance, several large companies that recently moved to Bishop Ranch have offered employee relocation allowances based on a sliding scale, with the largest contribution going to workers who move the closest to their offices.

Transportation Pricing and Taxation

Jobs-housing balance could also be achieved by increasing the cost of transportation via higher gasoline prices, tolls, parking fees, or some combination thereof. In the long run, higher transportation costs would encourage infill development and would prod more developers to build housing close to job sites. Higher fuel taxes, in particular, would induce more Americans to cut back on transportation expenses by relocating closer to their workplaces and to patronize public transit services more regularly as well. Critics rightfully point out that higher transportation costs would hurt the poor the most. Such

maldistributive impacts, however, could be reduced by channeling the surplus gasoline tax revenues into improved public transit services and the provision of more affordable housing. Western Europe stands as a testament to the effects of higher transportation costs on land use. In Spain, France, and Italy, fuel taxes exceed $1.50 (U.S.) per gallon, compared to the 10 cents to 20 cents per gallon surcharge levied across the United States. It is no coincidence that European nations that exact high fuel taxes from motorists also have balanced job and housing growth, limited sprawl, and heavily patronized transit services.

Conclusion

Jobs-housing imbalances seem to be a root cause of many problems plaguing America's metropolises, not the least of which has been increased regional traffic congestion. Restrictive zoning and inaffordable housing have created a widening gulf between where Americans live and where they work. Yet an array of regulatory, institutional, and incentive devices are available to policy makers that would remove these divisive barriers and narrow the jobs-housing gap. Inclusionary zoning, growth phasing, fiscal disparity programs, and fair-share housing laws deserve particular consideration.

Striking a jobs-housing balance, it should be emphasized, does not mean ushering in a new era whereby merchants live atop stores, suburban homes abut offices, or cottage industries flourish. Rather, it involves providing workers the opportunity to reside close to their job sites if they so choose. Indeed, in some settings, jobs-housing balance could involve the preponderance of adults residing in different communities from the ones in which they work. After all, municipal boundaries are historical artifacts that bear little resemblance to the spatial configuration of problems in a metropolitan area. Regions with a multiplicity of small jurisdictions may have extreme jobs-housing mismatches within the political boundaries of municipalities, while at the subregional level they enjoy a balance. Thus, the overall composition of land uses and the match-up of job and housing growth at the subregional level are apt to be far more important in achieving balance than some numerical parity of workers and households within specific jurisdictions.

In many ways, it is easier to define what jobs-housing balance is not than to define what it is. Clearly, job and housing growth is out of kilter when workers commute well over an hour each day because housing is neither affordable or in sufficient supply within reasonable proximity of their workplaces. The spirit of jobs-housing balancing is to break down the exclusionary barriers that are forcing more and more Americans to reside farther from their workplaces than they would prefer, and in so doing to reduce regional congestion, conserve energy, and enhance environmental quality.

Communities that court office and industrial development but shun housing may be sowing the seeds of their own economic decline. In general, businesses will go where the labor force goes. Sooner or later, a lack of housing for local workers will translate into higher office and commercial vacancy rates. Communities that counted on fiscal payoffs from their investments in office and industrial infrastructure will be in for a rude awakening when companies stop arriving because of too little housing for their employees. Thus, jobs-housing balance is in the long-term interest of bedroom communities and corporate communities alike.

In the end, the balancing of job and housing growth could do as much to improve regional mobility as any mix of traffic management or roadway expansion programs, and perhaps it could do far more. Land use actions, unfortunately, have generally been overlooked as a transportation planning tool in recent times, in part because they are long-term propositions and thus are at odds with a political system that demands short-term payoffs. This trend must be reversed, however. Planners must seize the opportunity to use land development as a lever to improve mobility while America's suburban landscape is being rapidly transformed. More and more regional planning agencies need to take specific actions to ensure that sufficient affordable housing is being provided near job centers and that discriminatory zoning practices are eliminated. Future levels of mobility and the overall quality of metropolitan living could very well depend on it.

NOTES

1. This ceiling for "balance" is based on: [(1.7 jobs/cohabitant household) * (0.9 cohabitant households)]/ households=1.53, or approximately 1.5 jobs/household.
2. The availability and affordability of housing were thought to be important determinants of residential locational choice of suburban workers. What is affordable obviously differs among subpopulations. While a $250,000 house might be viewed as exorbitant by most clerical workers, executives might consider this to be the minimum price that they would pay for a home. Including occupational breakdowns, then, controlled for income effects.
3. With more residentially zoned land in a work area, less interaction can be expected with residential zones outside the work area. As a proxy for the absence of fiscal zoning, $RESZONE_w$ represented an attracter factor, pulling people to live close to their workplace when zoning for residential uses is ample.
4. This is a repellent factor, pushing people to locate outside their work area when, *ceteris paribus*, housing is too costly, controlling for worker occupation.
5. The four-mile figure is based on the use of census tracts with large numbers of workers and census tracts that are contiguous to them. In most cases, this produced a unit of analysis that was four or more miles in radius.

6. A host of candidate variables measuring the size, density, land use composition, and other site characteristics of each of the 42 cases were available for the analysis, along with variables measuring the price and supply of local transportation services (e.g., parking, bus transit). While stepwise regression does not provide insight into the influences of all variables of interest, it does offer a foundation for understanding the unique influences of those few variables that do enter into the analysis.
7. The other variables that entered the stepwise model are also consistent with expectations. The sign on the supply-side variable EMP/VAN suggests that, when there are few vans relative to the number of employees, the share of commute trips made by foot or bicycle increases, all things equal. This probably reflects less the fact that walking can serve as a substitute for vehicle-pooling and more the fact that balanced, mixed-use work settings tend to have relatively high shares of walking and relatively low shares of vanpooling. One can surmise that factors like jobs-housing balance are intervening influences on the relationship between walking and vanpooling. Table 3 also suggests that walking and cycling trips are more likely to occur as the share of floorspace devoted to retail activities increases. The availability of on-site retail activities, one can infer, allows some workers to take care of personal business and other chores on foot, freeing them of the need to have an automobile available.
8. The letter values are related to the following expressions of traffic volumes as a percent of capacity: A=<60 percent (free flow); B=60–69 percent (mainly free flow); C=70–79 percent (stable flow); D=80–89 percent (approaching unstable flow); E=90–99 percent (unstable flow); and F=100 percent (jammed, forced-flow).

REFERENCES

Association of Bay Area Governments. 1985. *Jobs/Housing Balance for Traffic Mitigation.* Oakland, CA: Association of Bay Area Governments.

Atlanta Regional Commission. 1986. *Population and Housing Estimates for the Atlanta Region, 1986.* Atlanta: Atlanta Regional Commission.

Bachman, G. 1987. Edinborough MXD: Providing Affordable Housing on a Prime Tract in the Minneapolis Region's Hottest Office Market. *Urban Land* 46, 11: 16–20.

Blalock, H. M. 1979. *Social Statistics.* 2d ed. New York: McGraw-Hill.

Bookout, L. W., and J. W. Wentling. 1988. Density by Design. *Urban Land.* 47, 6: 10–15.

Burby, R. J., et al. 1976. *New Communities USA.* Lexington, MA: Lexington Books.

Cervero, R. 1986a. *Jobs-Housing Imbalances as a Transportation Problem.* Research Report no. 86–9. Berkeley, CA: Institute of Transportation Studies, University of California.

———. 1986b. *Suburban Gridlock.* New Brunswick, NJ: Center for Urban Policy Research, Rutgers University.

———. 1989. *America's Suburban Centers: The Land Use–Transportation Link.* London: Unwin-Hyman.

Church, G. J. 1987. The Boom Towns. *Time.* June 15, 1987, p. 17.

Communications Technologies. 1987. *The Commuting Behavior of Employees of Santa Clara County's Golden Triangle.* San Francisco: Report prepared for the Golden Triangle Task Force, Santa Clara County, California.

Delaware Valley Regional Planning Commission. 1986. *Route 130 Corridor Study.* Philadelphia: Report prepared for the New Jersey Department of Transportation.

Dowall, D. E. 1984. *The Suburban Squeeze: Land Conversion and Regulation in the San Francisco Bay Area.* Berkeley, CA: University of California Press.

DuPage County Development Department. 1986. *DuPage County Growth Trend Report.* Wheaton, IL: DuPage County Development Department.

Federal Highway Administration. 1986. *Highway Statistics.* Washington, D.C.: U.S. Department of Transportation.

Fulton, P.M. 1986. Changing Journey-to-Work Patterns: The Increasing Prevalence of Commuting Within the Suburbs in Metropolitan Areas. Paper presented at the 65th annual meeting of the Transportation Research Board, Washington, D.C., January.

Fulton, W. 1987. Boundary Fights Lead to Tax-Sharing Debate. *California Planning & Development Report.* 2, 9: 1,5.

Guest, A. M., and C. Cluett. 1976. Workplace and Residential Location: A Push-Pull Model. *Journal of Regional Science* 16: 399–410.

Hausrath, L.J. 1988. Economic Basis for Linking Jobs and Housing in San Francisco. *Journal of the American Planning Association* 54, 2: 210–16.

Klinger, D., and J. R. Kusmyak. 1986. *1983–1984 National Personal Transportation Study.* Washington, D.C.: U.S. Department of Transportation, Federal Highway Administration.

Leinberger, C. B., and C. Lockwood. 1986. How Business is Reshaping America. *The Atlantic Monthly.* October 1986: 43–51.

Ley, D. 1985. Work-Residence Relations for Head Office Employees in an Inflating Housing Market. *Urban Studies* 22: 21–38.

Lindley, J. A. 1987. Urban Freeway Congestion: Quantification of the Problem and Effectiveness of Potential Solutions. *ITE Journal* 57: 27–32.

Margolis, J. 1973. Municipal Fiscal Structure in a Metropolitan Region. *Urban Economics: Readings and Analysis,* edited by R.E. Grieson. Boston: Little Brown.

Northeastern Illinois Planning Commission. 1984.

Transportation Availability and Employment Opportunities. Chicago: Northeastern Illinois Planning Commission.

Orski, C. K. 1986. Toward a Policy for Suburban Mobility. *Urban Traffic Congestion: What Does the Future Hold?* Washington, D. C.: Institute of Transportation Engineers.

Pisarski, A. E. 1987. *Commuting in America.* Westport, CT: Eno Foundation for Transportation, Inc.

Porter, D. R. 1985. The Office/Housing Linkage Issue. *Urban Land* 44, 8: 16–21.

Reschovsky, A., and E. Knaff. 1977. Tax Base Sharing: An Assessment of the Minnesota Experience. *Journal of the American Institute of Planners* 43: 361–70.

Rolleston, B. 1987. Determinants of Restrictive Suburban Zoning: An Empirical Analysis. *Journal of Urban Economics* 21: 1–21.

Sachs, M. 1986. *Transportation in Suburban Job Growth Areas.* Chicago: Northeastern Illinois Planning Commission.

Transportation Research Board. 1985. *Highway Capacity Manual.* Washington, D.C.: National Research Council.

U.S. Bureau of the Census. 1982. *Census of Population, 1980.* Washington, D.C.: U.S. Government Printing Office.

———. 1983. *Urban Transportation Planning Package: 1980 Technical Documentation for Summary Tape.* Washington, D.C.: U.S. Government Printing Office.

———. 1984. *Statistical Abstract of the United States.* Washington, D.C.: U.S. Government Printing Office.

Wasylenko, M. 1980. Evidence of Fiscal Differentials and Intrametropolitan Firm Relocation. *Land Economics* 56: 339–49.

Windsor, D. 1979. *Fiscal Zoning in Suburban Communities.* Lexington, MA: Lexington Books.