

# Changes in the Direction of Urban Travel for the Chicago Area, 1970 to 1990

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There is considerable interest in reverse commuting but little understanding of what the term "reverse commuting" means. This study defines directional travel and reverse commuting and examines changes from 1970 to 1990. The household travel surveys of the Chicago Area Transportation Study are used to show that work trips are still very strongly oriented toward the central business district (CBD). Even though there have been increases in the number of workers commuting toward peripheral locations, the proportion commuting toward the CBD has remained fixed at 52 percent or has declined only slightly, depending upon how the CBD is defined. Work and shopping destinations illustrate an expected geographic pattern. Movement from the central county (Cook County) is more likely to be outbound than that which originates in peripherally located counties. Work trips show the strongest directional bias toward the CBD, whereas both recreational and shopping trips have a slightly greater tendency to be directed away from it. The study concludes that all modes of travel, except by suburban bus and school bus, illustrate a bias toward the CBD despite rapid population decentralization and an increasingly diffuse pattern of urban development. Further, these directional biases have changed little in 20 years, providing insights into the interaction between how a city grows and how the travel behavior of its populace changes.

During the past half-century American cities have grown territorially, changing from core-dominated to dispersed low-density regions. Whereas transportation systems previously focused on travel to the downtown, they now must provide access to many diverse locations. For many travelers, however, the destinations away from home are still directed toward the downtown. Studies have shown that there exists a sectoral (radial) bias in daily trip activity and that the majority of trips from home are toward rather than away from the central business district (CBD). But, considering the evolution of American cities, the decentralization process has been so strong that the traditional wisdom regarding trip direction and sectoral bias may no longer hold.

This study will examine changes in urban travel activity and determine to what extent the direction and restructuring of travel has changed with urban decentralization. This study is important because it (a) provides useful information about the travel behavior that contributes to inbound congestion; (b) identifies the degree of outbound travel activity, which is commonly not well served by public transportation; (c) shows the changes in directional travel over a 20-year period; (d) provides a discussion of reverse commuting and reverse travel; and (e) suggests a method of defining reverse travel that is transferable to other areas.

The travel data examined here will provide insight into how travel behavior changes as urban form evolves. It will address two related questions: Is there proportionately more reverse commuting

in contemporary metropolitan areas, such as Chicago, and is the increase a product of growing labor force participation rates and population growth?

## BACKGROUND

Reverse commuting has been observed for several decades (1), and it continues as suburban employment opportunities grow. To assess the magnitude of this reverse travel activity it is necessary to establish a definition of reverse commuting. In its simplest form reverse commuting can be defined as work trips from the central city to suburban job locations (2). It may also have a temporal dimension, that is, a peak directional demand. However, there are two problems with the city-to-suburb definition. First, it is not uniformly accepted. A recent study for the Chicago Area Regional Transportation Authority (3) identified the reverse commute as being from city to suburbs, but for commuter rail operations the "city" included three high-density suburbs—Evanston, Cicero, and Oak Park. However, the city is not consistently confined to a few suburbs but may include all close-in suburbs (4).

Second, if only central-city residents were eligible to be reverse travelers, then the definition would be totally dependent on the territorial size of the central city. In the United States the central-city size varies from less than 50 mi<sup>2</sup> (130 km<sup>2</sup>) for municipalities such as Boston, Buffalo, Miami, and San Francisco to more than 300 mi<sup>2</sup> (780 km<sup>2</sup>) for Dallas, Houston, Indianapolis, Kansas City, Los Angeles, New York, Phoenix, and San Diego. Consequently, many of these areas lack an ideal fit between the old established, high-density part of the metropolitan region and the city limits. Therefore, the city-to-suburb definition yields very different travel patterns in Boston and Houston and restricts interregional comparisons.

To remedy this, a definition based on the prevailing direction of movement was established. It is patterned after the definition used by Marston et al. (5). This definition is centered around one key question: Is the trip headed in a direction toward or away from the CBD? In as much as travel from any location in the metropolitan area toward its CBD is likely to be targeted at higher-density destinations with a more established street network and a greater density of public transit coverage, it is very different from a trip toward the urban periphery. However, there will always be some trips that are neutral, in which the destination is not clearly closer to or farther from the CBD. This neutral category includes two types of trip: local trips, which are less than 1 mi (0.3 km) and longer trips, called lateral trips (Figure 1). Each trip is placed into one of four categories:

1. **Toward the CBD:** Trips toward the CBD are those for which the destination is at least one airline mile closer to the CBD than the trip origin.

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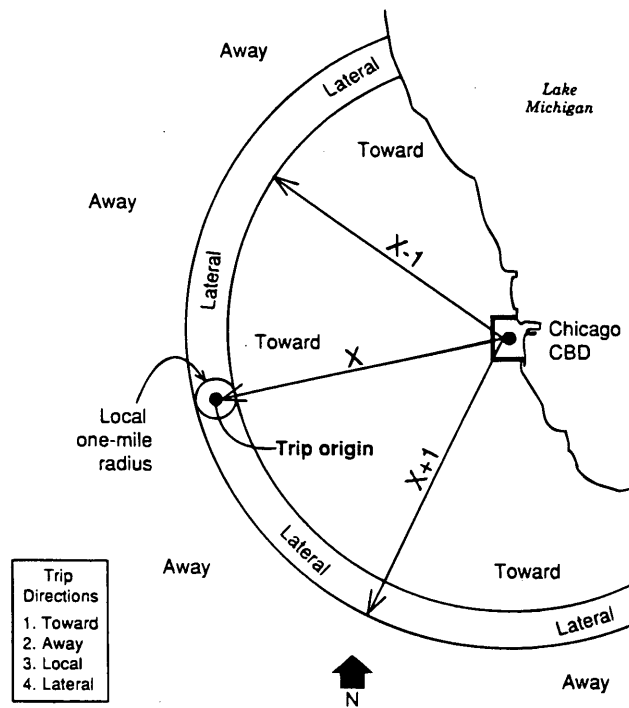


FIGURE 1 Four trip-direction categories.

2. **Away from the CBD:** Trips away from the CBD include those for which the destination is at least 1 mi farther from the CBD than the trip origin. Trips in this category are classified as reverse commutes.

3. **Local (Neighborhood) Trips:** Neighborhood trips have destinations within a 1-mi radius of the origin.

4. **Lateral Trips:** Lateral trips have destinations outside the neighborhood but are not more than 1 mi farther from the CBD or less than 1 mi closer to the CBD than the trip origin. These trip definitions are shown graphically in Figure 1.

To apply these definitions a point within the CBD must be identified that represents the focal point of the downtown. In Chicago, the intersection of State and Madison streets was chosen, which incidentally is the origin of the city's address system.

Before continuing further it is necessary to discuss how the definition may be applied to a typical sequence of trips. Figure 2 illustrates a work trip chain in which there are five destinations and five trips. There are at least two ways to interpret trip directions: unlinked trip directions (Figure 2, *top*) and home-based directions (Figure 2, *bottom*).

In the case of unlinked directions the directionality definition shown in Figure 1 is applied from the origin to the destination of each trip segment of the trip chain. For example, the eat-meal trip before the work trip will have the direction specified by arrow 1 in Figure 2 and is classified as toward the CBD. Trip 2, to work, is short (less than 1 mi) and is classified as local, and the shopping trip (arrow 4) is away from the CBD. In this scenario the directional criterion is reapplied to each additional origin.

For home-based directions the directionality definitions are applied to each destination, holding the origin constant at the home location. The interconnections between destinations (the actual trips) are not considered except for the first trip. Note that in a chain

of  $N$  stops there are  $N - 1$  home-based directions, and, in this example, all four are toward the CBD.

In effect, the unlinked direction considers both the trip and its direction, whereas the home-based direction focuses only on direction. For the transportation planner this definition of home-based direction should not be confused with the traditional definition of home-based trips.

## PURPOSE OF STUDY

The focus of this paper is on both the unlinked and the home-based directions shown in Figure 2. The unlinked direction is useful because it traces the actual travel route. On the other hand, the home-based analysis yields information about where the destinations are in relation to the home location, thus providing insights into travel in the context of urban form. This paper, then, contributes background information to the debate on jobs-housing imbalance (6,7) by illustrating that little has changed in directional travel in 20 years.

The home-based direction indicates to what extent urban residents continue to relocate toward lower-density neighborhoods from their places of work. Larger homes or real estate parcels can frequently be purchased in neighborhoods farther from the CBD or lower housing costs are achieved through the trade-off with transportation costs (8). Although the housing and transportation costs trade-off has been theorized for decades, evidence shows that urban growth can nullify this relationship (9). With both residences and jobs decentralizing, the locational advantage of living near the downtown begins to dissipate. Further, many blue-collar workers living in the urban core cannot take advantage of white-collar jobs in the CBD and have moderately long reverse commutes.

This paper contributes to the discussion of both the jobs-housing imbalance and the housing-transportation cost trade-off by examin-

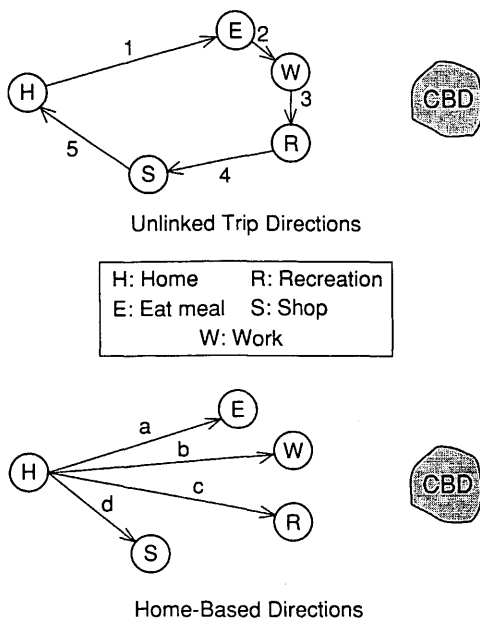


FIGURE 2 Unlinked and home-based trip directions.

ing a very specific aspect of travel behavior, travel direction and its change over time. This includes an examination of what proportion of travel is also directionless, whether by being too short (local trips) or by having no discernible direction (lateral trips). These two travel categories are examples of trips that do not typically support either the imbalance or the trade-off argument.

## DATA AND STUDY AREA

The study uses the household travel surveys conducted by the Chicago Area Transportation Study (CATS) in both 1970 and 1990 (10,11). The 1970 home-interview survey includes information on 21,748 households and 113,653 trips. The 1990 study includes 19,314 households and data on 162,755 trips.

There are differences in the data sets. For example, the 1970 data collapsed access trips for commuter rail into the traditional priority mode trips. But the 1990 data contained access and egress modes as separate trips. For this analysis the 1990 data base was adjusted so direct comparisons could be made.

There are other more subtle differences in the two data sets. The most notable is the change in method from a home-interview format to a mail-out mail-back survey. Another change for the 1990 data is the inclusion of more trip purposes, such as eating out and banking. This change led to the elimination of the personal business category, which has traditionally plagued surveyors as being difficult to define.

The choice of a 1970-to-1990 comparison is advantageous for several reasons. First, the late 1970s and early 1980s can be shown to be highly unstable in terms of urban development, maturation, and growth. Second, 1980 would reflect the high energy costs in the early 1980s and the energy shocks experienced by the traveling public in the late 1970s. In 1981 the average cost of a gallon of gasoline was approximately \$1.90 (using 1994 dollars), in contrast to less than \$1.15 per gallon in early 1994. Third, the population driver, the

Baby Boomer, moved from a prefamily to a mature-family stage, facing expenses such as college tuition during this period (12).

The study area consists of what is generally known as Northeastern Illinois or the metropolitan Chicago region. It includes six counties, with the addition of Kendall County in the 1990 data. Because Kendall County has a population of only 38,000, it represents well under 1 percent of the population of the entire study area. Therefore its addition to the data does not significantly affect the comparison of the 1970 and 1990 data. It should be noted that part of the analysis focuses on these geographic subdivisions or counties. Cook County is further divided into three subareas, including suburban Cook County, the city of Chicago, and the geographic CBD (CBD zone).

Between 1970 and 1990 the region's population grew by approximately 4 percent to just over 7.1 million, but the urban territory expanded by nearly 50 percent. One measure of this population decentralization is the size of the region's Census Transportation Planning Package. The population of the 0.25-mi<sup>2</sup> (0.65-km<sup>2</sup>) traffic analysis zone has increased from 4,820 in the 1970 package to 10,060 in the 1990 package. Unlike many other metropolitan areas, the Chicago area has substantially expanded geographically, with little population growth.

## FINDINGS

### Patterns in 1990

The regional variations in trip direction are examined in categories of purpose and mode. Each of these trip types has a distinct set of directional patterns.

#### Trip Purpose

For any home location, work and work-related destinations have the highest propensity to be headed toward the CBD, in both cases just over 50 percent (Table 1). Conversely, just under one-fourth of these trips are to locations farther from the CBD than the home and would be considered reverse commutes. In effect, the reverse component of all work trips is clearly in the minority. Beyond that, it is not perceptibly different from the reverse direction for other purposes (Table 1). With the exception of passenger and banking trips, which are largely local activities, the proportion of away trips ranges from 22 to 26 percent. For purposes such as banking, eating a meal, and serving a passenger, the trip toward the CBD is the prevailing one. None of the purposes is found in greater proportions heading away from the CBD. Both shopping and recreation trips have the best balance between trip ends toward and away from the CBD.

Except for work and work-related activities, most other travel purposes are dominated by short trips. Banking, serving a passenger, and shopping all have more than a third of their destinations less than 1 mi from home. Perhaps only banking shows prospects for vehicle trip reduction, provided that it is not chained to other purposes. Shopping and serving a passenger are likely to require a vehicle.

The most consistent direction is lateral. This category includes trips with destinations outside the local neighborhood that show no substantial progress toward or away from the CBD. From 11 to 16 percent of trips, regardless of purpose, fall into this lateral category.

TABLE 1 Trip Direction by Purpose for 1990 (Home-Based Direction)

Trip Purpose	Trips (mil)	Toward CBD	Away from CBD	Local	Lateral
Work	3.56	52%*	24%	14%	11%
Work related	0.76	51%*	24%	13%	12%
Serve Pass	1.40	27%	17%	41%*	16%
Other	1.67	30%	23%	33%*	14%
School	0.71	30%*	26%	29%	15%
Recreation	1.05	29%	26%	30%*	14%
Return Home	0	NA	NA	NA	NA
Bank	0.35	28%	15%	42%*	15%
Eat Meal	0.79	39%*	23%	25%	13%
Shop	2.05	24%	22%	38%*	16%
All Trips	12.34#	39%*	21%	27%	13%
* Highest values for trip purpose. # Total of 14.34 million directions; 2 million change-of-mode trips not included. Source: Computer from the 1990 CATS Household Travel Survey.					

**Work Trips** Travel to work creates the greatest stress on the highway system, in part because the travel is very directionally biased. Figure 3 illustrates the regional variations in unlinked trip directions. It again underscores the difference between inbound and outbound commuting found in Table 1 (in which the home-based direction was examined). Four of the most peripheral counties have the highest amount of directional travel heading toward the CBD. For each one, more than half of all the work trips are destined toward the CBD. Even in Chicago, without considering those who live within the geographic boundary of the CBD, 43 percent of travelers commute toward it, only slightly fewer than those in suburban Cook County (46 percent) and DuPage County (48 percent).

Conversely, more than a fourth of the residents of the city of Chicago commute in an outbound direction. This figure drops from 27 percent in the city to 23 percent in both suburban Cook and DuPage counties. In effect, the outbound commuting behavior is not unique to the city but is almost equally common in the inner ring of suburbs. As little employment is found in the peripheral areas in the distant counties other than Cook County, the outbound percentages drop into the teens.

Not surprisingly, short-distance commuting (less than 1 mi) declines from 44 percent in the CBD zone and 21 percent in the city of Chicago to less than 20 percent in the first ring of suburbs. It is back up in the 20 percent range in the three western most counties. One explanation for this is that in the higher-density parts of Chicago job opportunities are more prevalent, and again in the most distant suburbs the labor force is believed to be rather localized.

One of the most uniform patterns is the consistency in the local and lateral categories, which together identify a lack of directional

trends. For most of the study zones 30 percent of trips show no distinct directionality. Two clear exceptions are the CBD zone and Kane County, both of which have many local job sites. In the case of Kane County, its principal north-south urban corridor is along the Fox River Valley, which is largely equidistant from the CBD.

Considering that the private vehicle is so dominant in the work trip, the pattern for drivers was also examined and found to be rather similar to Figure 3. Because of that similarity it has not been included as a separate figure. However, the major difference is a slightly higher degree of outbound commuting. In the city of Chicago the away direction accounts for 39 percent of the private vehicle work trips, and the toward-CBD direction constitutes 37 percent. These percentages indicate that the outbound movement by drivers is greater but only by a small margin.

**Shopping Trips** Unlinked shopping trips have a very different directional pattern. Unlike work trips, shopping travel is largely local. A shopping trip distance of less than 1 mi ranges from 30 percent in the low-density counties of Will and Kendall to 49 percent in the city of Chicago and 59 percent in the CBD zone (Figure 4). As a whole, 40 percent of all shopping trips are less than 1 mi long, in contrast to only 20 percent for work trips.

The strongest shopping directional bias occurs in the city of Chicago, where 24 percent of the trips are outbound and only 15 percent are inbound. Suburban Cook County also has a stronger outbound than inbound movement, as does DuPage, although the latter is not statistically significant. Looking back to Figure 3, one finds that there are no such examples for work trips. In sharp

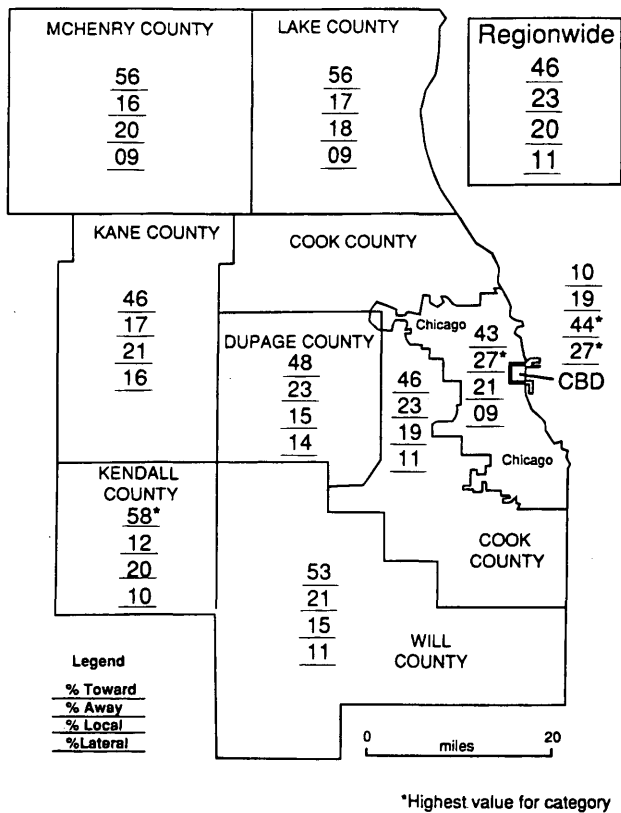


FIGURE 3 Direction of unlinked work trips for 1990.

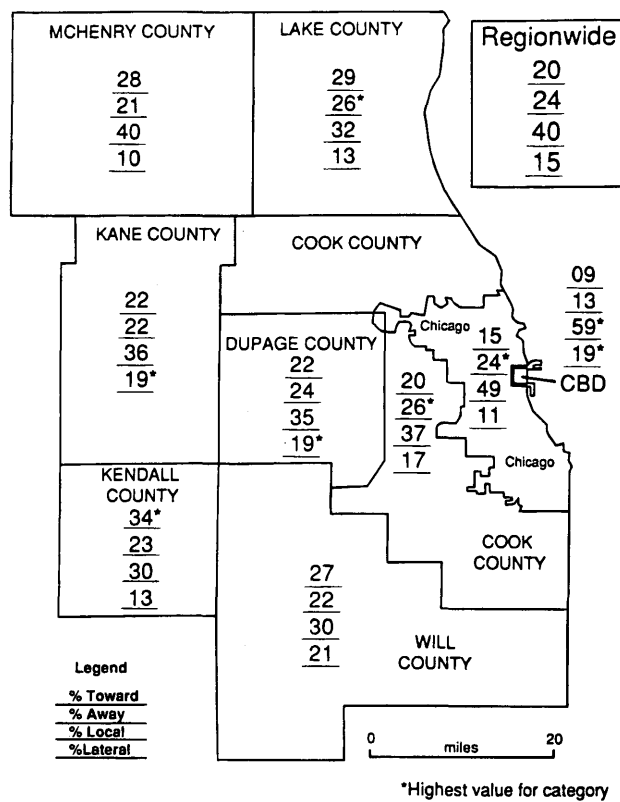


FIGURE 4 Direction of unlinked shopping trips for 1990.

contrast, inbound work trips outscore outbound trips by at least 15 percentage points for all study zones.

The outbound movement from the city of Chicago reflects travel to suburban shopping centers, where parking is easy and the diversity of merchandise is great. Particularly popular are suburban shopping centers on radial expressways leading from the city. A survey of municipal stickers by one of the authors found that as many as one-third of the vehicles at a popular suburban shopping center had Chicago vehicle registrations.

In sum, the outer counties tend to shop toward the CBD, and the inner areas shop in directions away from the CBD. All places have a large local shopping component. As such, shopping trips do not compound the CBD directional biases found in work trips.

*Travel Mode*

An analysis of travel direction by mode shows that the results are very different for the home-based direction than for unlinked directions. If one examines the 24-hr day by using the unlinked directional criteria, then, as Table 2 shows, the directions to and from the CBD are largely in balance. Table 2 is not therefore particularly revealing except that it illustrates the radial nature of the two rail modes, which exhibit only a few trips to local and lateral destinations. The local category also reflects the average trip length of these modes. For example, 43 percent of the taxi trips are less than 1 mi. More informative was the examination of directionality measured during the 6:00 a.m. to 10:00 a.m. peak period. Here it was found that within the individual regions represented in Figure 3, 92 to 100

percent of the commuter rail trips were headed toward the CBD. Regionwide 95 percent of the commuter rail trips headed toward the CBD, whereas 4 percent headed away.

Considering the location of the destination using the home-based direction definition (Table 3), it becomes apparent that, besides the taxi mode, the two rail modes, commuter rail and subway-heavy rail, have the strongest CBD orientation. However, there is a substantial difference in destination for riders of city and suburban buses. In Chicago there is a definite CBD directional bias, but in the suburbs there are more trips away from the CBD than toward it—39 percent versus 32 percent. Clearly, the suburban bus system provides an important function, serving a large number of riders in the reverse direction.

Both automobile drivers and passengers are more likely to be destined toward the CBD than away from it. Passengers frequently make short trips, and because 26 percent have trips of less than 1 mi (local trips), the proportion destined toward the CBD is only 32 percent but it is still higher than the 27 percent for trips that are away from the CBD.

Perhaps the most important finding between the two directional definitions is in the walking mode. Whereas more than 90 percent of the walking trips are less than 1 mi long (Table 2), only 41 percent of the walking trips are made close to home (Table 3). Of those trips whose destinations are not close to home, the overwhelming proportion are made closer to the CBD than away from it in reference to the home location. In effect, then, if a person's work trip is toward the CBD, he or she is much more likely to walk to work or to be out walking than if the work location is farther from the CBD than from home.

**TABLE 2 Trip Direction by Mode for 1990 (Unlinked Trip Direction)**

Trip Mode	Trips (mil)	Toward CBD	Away from CBD	Local	Lateral
Walk	1.59	2%	2%	91%*	4%
Auto Drive	13.11	29%*	29%*	28%	15%
Passenger	2.26	27%	27%	28%*	17%
Suburban Bus	0.09	33%*	33%*	18%	16%
Commuter RR	0.33	49%*	49%*	1%	0%
City Bus	1.16	34%*	34%*	17%	16%
Subway/El	0.55	46%*	46%*	3%	4%
School Bus	0.18	27%	30%*	20%	23%
Taxi	0.08	23%	22%	43%*	15%
Other	0.16	22%	22%	43%*	15%
All Trips	19.51	27%	27%	31%*	14%

\* Highest values for trip mode.  
Source: Computed from the 1990 CATS Household Travel Survey.

**TABLE 3 Trip Direction by Mode for 1990 (Home-Based Direction)**

Trip Mode	Trips (mil)	Toward CBD	Away from CBD	Local	Lateral
Walk	2.05	50%*	5%	41%	4%
Auto Drive	8.57	36%*	24%	26%	14%
Passenger	1.48	32%*	27%	26%	16%
Suburban Bus	0.10	32%	39%*	15%	14%
Commuter RR	0.34	60%*	6%	23%	11%
City Bus	0.91	46%*	21%	18%	15%
Subway/El	0.58	54%*	10%	29%	8%
School Bus	0.11	20%	36%*	22%	23%
Taxi	0.07	66%*	11%	14%	9%
Other	0.13	32%*	25%	29%	14%
All Trips	14.34	39%	21%	27%	13%

\* Highest values for trip mode.  
Source: Computed from the 1990 CATS Household Travel Survey.

### Comparison of Unlinked and Home-Based Directions

The data for the two directional definitions are generally similar, but there are some notable differences. The local category for the work trips illustrates one difference. Table 4 shows that although 14 percent of the work trips are to job sites within 1 mi of the home, 20 percent of the airline trip lengths to work (measured from the last stop) are 1 mi or less. This difference is even greater for work-related activities. Table 4 suggests the obvious, that these work-related trips have destinations that are closer to work than to home.

Shopping is also illustrative of the differences. Whereas 28 percent of the shopping activity takes place within 1 mi of the home, 40 percent of the shopping trips are less than that length. Concerning the CBD zone, shopping trip directions tend to be away from the CBD, perhaps on the way home from a city work location. However, when shopping trip direction is evaluated in reference to home locations, more shopping destinations are closer to than farther from the CBD.

In general, the home-based direction suggests a stronger "toward the CBD" bias than the unlinked direction and is more directly linked to urban form.

### Changes from 1970 to 1990

During the 20-year period there were dramatic changes in land use and travel behavior. Vehicular ownership increased dramatically (13), and the region grew territorially (14). Against this backdrop

one would expect the reverse traffic to decrease with population decentralization but to increase with employment decentralization and, because of the greater dispersion, for local activity to decline. How these forces balance is the subject of this section. This examination also adds to the debate regarding the travel efficiencies of core-dominated versus dispersed metropolitan regions (15, 16). The Chicago area was clearly much more dispersed in 1990 than it was in 1970.

Despite major decentralization forces there was little change in the directionality of trip purposes. There were moderate declines in trips toward the CBD for work, shopping, and recreation, but recreation also exhibited a decline in trips away from the CBD (Table 5). Also, although work trips shifted away from the CBD, work-related travel showed a slight shift toward it.

### Work Trips

There was little change in directional activity for the trip to work (Table 5). Many of the four directional categories registered no more than a two-percentage-point shift. Although the unlinked directional analysis for work trips exhibits a slight shift from the direction toward the CBD to the direction away from it, the ratio of toward versus away is still 2:1. In contrast, the home-based direction stayed at 52 percent toward the CBD for both 1970 and 1990. The away direction increased from 21 to 24 percent, and the other two directional categories declined slightly.

TABLE 4 Trip Direction by Purpose for 1990 [Unlinked Trip Directions (UT) and Home-Based Directions (HB)]

Trip Purpose	Toward CBD		Away from CBD		Local		Lateral	
	HB	UT	HB	UT	HB	UT	HB	UT
Work	52%*	46%*	24%	23%	14%	20%*	11%	11%
Work Related	51%*	34%*	24%	27%	13%	26%	12%	12%
Serve Pass	27%	25%	17%	21%	41%*	39%*	16%	16%
Other	30%	25%	23%	25%	33%*	36%*	14%	14%
School	30%*	25%*	26%	26%	29%	32%*	15%	16%
Recreation	29%	25%	26%	28%	30%*	33%*	14%	15%
Return Home	NA	22%	NA	34%*	NA	30%	NA	14%
Bank	28%	22%	15%	19%	42%*	46%*	15%	14%
Eat Meal	39%*	20%	23%	21%	25%	44%*	13%	15%
Shop	24%	20%	22%	24%	28%*	40%*	16%	15%
All Trips	39%*	27%	21%	27%	27%	32%	13%	14%

\* Highest values for trip purpose.

NA Not applicable.

Source: Computed from the 1990 CATS Household Travel Survey.

**TABLE 5** Changes in Trip Directions by Purpose from 1970 to 1990 (Unlinked Trip Direction)

Trip Purpose	Toward CBD		Away from CBD		Local		Lateral	
	1970	1990	1970	1990	1970	1990	1970	1990
Work	49%*	46%*	22%	23%	17%	20%	12%	11%
Work Related	31%	34%*	32%*	27%	24%	26%	13%	12%
Serve Pass	24%	25%	16%	21%	41%*	39%*	19%	16%
Shop	23%	20%	22%	24%	38%*	40%*	18%	15%
Recreation	28%	25%	29%*	28%	27%	33%*	17%	15%
Bank	NA	22%	NA	19%	NA	46%*	NA	14%
Eat Meal	NA	20%	NA	21%	NA	44%*	NA	15%
Personal Bus	31%	NA	23%	NA	30%*	NA	16%	NA
Other	NA	25%	NA	25%	NA	36%*	NA	14%
Return Home	23%*	22%	35%*	34%*	26%	30%*	16%	14%
All Trips	28%	27%	29%*	27%	27%	31%*	16%	14%

\* Highest values for trip purpose.  
 NA Data not collected.  
 Source: Computed from the 1970 and 1990 CATS Household Travel Surveys.

Table 6 shows that driving toward the CBD has declined, but the two-percentage-point drop does not identify a statistically significant change. Besides trips in the Other category, the largest drop in commuting toward the CBD is for automobile passengers or ridesharers, from 42 percent to 37 percent. Still, there is no corresponding increase for commuting away from the CBD; the increase is for local ridesharing.

An examination by county of trip origin shows that for the central county (Cook) there was a substantial change in the commute toward the CBD and in local commuting. However, as these offset each other, there was little change in commuting away from the CBD (Figure 5). Work trips away from the CBD increased from 23 percent in 1970 to 25 percent in 1990, only a two-percentage-point change. In contrast, local work trips increased from 16 to 21 percent, a five-percentage-point increase.

Commuting toward the Chicago CBD also declined for DuPage County but showed a strong increase for most of the peripheral counties. McHenry, Kane, and Will counties all showed approximately a 10-percentage-point increase in the commute toward the CBD. In many of these cases, local work trips declined as a proportion of all work trips, and the gains were toward the CBD.

### Shopping Trips

Table 7 shows only minor changes and shifts for automobile shopping trips. Local automobile trips have declined; the increase was

spread over trips both toward and away from the CBD. In essence, people may be driving farther to reach shopping destinations. There are, however, major changes in direction by public transit. Trips toward the CBD decreased dramatically for commuter rail, bus, and subway. Because local destinations also increased by transit (except commuter rail), the mode shift reflects the decentralization of shopping from areas in and near the CBD.

### CONCLUSIONS AND IMPLICATIONS

This study offers definitions of reverse commuting and directional travel and presents a framework for their analysis. The data presented here suggest that the four definitional categories—toward the CBD, away from the CBD, local, and lateral—provide a workable framework. A substantial proportion of trips are either local or are longer but do not really make progress toward or away from the CBD. The remaining trips are clearly toward or away from the CBD, and they illustrate distinct patterns by the trip purpose and mode used.

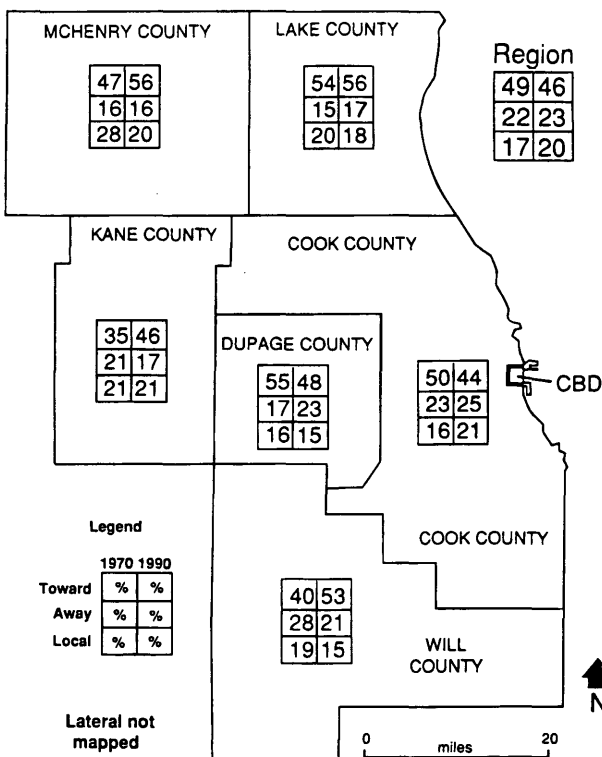
Commuting to work has had and still exhibits a strong directional bias toward the CBD. All the discussion about reverse commuting suggests a dramatic phenomenon based on actual numbers, but the data here do not show a statistically significant increase in the proportion, especially for work trips. Approximately one-half of the work trips remain destined toward the CBD, and fewer than a fourth are away from it. However, the magnitude of reverse commuting is



**TABLE 6** Direction of Work Trip by Mode for 1970 and 1990 (Unlinked Trip Direction)

Trip Mode	Toward CBD		Away from CBD		Local		Lateral	
	1970	1990	1970	1990	1970	1990	1970	1990
Walk	2%	3%	2%	1%	92%*	92%*	4%	5%
Auto Drive	47%	45%*	26%	28%	14%	16%	14%	12%
Passenger	42%	37%*	27%	26%	16%	23%	16%	14%
Suburban Bus	NA**	35%	NA	37%*	NA	16%	NA	12%
Commuter RR	96%*	96%*	3%	3%	0%	0%	0%	0%
City Bus	56%*	57%*	19%	17%	10%	12%	15%	14%
Subway/El	85%*	80%*	11%	14%	1%	2%	3%	4%
Taxi	22%	39%	13%	7%	49%*	40%*	16%	14%
Other	48%*	30%	19%	20%	21%	38%*	12%	12%
All Trips	49%	46%	22%	23%	17%	20%	12%	11%

\* Highest values for trip mode.  
 \*\* In 1970 suburban and city bus trips were combined.  
 Source: Computed from the 1970 and 1990 CATS Household Travel Surveys.



growing because the labor force has increased, especially because the city of Chicago's population declined during the study period and few commuters use public transit in the reverse direction. Reverse commuting congestion would be worse if the proportion of the labor force commuting in this direction also increased.

In many communities reverse travel is increasing, and a substantial portion of this activity is not easily accomplished on public transit. Nevertheless, there is evidence that transit is serving some reverse travel. Table 3 shows that suburban bus was used principally to travel in the reverse direction.

The data also indicate that the reverse commute is not strictly a city-to-suburb phenomenon. It is almost as prevalent in the inner suburbs. The reverse commute drops from only 27 percent of all trips in the city to 23 percent in suburban Cook and 23 percent in DuPage counties. Considering just automobile drivers, reverse commuting is more evident, with 39 percent commuting away from the CBD and 37 percent toward it from city origins.

Regarding home-based directions it may be surprising that all trip purposes exhibit at least some bias toward the CBD as opposed to away from it. However, some of these purposes, such as shopping and recreation, do not show strong differences and as such do not substantially contribute to inbound traffic activity. The mode that shows the greatest CBD directional bias is walking. Apparently those who make trips toward the urban periphery walk very little. The bulk of the walking activity in the Chicago area, outside the local neighborhood, occurs toward the CBD.

In conclusion, besides being able to analyze the directional patterns associated with trip making, the methods used here are trans-

**FIGURE 5** Unlinked work trip directions for 1970 and 1990.

TABLE 7 Direction of Shopping Trips by Mode for 1970 and 1990 (Unlinked Trip Direction)

Trip Mode	Toward CBD		Away from CBD		Local		Lateral	
	1970	1990	1970	1990	1970	1990	1970	1990
Walk	0%	3%	0%	1%	100%	94%*	0%	2%
Auto Drive	20%	22%	21%	25%	41%*	36%*	17%	17%
Passenger	23%	22%	24%	29%	33%*	32%*	20%	17%
Suburban Bus	NA**	25%	NA	46%*	NA	15%	NA	14%
Commuter RR	38%	29%	62%*	71%*	0%	0%	0%	0%
City Bus	41%*	20%	20%	33%*	23%	31%	16%	16%
Subway/El	77%*	46%*	18%	43%	1%	11%	4%	0%
Taxi	35%	-%	7%	68%*	48%*	16%*	10%	17%
Other	0%	19%	20%	23%	81%*	45%*	0%	14%
All Trips	23%	20%	22%	24%	38%	40%	18%	15%

\* Highest values for trip mode.  
 \*\* In 1970 suburban and city bus trips were combined.  
 Source: Computed from the 1970 and 1990 CATS Household Travel Surveys.

ferable to any region with geographically coded trip data. In this way comparisons between regions can provide a better understanding of urban form and its travel implications. Finally, the directional definitions proved useful in this study, and others are invited to use them.

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