



**Transportation Research Forum**

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Industry Issue Paper: Emerging Commuting Trends: Evidence from the Chicago Area

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Source: *Journal of the Transportation Research Forum*, Vol. 45, No. 3 (Fall 2006), pp. 109-123

Published by: Transportation Research Forum

Stable URL: <http://www.trforum.org/journal>

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## Emerging Commuting Trends: Evidence from the Chicago Area

by Siim Sööt, Joost Gideon Berman, and Joseph DiJohn

*Over the last several decades, commuting distances have increased in both miles and travel time. This analysis focuses on the county-to-county commuting data from the Census Transportation Planning Package that show intercounty commuting has increased substantially. In the Chicago six-county region, these data indicate that three of the six counties are now (2000) net importers of workers. In the past, only Cook County (Chicago) had a net positive balance of workers.*

*In contrast to past trends, demographic changes now contribute to lower increases in the growth in the number of workers. Specifically, in the 1990s average household size stopped decreasing for the first time in 100 years. This was partially responsible for a decline in the portion of the population that was commuting, a statistic that had been steadily increasing. In fact, in previous decades there was a larger growth in the number of workers than in people, thereby adding substantially to peak-period traffic when population growth was modest. This has changed.*

*Furthermore, in past decades large increases in homeownership rates contributed to the growth of urbanized areas. This suggests that workers made housing choices that added to commuting distances. The ability and willingness to increase commuting distances made it possible for employers to find their employees from a larger geographic region.*

### INTRODUCTION

The Census Bureau collects information about where people live and work and how they commute. While commutes are very predictable, they cause recurring stress to transportation systems. Numerous studies examine these data (Reschovsky 2004, Sööt et al. 2003). The 2001 Nationwide Household Travel Survey has received considerable scrutiny in achieving a better understanding of how commuting trends change (Pucher and Renne 2003). Many of these and other studies have contributed to a comprehensive overview of the multitude of changes that have characterized commuting in the last few decades (Pisarski 1987, Pisarski 1996). Since commuting contributes to frustration and many hours of lost productivity, as well as implications for urban sprawl and environmental quality, the study of commuting is prevalent.

Using the Census Transportation Planning Package (CTPP) and focusing on two competing trends, this study will show that in the last several decades the Chicago area, as well as the entire nation, has experienced evolutionary changes in economic activity and traffic. On the one hand, demographic changes are ameliorating the growing number of workers. Despite a sizeable increase in Chicago-area population, the number of workers has not increased as rapidly as it did in previous decades. Conversely, many home purchasers are acquiring homes on the fringe of the metropolitan area – thereby raising homeownership rates but increasing travel time to work.

Further, this paper provides a brief overview of the most noteworthy changes in commuting patterns since 1960. It suggests a substantial decline in the number of suburbs that offer little employment opportunities, often known as *bedroom communities* or *dormitory towns*, and a shift toward suburban employment centers. All the Chicago-area collar counties experienced major increases in commutes to their counties. Since 1970 DuPage County, immediately to the west of Chicago, experienced a growth of more than 100,000 jobs, while Lake County, to the north, registered a lower growth in numbers (81,000) but a higher percentage change (33% in contrast

## Emerging Commuting Trends

to 23% in DuPage County). Currently, both counties import more workers than they export. The stereotypical bedroom communities, where urbanites live but do not work, are no longer the only dominant urban land uses. The face of suburban Chicago has changed noticeably. While the Chicago area is used as the primary laboratory in this study, the findings have national implications; where appropriate, national data are cited.

Also, for the first time in many decades, growth in population now equals the growth in workers. Specifically, the concerns raised in the 1970s and 1980s in the Chicago area about major increases in congestion, due to expected increases in population, have not materialized. Still, congestion has increased, with longer commutes, reflected in increasing inter-county commuting. The choices urban residents make regarding lifestyle and affordable housing on the fringe of the region also contribute to higher travel times to work and the associated congestion.

## DATA AND STUDY AREA

The findings in this paper are largely based on census county-to-county work-trip information (U.S. Census Bureau 2003b). The data were tabulated from the census question: “At what location did this person work *last week*?”—referring to the last week of March 2000. When using these data, it is important to note that there are several reasons why these data do not precisely represent the number of jobs. They exclude persons not working during the reference week and do not account for persons with multiple jobs or multiple work sites. Neither do they record trip chains or multiple transportation modes in one trip.

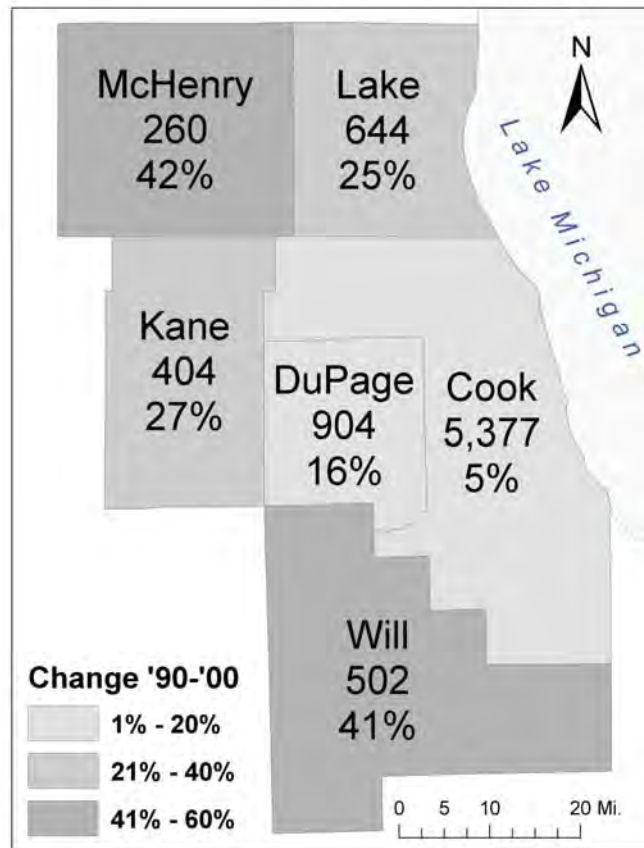
There is also a difference between the size of the civilian labor force (that includes the unemployed), the number employed, and the number of workers or commuters as examined in this paper. For 2000, the Census Bureau reports the size of the resident six-county Chicago area *labor force* as 4.17 million, of which 3.78 were *employed*, and the number of *workers* residing in these counties as 3.73 million (Table 1). Further, approximately 0.1 million workers commuted to the six-county area from outside the study area. It is important to understand the differences in these definitions.

These commuting data represent a unique product that has been collected consistently for many decades. While they do not report the exact number of jobs, the data provide important information about trends, such as the generalized increases and decreases in jobs by large geographic areas, e.g., counties.

Finally, the Chicago metropolitan area has grown during the past 30 years from six to over a dozen counties. However, this study focuses on the original six-county metropolitan area (Cook, DuPage, Kane, Lake, McHenry, and Will counties). Of the current 13-county metropolitan population, 88% lives in the six-county study area. Most of the metropolitan population outside the six-county area resides in Indiana (7% of the total population).

## CHANGE IN POPULATION AND WORKERS

The Chicago area has traditionally been a very concentric region with population and employment moving to the periphery. Figure 1 illustrates the current population distribution and the recent growth rates. Notice that since 1990 the central county, Cook, grew by only 5%, and the most distant counties, Will and McHenry, grew by over 40%. The concentricity is still evident.

**Figure 1: Population in 2000 and Percent Change, 1990-2000 (population in thousands)**

Source: Computed by the authors from data in the 1990 and 2000 U.S. Census Bureau Census of Population.

Both the number of people and workers has grown since 1960 (Table 1). The percentage growth in the number of workers was in the double digits from at least 1960 until the last decade, when the percentage growth dropped to 6.9%. With the recent decline, the encouraging news from a travel-congestion perspective is that both the rate of increase and the growth in the number of workers declined in the 1990s. The growth in the number of workers and the distances traveled by private vehicles contributed to congestion. In the 1970s and 1980s, the number of workers grew much faster than the population. The proportion of the population that was commuting rose from 40% in 1960 to 48% in 1990, raising concerns about the effects of looming increases in population and the number of workers in this future population. This percentage, however, dropped to 46 in 2000, and the ratio of change in workers to change in population changed from approximately 2:1 to 1:3.5. A small part of this decline is attributable to the drop in the proportion of the population aged 16 to 64—from 65.4% to 64.1% from 1990 to 2000 (U.S. Census Bureau 1990 and 2000).

Nationally, the proportion of the population that was working rose from 36% to 46%, a ten-point increase, similar to the eight-point increase in the Chicago area. More specifically, the national proportion of the population that commuted to work rose from 36.1% in 1960 to 37.8% in 1970, 42.6% in 1980, and 46.3% in 1990 before declining in the 1990s to 45.6% (U.S. Department of Transportation 2003, p. 1-2). This indicates that, on average, *without* an increase in population there would be a 28% increase in the number of workers in 30 years (dividing the 0.463 proportion of the population that commutes to work in 1990 by 0.361 in the 1960 base year). A 20% growth in

**Table 1: Chicago Area Change in Population and Workers, 1960-2000**

Year	Total Population	Change		Total Workers	Change		Workers/Population
		Number	Percent		Number	Percent	
2000	8,092	831	11.4%	3,726	239	6.9%	<b>0.46</b>
1990	7,261	157	2.2%	3,487	328	10.4%	<b>0.48</b>
1980	7,104	129	1.8%	3,159	341	12.1%	<b>0.44</b>
1970	6,975	754	12.1%	2,818	407	12.2%	<b>0.40</b>
1960	6,221	--	--	2,512	--	--	<b>0.40</b>

Data in thousands unless otherwise specified.

Sources: U.S. Census Bureau (1962, 1972, 1983, 1994, 2003a).

population translates to an increase of 54% ( $120 \times 0.463 / 100 \times 0.361$ ) in the number of workers. It does not take a large increase in population to find a substantial increase in the number of workers and the effect on rush-hour congestion. Coupled with the increase in trip chaining (multiple stops), the afternoon rush-period traffic has noticeably grown even in areas with no to little population growth.

During the same 1960-2000 period cited above, there was a remarkable increase in the number of female workers. In these 40 years, the number of male workers increased nationally by 56% while the number of female workers increased by 187%, nearly tripling the number of female workers (computed by the authors from data in U.S. Department of Transportation 2003, p. 1-5). Moreover, there were approximately 60% more female workers added to the national total during this period than male workers, 39.0 million versus 24.5 million (computed by the authors from data in U.S. Department of Transportation 2003, p. 1-5). In the Chicago area the number of female workers grew in the 1990s by approximately 300,000, in contrast to 250,000 males, and now account for 46.8% of all workers. The 50,000 additional female workers is approximately one-fourth of the 200,000 current difference in the number of male and female workers – suggesting that it will take some time at the current rate before females account for half of all workers.

The most noteworthy change in the 1990s was the modest increase in workers given the large increase in population. For the first time in decades, the Chicago-area population began growing at a robust pace. Between 1970 and 1990, population grew by only 4% in contrast to the 11% population growth in the 1990s.

Between 1970 and 1990, the 4% increase in population can also be contrasted with a more than 20% increase in workers. Had this previous ratio of workers to population (20% / 4%) continued between 1990 and 2000, workers would have increased by 55% ( $5 \times 11\%$ ), bringing the transportation system to a standstill. While the likelihood of this ‘doomsday scenario’ was small—as some of the population would have shifted modes, origins and destinations—there is no doubt that a substantially larger increase in the number of workers would have caused a considerable increase in highway congestion.

In the 1990s there was concern that a higher rate of population growth would result in an even greater increase in the number of residents commuting to work, and therefore increases in congestion. Inevitably, increases in the number of workers contribute to peak-period traffic, particularly in the morning. Since *the ratio of population growth to worker growth* has not held constant, the direct congestion consequences of major increases in population have not occurred. Still, population has grown and so has the number of workers contributing to traffic congestion.

Indeed the annual number of hours of traffic delay per traveler in the Chicago area has increased substantially from 16 to 58 (1982-2002), but this increase is not as dramatic as in other urban areas (Shrank and Lomax, 2005, Table 4). Dallas, Miami and Atlanta and other locations experienced

greater changes. Atlanta, with major population growth, increased from 14 to 67 annual hours of delay in the same time period.

Despite the large increase in delays per *traveler* described above, when measured in the hours of delay per *person*, Chicago's relative position has shown modest improvement. In 1982, the city ranked sixth highest in per person delay but dropped to 13th in both 1988 and 2001 before moving up to seventh place in 2001 and 2002 (the large one-year change from 2001 to 2002 is difficult to explain). From 1990 to 2000, when the population grew by 11.4%, the Chicago area rank showed an improvement from tenth to twelfth place. In either delay statistic, per person or per traveler, the relative position of the Chicago area has not deteriorated.

## WORKING WITHIN COUNTY

Census 2000 data also report the number of workers employed within the county of residence. In a place such as suburban Chicago, where the counties are roughly equivalent in area, census data also provide some information about commuting distance and distribution of jobs.

Quite expectedly, the trend is toward a smaller proportion of workers working within the county of residence (Table 2), suggesting an increase in commuting distances. In particular, Cook County exhibits an increase in reverse commuting<sup>1</sup> (see also Christopher et al. 1995). In Cook County, the county containing Chicago, out-of-county work is typically an example of reverse commuting. The fact that the intracounty percentage declined only 10 percentage points, from 98% in 1960 to 88% in 2000, is partially a reflection of the size of Cook County (the second largest county in the United States). Stated differently, the percent commuting from the county rose from 2% to 12%, a sizable increase in reverse commuting.

Conversely, DuPage County has had a steady increase in intracounty commuting – from 44% to 59% of its workers. While this reflects a substantial increase in the number of local jobs, as will be seen in Table 3, the number of workers commuting from DuPage has also nearly doubled since 1970. This has led to considerably more traffic within and around the county.

Similar to Cook County, in Will County to its south the proportion of the population working within the county has dropped, but more dramatically, from 77% to 44% (Table 2). This suggests a large growth in households seeking modestly priced housing on the fringe of the metropolitan region beyond the centers of employment. According to 2000 Census data, 47.5% of the homes in Will County had a value under \$150,000 while in DuPage County the equivalent proportion was only 21.8% (U.S. Census Bureau 2002). Although the number of workers employed in the county increased by approximately 50,000, the number of workers residing in Will County increased by just over 70,000. Clearly, the number of workers moving into this peripheral county outpaced the growth in local jobs.

Will County is a large county with large tracts of undeveloped land and therefore a low gross population density (600 persons per square mile in 2000). It is reminiscent of the closer-in DuPage County in the 1960s, when it was the choice of households seeking affordable suburban housing. Note that the number of employees who live and work in the same county is 44% for both DuPage County in 1960 and for Will County in 2000, 40 years later (Table 2). This raises the interesting question of whether Will County will follow DuPage County's lead of increased local employment over future decades, becoming more self-sufficient in employment and experiencing a greater mix of urban land uses.

**Table 2: Percent of Workers Who Work in the County of Residence, 1960-2000**

<b>County</b>	<b>1960</b>	<b>1970</b>	<b>1980</b>	<b>1990</b>	<b>2000</b>
<b>Cook</b>	98%	95%	94%	91%	88%
<b>DuPage</b>	44%	49%	53%	58%	59%
<b>Kane</b>	85%	74%	70%	60%	56%
<b>Lake</b>	79%	73%	69%	63%	67%
<b>McHenry</b>	73%	63%	59%	51%	51%
<b>Will</b>	77%	69%	56%	46%	44%

Sources: Chicago Area Transportation Study (1993), and U.S. Census Bureau (2003b).

The proportion of the workers in the entire six-county area that live and work in the same county dropped from 87% to 73% in 40 years (Chicago Area Study 1993; U.S. Census Bureau 2003b). This suggests that workers are commuting longer distances. While the drop in in-county employment may contribute to longer commuting distance and travel time, it may also reflect the increasing specialization in the labor market. Employers need workers with well-defined skills and are able to tap nearly the entire six-county area in search of the right people. With growing incomes, workers with the requisite skills may be adequately compensated for long commutes.

### **IMPORT AND EXPORT OF WORKERS**

Embedded in the county-to-county worker flows is another remarkable example of how the region is changing. Table 3 reports workers who live and work within the same county, the number of workers entering the county for employment, the number leaving their home county to go to work, and the net flows or commuting balance (import minus export). Counties that import workers have job centers attracting labor from surrounding areas.

With the exception of Cook County, which shows little change, all the counties display noticeable increases in commuting within the county. From 1990 to 2000, commuting increased 43% within McHenry County, 37% in Will County, and 24% in Lake County. The number of workers imported by suburban counties increased even more (Table 3). The 1970 to 2000 increase in DuPage County alone was more than 200,000 (from 44,435 to 256,617). Kane is the only county that did not experience at least a three-fold increase in the number of imported workers during this 30-year period.

This data suggest that decentralization of jobs into the suburban counties has changed commuting patterns in these counties as the region transitions into a more multinucleated form. Employers are finding skilled labor, low land costs, and tax incentives in suburban areas. Most of the factors that Colby (1933) articulated for suburbanization of employment in the 1920s still hold today. Additionally, improvements in the transportation systems and the greater versatility of trucking over rail have played a role.

**Table 3: Changes in Within and Between County Commuting, 1970–2000**

<b>County</b>	<b>Year</b>	<b>Commute within County</b>	<b>Import of Workers</b>	<b>Export of Workers</b>	<b>Commuting Balance</b>
<b>Cook</b>	2000	2,077,798	476,320	293,363	182,957
	1990	2,147,598	424,755	222,026	202,729
	1980	2,150,111	305,896	130,739	175,157
	1970	2,105,178	199,593	108,630	90,963
<b>DuPage</b>	2000	277,934	256,617	191,439	65,178
	1990	244,898	188,352	180,386	7,966
	1980	178,473	89,504	156,487	-66,983
	1970	97,226	44,435	100,050	-55,615
<b>Kane</b>	2000	107,807	67,543	85,055	-17,512
	1990	94,614	49,147	62,868	-13,721
	1980	90,702	30,156	38,088	-7,932
	1970	76,982	25,045	26,953	-1,908
<b>Lake</b>	2000	212,450	113,717	104,992	8,725
	1990	171,535	73,630	98,709	-25,079
	1980	145,550	33,637	65,923	-32,286
	1970	121,183	29,695	44,491	-14,796
<b>McHenry</b>	2000	68,108	28,534	65,149	-36,615
	1990	47,757	17,241	46,119	-28,878
	1980	40,354	9,349	27,553	-18,204
	1970	28,076	5,183	16,529	-11,346
<b>Will</b>	2000	107,456	53,377	134,431	-81,054
	1990	78,614	31,617	91,631	-60,014
	1980	75,175	17,285	60,183	-42,898
	1970	63,957	10,193	28,266	-18,073
<b>Total</b>	2000	2,851,553	996,108	874,429	121,679
	1990	2,785,016	784,742	701,739	83,003
	1980	2,680,365	485,827	478,973	6,854
	1970	2,492,602	314,144	324,919	-10,775

Sources: Chicago Area Transportation Study (1993) and U.S. Census Bureau (2003b).



## Emerging Commuting Trends

All counties experienced growth in both workers to and from their counties (exports and imports). As expected, Cook County had the largest increase in exports – more than 71,000 from 1990 to 2000. Will County was not far behind, with approximately 43,000. The other counties had more modest increases in the export category.

On the import side, DuPage County registered an impressive gain of approximately 68,000 workers from 1990 to 2000. Large increases in workers to a county were recorded by Cook County (52,000) and Lake County (40,000). These three counties established themselves as job destinations. Still, regardless of trip origin and county location, all counties had increases in commutes to the county. In particular, the collar counties imported nearly 160,000 additional workers in the 1990s.

The net changes in commuting indicate that two suburban counties are no longer ‘bedroom counties’ that export their workers to the central county. DuPage is now solidly a net importing county, barely achieving that status by 1990 (Table 3). New to the list is Lake County that now has 8,725 more workers commuting into it as opposed to out of the county. This is largely due to the growing suburb-to-suburb commutes that began to emerge in large numbers a few decades ago.

Cook County as a source of suburban workers is declining in a relative sense. Although the number of workers commuting to suburban counties from Cook County has increased by almost 180,000 from 1970 to 2000, Cook’s share of suburban-county imports has dropped from 95% to 56% during the same period.

Overall commuting has increased in all four categories, within, imports, exports, and balance, but the largest increase has been in imports (Table 4). The greatest increases are between rather than within counties. This is primarily evident in the most recent decade, when increases in exports and imports were approximately three times higher than the within category. The largest increase in cross-county commuting occurred in the 1980s, approximately 137,000 more than in the 1990s (derived by adding the imports and exports for the two respective decades and computing the difference – 1980-1990 minus 1990-2000).

Given the greater job growth in the 1980s versus the 1990s, however, the 1990s had a higher proportionate increase in cross-county commuting, and each of the three decades shown in Table 4 had a progressively higher degree of cross-county commuting, 1970 to 2000, though not in number. The larger imports than exports (the balance column) shows the amount of commuting into the six-county area from beyond the study area.

**Table 4: Changes in Commuting, Chicago Six-County Area, 1970-2000**

Years	Within County	Imports	Exports	Balance
1990-2000	66,537	211,366	172,690	38,676
1980-1990	104,651	298,915	222,766	76,149
1970-1980	187,763	171,683	154,054	17,629
<b>1970-2000</b>	<b>358,951</b>	<b>681,964</b>	<b>549,510</b>	<b>132,454</b>

Source: Computed by the authors from Chicago Area Transportation Study (1993) and U.S. Census Bureau (2003b).

## COMMUTING TIME

Another way to assess the increase in cross-county commuting is to examine commuting time. Commuting times in the region have continued to increase. However, given the modest population growth in the 1970s and 1980s, by comparison the substantial growth in the 1990s only contributed to a slightly higher rise in commuting travel times. Average commutes grew by 1.8 minutes in the 1980s (U.S. Department of Transportation 2003, p. P-15) and by 3.1 minutes in the 1990s (U.S. Department of Transportation 1993, p. 4-36), although some of this increase can be attributed to a change in the 'top coding' – increasing the highest possible Census-collected travel time from 99 minutes in 1990 to 200 minutes in 2000. Higher travel times also reflect increases in the number of workers, work-trip lengths, and the modest increases in highway lane miles (capacity).

The Chicago-area increases may also be compared to the increases experienced by other metropolitan areas in the 1980s and 1990s. In the 1980s, only five of the 39 metropolitan areas with over one million residents had increases greater than 1.8 minutes (Los Angeles, D.C., San Diego, Sacramento and Orlando). The largest increase was for Los Angeles with 2.8 minutes, less than the 3.1 minutes registered by Chicago in the 1990s.

More importantly, in the 1990s when population was growing rapidly in the Chicago area, the travel time increase mirrored the national increase – both at 3.1 minutes. Atlanta had the highest increase in the 1990s at 5.2 minutes. Although the 3.1-minute increase in the 1990s was greater than the 1.8-minute increase in the 1980s, the metropolitan comparison suggests that the 1980s figure was relatively high while the 1990s figure was in the middle range. This further suggests the large population increase in the Chicago area in the 1990s, in contrast to earlier decades, had only a modest effect on commuting times and congestion. Understandably, Chicago's relative position among metropolitan areas in commuting-time increases better reflects the growth in workers than population, the former being smaller.

Also, as expected, there has been a decrease in the number of short commutes, defined as less than 20 minutes. Despite the increase in the number of workers (6.9%) in the 1990s, the number commuting less than 20 minutes actually declined by approximately 5% while the number commuting over 45 minutes increased by 21% (U.S. Department of Transportation 2003), greater than the increase in workers.

Increasing travel times were found throughout the study area (Table 5). In Will County, where the growth (1990-2000) in workers living in the county (71,000, computed from Table 3) outpaced the growth in workers working in the county (50,000), at least 21,000 more workers had to commute from the county. Table 3 shows that in reality the increase in exports was nearly 43,000. This contributed to Will County having the greatest increase in travel times to work (4.7 minutes). Despite this noticeable growth, Will County's median travel time (32.0 minutes) remained less than in Cook and McHenry counties. However, if the trend continues, Will County may soon surpass Cook County.

At the other end of the spectrum, DuPage County, with its high growth in jobs, experienced the smallest increase in commuting time (1.7 minutes). At 29.0 minutes, the DuPage County median is the second lowest in travel time to work, behind Kane County's 27.3 minutes. The concentration of people and jobs in the Fox River Valley (including large cities like Aurora and Elgin) accounts for the low travel times in Kane County.

**Table 5: Changes in Mean Travel Times for All Workers by County and CMSA, 1990-2000**  
(travel times in minutes)

Place	1990	2000	Change
<b>Cook</b>	29.4	32.6	3.2
<b>DuPage</b>	27.3	29.0	1.7
<b>Kane</b>	23.5	27.3	3.8
<b>Lake</b>	26.4	30.1	3.7
<b>McHenry</b>	28.8	32.2	3.4
<b>Will</b>	27.3	32.0	4.7
<b>Chicago CMSA</b>	27.9	31.0	3.1
<b>New York CMSA</b>	30.0	34.0	4.1
<b>Los Angeles CMSA</b>	26.4	29.1	2.7
<b>National mean</b>	22.4	25.5	3.1

Source: U.S. Census Bureau 1990 and 2000 Census of Population and U.S. Department of Transportation (2003, p. 3-5).

The mean travel time data place Chicago somewhere between New York and Los Angeles. The data from these three cities show an apparent relationship between public transit use and travel times; public-transit times are traditionally higher than times for other modes, though time may be used more productively. The high travel times in Cook County (Table 5) reflect the high use of public transportation. Table 6 illustrates that many work trips via public transportation are lengthy. Public transportation accounts for one in three work trips over 60 minutes, but less than one in 20 work trips were less than 30 minutes. The mean travel time via public transportation in the Chicago area is 49.7 minutes, in contrast to 28.5 minutes for all other modes combined.

**Table 6: Proportion of Trips by Public Transportation, Chicago CMSA, 2000**

Travel Time	Number of Trips (thousands)	Proportion by Transit	Proportion of Transit Trips
< 30 minutes	2,113	4.0%	18%
30 - 44 minutes	962	13.2%	26%
45 - 59 minutes	480	19.3%	29%
> 60 minutes	540	33.3%	37%
Total	4,096	-	100%

Source: U.S. Census Bureau (2002).

## TRAFFIC AND HOMEOWNERSHIP

One of the major contributing factors to rising travel times is rising homeownership rates. In the Chicago area the distant suburbs offer land at low costs, and therefore many of the lowest-cost new homes in the region. Recent housing transactions (Chicago Tribune 2006) indicate that satellite cities such as Joliet and Aurora have median sales prices less than half of sales prices of homes in Chicago neighborhoods with the largest home sales.

Homeownership is commonly promoted as an important household investment strategy, contributing to financial stability (STPP and CNT 2000). In this context, the highest homeownership rates are in places that can grow territorially – providing households with the opportunity to buy new homes at modest prices. This causes households to spend more on transportation, and in many cases leads to long commutes, at least in distance (Sööt and Sen 1979) if not in time. This interpretation of the housing-transportation trade-off is the opposite of the STPP/CNT study interpretation. That

study suggests that sprawl causes high expenditures on transportation, which jeopardizes the ability to purchase a home. Again, the alternative explanation is that urban areas sprawl because housing on the fringe of the urban region is more affordable – leading to greater resources available for other items, such as transportation.

Therefore, homeownership rates are inversely correlated with the population density and population of the metropolitan area; the highest rates are in small metropolitan areas (Sööt et al. 2001). Another factor is the location of the metropolitan area. Homeownership is high in the central sections of the United States where metropolitan areas can sprawl, and consequently, housing costs are low. These include (with their 2003 metropolitan homeownership rates) Chicago (68.6%), Detroit (75.3%), Minneapolis-St. Paul (75.2%), Indianapolis (72.9%), and Milwaukee (70.0%) (U.S. Census Bureau 2005). Lower rates are found in places in California and Florida where local topographic conditions limit territorial expansion and consequently housing costs are higher. These lower metropolitan homeownership rates include Los Angeles (50.0%), San Francisco (50.8%) and Miami (55.9%).

The Chicago area has had one of the highest increases in homeownership rates in recent years. It has increased from 54.7% in 1986 to 68.6% in 2003, a 13.9 percentage point increase (computed by the authors from data in U.S. Census Bureau 2005). The nationwide average for the 75 largest metropolitan areas was an increase of 5.3 percentage points. Other places with double-digit increases are Dallas (11.9 percentage points), Baltimore (11.6), Minneapolis (11.0), and Atlanta (10.4). One can expect noticeable traffic effects from major increases in homeownership rates. This has particularly been true in Atlanta, while only the Minneapolis area had a 1990–2000 travel time increase less than the 3.1 minutes in the Chicago area.

On the lower end of the homeownership-increase range are places that cannot sprawl. This is the case for Los Angeles (1.7 percentage point increase from 1986 to 1993) and San Francisco (2.1 point increase). Both have low overall homeownership rates but major traffic congestion problems due to the concentration of a large number of people and cars in a relatively compact space. They rank first and second in annual hours of traffic delay (Shrank and Lomax 2004).

Another metropolitan area with limits on territorial expansion is Portland, Oregon, where the state has enacted an urban growth boundary. Homeownership grew by only 0.9 points from 1986 to 2003, reminiscent of many California metropolitan areas that are constrained by topography (computed by the authors from data in U.S. Census Bureau 2005). Portland now has a homeownership rate that is lower than the Chicago area (66.1% versus 68.6% in 2003, and 68.3% versus 70.0% in 2005).

The change in homeownership rates also must be evaluated with changes in the number of households. In much of the previous century, population changes have frequently not mirrored changes in the number of households. Since the beginning of the previous century, household sizes have decreased (Table 7). Using Table 7, data for Chicago show that with declining household sizes, a constant population would have yielded an increase of 76% in households from 1900 to 2000. In recent decades the decrease in household size has slowed, and in several parts of the Chicago area household size is increasing.

In Lake and Kane counties, both the number of Hispanics and household sizes increased in the 1990s. In the Chicago area, the average Hispanic household had 4.1 members in contrast to 2.5 for non-Hispanic white households (U.S. Bureau of the Census 2002). In 1990 and 2000 the Chicago metropolitan area household sizes were 2.77 and 2.78 respectively, and 2.72 and 2.73 for the city of Chicago. With the modest difference, it is reasonable to state that household size in the Chicago area has stopped declining, and now percent changes in population and households are largely equivalent.

**Table 7: Average Household Size: City of Chicago and the Nation, 1900-2000**

Year	City of Chicago	Nation
1900	4.81	4.69
1910	4.62	4.54
1920	4.33	4.34
1930	4.01	4.01
1940	3.57	3.67
1950	3.33	3.37
1960	3.07	3.33
1970	2.96	3.14
1980	2.75	2.76
1990	2.72	2.63
2000	2.73	2.59

Source: Computed by the authors from the U.S. Census Bureau 1900-2000 Censuses of Population and Housing.<sup>2</sup>

In the Chicago area, then, some of the demographic trends may be ameliorating traffic impacts, but increasing homeownership rates and urban territorial growth has contributed to higher travel times to work. Other than Cook County, where the use of public transportation and road congestion account for high average travel times, the two fastest growing and most distant counties from Chicago, Will, and McHenry have the highest average travel times to work.

## SUMMARY

This research found major changes in the distribution of jobs, commuting trends including reverse commuting, and homeownership. Regarding distribution of jobs, it was established that half the counties in the Chicago six-county metropolitan area are net importers of workers. The locations of jobs have decentralized in the last decade, contributing to rises in within-county commuting in suburban counties. A county close to Chicago, such as DuPage, that had high population growth rates in the 1960s and 1970s is now more centrally located – contributing to a net inflow of workers, lower travel times than in other counties, and lower increases in travel times.

Changes in commuting trends are largely following suit. The workforce is becoming more mobile, contributing to more intercounty work trips and higher travel times. As cross county boundary commuting increases, the overall pattern is becoming more diverse, harder to describe through a simple model, and more difficult to serve by public transit. Cook County, the county that includes the City of Chicago, continues to exhibit a large increase in work trips to the county, but the reverse commute from the county is growing even faster. Reverse commutes to the five suburban counties from Cook County have grown by more than 160,000 between 1980 and 2000. While jobs are decentralizing into the collar counties and the population of these counties is still increasing, the 1990s also saw a sharp increase in within-county commuting. This was especially apparent in the most distant counties, McHenry, Will, and Lake.

Homeownership rates also play a role, being positively correlated with urban territorial expansion. Metropolitan areas that have few limits on territorial growth have high ownership rates. This urban expansion may also contribute to longer commutes to work.

## CONCLUSIONS AND IMPLICATIONS

This study shows that the average household size in the Chicago area has stopped declining. For the first time in 100 years the number of persons per household in this region is stabilizing at 2.78 (in 2000). This is important, since households generate workers and work trips. When household size declines as it did throughout all but the end of the previous century, a constant population results in more households, more workers, and more traffic. Now that the portion of the population that is commuting is also declining in the Chicago area (for the first time in 40 years), the factors that translate population growth into commuting and traffic generation are changing. Traffic congestion may be increasing but two factors, household size and proportion of the population commuting, tend to moderate the effect of population growth on traffic.

Another major finding of this study is that an increasing proportion of workers commute to sites outside their home county, which may contribute to increases in commuting time. This has two interpretations. First, work sites are decentralizing and workers commute greater distances or on roadways that are more congested. This suggests that the search for affordable housing (large houses with large lots) may well be contributing to longer commutes. To the extent that this is a manifestation of personal choice, it is difficult to devise a transportation-related solution to increasing commuting times. Many first-time buyers are participating in the traditionally cited trade-off between housing and transportation costs by moving to the fringe of the metropolitan region and incurring long commuting distances by automobile (Sööt and Sen 1979).

The second interpretation is from the perspective of the employer. The job market is undergoing a process of specialization and since workers are increasingly mobile, much of the region is the labor shed for an employer. As county-to-county commutes increase in the suburbs where travel speeds are greater than in the central city, there may be a good match between the skills of workers and employer needs. When true, it could add to worker productivity – the major contributing factor to increasing living standards. Conversely, if the commute becomes more onerous it may detract from productivity. At the same time the labor mismatch hypothesis as a counter prevailing trend, with low-income workers not able to reach distant jobs, is acknowledged. This topic needs more research.

The study also finds that, over the decades, employment has followed population to suburban counties. There is also ample evidence of residents following large employment sites to locations on the urban fringe. In either case, the relocation of employment centers to the suburbs can lead to shorter commutes for those who live in suburban areas. Many, however, are choosing to live in even more distant suburbs beyond employment clusters. This has led to a dispersed distribution and relatively low densities for both population and employment. This process has two implications for transportation planners and providers. First, the densities are frequently too low to offer frequent transit service unless local communities are willing to change their zoning ordinances to allow higher-density land uses for residences and employment. Second, as trip origins and destinations become more dispersed, highway planners may need to focus their attention more on local arterials than on expressways, and transit planners need to focus on more specialized services, such as van pools and demand responsive operations.

### Endnotes

1. We define reverse commuting as travel away from the CBD. The more common definition in the literature, “opposite the peak direction” (Regional Transportation Authority, 2005, p. 101) does not work well for some Chicago-area expressways where the a.m. peak travel is toward the suburbs.

2. In order to provide data over a 100-year period, data were compiled by dividing population by the number of households.

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