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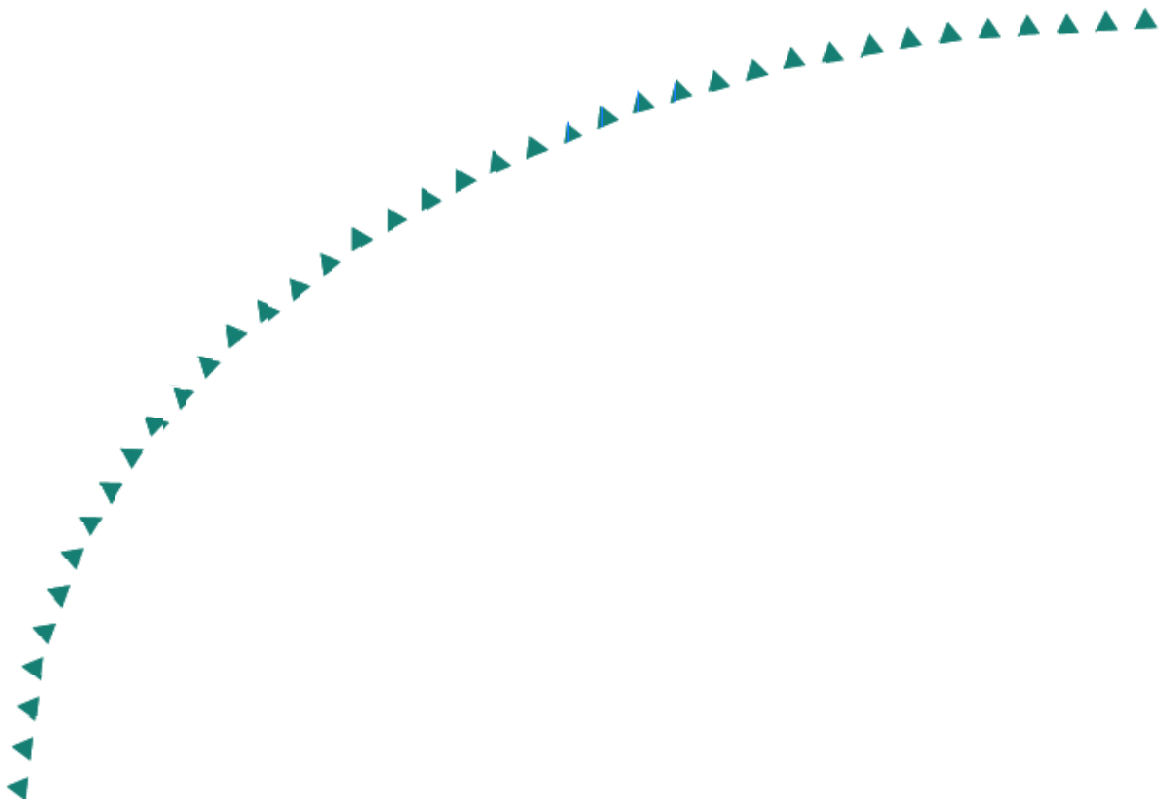
Final Report

Urbanization of Minnesota's Countryside, 2000-2025: Evolving Geographies and Transportation Impacts



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In this study, we examine population and housing change, changes in industrial activity and occupational changes, and characteristics of commuters and the journey to work for those working away from home in 26 regional centers and their commute sheds in Greater Minnesota. We also explore ways in which Public Use Microdata Samples (PUMS) and Public Use Microdata Areas (PUMAs) might be exploited to shed additional insight into the changing nature of the demographic, economic and commuting patterns that are now pervasive throughout Greater Minnesota. These data are evaluated to explore links between demographic and economic features of working-age populations, and relationships between worker and household characteristics and aspects of commuting activity on the other. The final chapter examines regional economic vitality and travel behavior across the Minnesota Countryside.

When population change in sample regional centers in the 1990s is compared with change in the nearby counties that comprise the centers' commuting fields, four situations appear: those where centers and their commuting fields both had population increases; centers with declining populations, but increases in the commuting fields; centers with growing populations, but with declines in their commuting fields; and situations where both the center and the commute field lost population.

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Urbanization of Minnesota's Countryside, 2000-2025: Evolving Geographies and Transportation Impacts

Final Report

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EXECUTIVE SUMMARY

Major changes are underway in Greater Minnesota, and each of them may have relevance for the next two decades of highway planning at scales from the state to the local level. Three of these major trends are examined in this report: (1) population and housing change, (2) the restructuring of the state's economy, and (3) changes in daily travel behavior, specifically the journey to work and other daily and weekly personal travel on the state's highways. Based on this examination, we discuss implications of the trends for transportation planning at geographical scales ranging from statewide, to sub-regional, to local.

The functions of roads in the state are changing. The *major* highways were originally built to link cities and towns, but the majority of roads connected towns with the countryside so that output of farm and forest could be marketed through towns, and towns could distribute goods and services to rural customers. Those traditional functions persist, but road system usage is in transition. Traditional uses of roads in Greater Minnesota are being superseded by their use as "residential streets" serving dispersed neighborhoods in forested areas, throughout the lake districts, and across the agricultural countryside. This report discusses some of those uses, with special attention to daily commuting.

Underlying this study is the question whether the trunk highway system serving Greater Minnesota is likely to be sufficient to handle the increasing loads that a changing society, expanding economy, and new travel patterns will be imposing on it in the years ahead. We cannot predict the future of our state or its sub-areas within with any degree of certainty, but we can describe certain demographic, economic and travel behavior trends underway in Greater Minnesota. We can relate them to trends in society at large, and speculate on what they may portend for state, regional and local transportation planning in the coming years. That is the goal of this report.

This project and the one that preceded it considered new ways to think about land use, transportation, and emerging settlement types across the country in general and throughout Greater Minnesota in particular. A major focus was to examine the forces driving socioeconomic change in our country, and to illustrate how evidence of those drivers of change appear in the form of landscape modification and in modified transportation requirements. The present project also demonstrates ways to use specialized Census data sources in analyzing these questions.

The principles surrounding road congestion apply in the same way to Minnesota's smaller regional centers as they do to large metropolitan regions and their tributary areas. It boils down to the relationship between the *demand for road capacity at specific times and places* compared with the *supply of road capacity at those times and places*. Looking ahead, increases in fuel prices raise transportation costs, cut discretionary spending on other goods and services, and prompt reconsideration of tradeoffs involving cheaper land and housing at locations remote from jobs *versus* long-distance commuting.

Greater Minnesota is diverse in demographic and economic terms. When population change in sample regional centers in the 1990s is compared with change in the nearby counties that make up the centers' commuting fields, four situations appear: those where centers and their commuting fields both had population increases; centers with declining populations, but increases in the commuting fields; centers with growing populations, but with declines in their commuting fields; and situations where both the center and the commute field lost population. A good portion of the 1990s net population growth in the 26 study areas reflected growth in non-white and Hispanic populations.

Population increases impose pressures on the housing stocks within some study areas. In the 1990s, the statewide housing inventory increased, with many of the same growth leaders of the previous period maintaining or exceeding the state in net additions of new housing units. Steady expansion of the housing stock in a study area usually accompanies house price inflation, which yields positive *wealth effects* for residents, which stimulate additional rounds of local consumption and investment.

Employment changes between 1970 and 2000 are examined in terms of *industries* of employment as well as by the changing mix of *occupations* pursued. The study areas are grouped into (1) fast-growing recreation and retirement areas, located mainly in northern lake districts; (2) areas with mixed economies and moderate job growth; and (3) slow-growth areas in the west and southwest parts of Minnesota that depend on a weak farm economy, plus northern areas supported largely by mining and forest products industries. Structural changes in regional economies bring about changes in household activity within those sub-regions, and vice-versa. Along with changes in economic activity and household behavior come changes in daily travel behavior, which yield corresponding impacts on the state's trunk highways.

During the 1990s, the three geographic settings displayed the following trends: (1) areas of *fast growth*, mainly in the northern lake districts, saw employment expansion; (2) areas of *modest growth* and diversified economies had employment growth; while (3) slow-growth natural-resource-based economies lagged with employment change.

On the demand side of the picture–where trips *originate*–the number of people and number of households will continue increasing as an outcome of a relatively robust state economy. Of the state's 5 million population, 40 percent live outside the greater Twin Cities, and that number is likely to continue increasing even though growth rates are unlikely to match those of the Twin Cities area. Like the Twin Cities area, the number of households and number of cars in Greater Minnesota may rise faster than the population.

On the other side of the planning equation are *trip destinations*. Locations of homes and jobs continue to change. Like the Twin Cities metro area, we see dispersal of practically everything over the last 50 years. The retailing functions of villages and hamlets have given way to ubiquitous shopping mall and superstores. Retailing is farther away from the customers, but with disposable incomes higher, shopping baskets are fuller, and vehicle miles traveled keep rising. Recreation continues to form a bigger share of household lives, and will generate more daily and weekend recreational travel. As jobs, shopping and recreation opportunities disperse, trips of all kinds increase in number and length, generating complex *trip chains* that are hard to measure, to model, and to plan for in the countryside for the same reasons they pose challenges for Twin

Cities planners.

The study also examines changes between 1980 and 2000 in commuting trends, including the share of all workers who commuted to jobs away from home, workers commuting to jobs outside their county of residence, and the share of commuters driving alone to work. In every one of the Minnesota counties included in the study areas, the percentage of workers who commuted to jobs outside their county of residence increased between 1980 and 2000. The number and the percentage of workers driving alone to work rose sharply in the 1980s. Daily commuting traffic has been rising steadily, partly due to a greater number of workers, but increasingly due to workers commuting alone. Moreover, those solo commuters, on average, are spending more time in their commutes. There seems to be little difference among the study areas grouped by growth rates in their experiences regarding average commuting times. The census data do not reveal whether the longer commute times are due to longer commutes, slower commutes, more complex commutes (e.g., due to stops along the way), or some combination of factors.

In this study and the one that preceded it we have tried to shed light on how the Minnesota countryside is rapidly urbanizing and what that might mean for highway transportation planning. New housing on large lots is dispersing across the countryside, while average commuting times are steadily increasing. Evidently, households select places to live in the general vicinity of available employment opportunities, but once they decide where to live, they seem willing to drive to available jobs, sometimes with a commute of an hour or more. Neither the location of jobs nor the location of housing opportunities is fixed in space. Both are in constant flux. Once jobs and housing are matched up, the journey to work is the result. In cases where a worker holds multiple jobs away from home, more than one journey is needed. In cases where more than one household member works away from home, the household undertakes multiple journeys to work.

Disparate rates of population growth in Greater Minnesota can be expected to continue in the coming two decades. Moreover, additional dispersion of population is likely to occur, not only in the high-amenity forest and lake districts, but also in sparsely populated parts of the state experiencing only modest growth–or no growth at all. People seem to like spreading out, many (probably most) preferring low-density living over high density, and as long as easy movement on the state's trunk highways and the roads that feed them is available and roads are well maintained, our sense is that the trends toward dispersion with more time spent commuting seem likely to continue.

Road capacity in most parts of greater Minnesota seems more than adequate to handle *commuting* loads, although that is only one element in total traffic loads. Besides the journey to work, as discussed in an earlier report, congestion during certain hours (due to commuting) and parts of certain days (daily and weekend *shopping and recreation* traffic) on segments of the Interstates and other trunk highways has been building steadily. Finally, over-the-road *trucking and business traffic* provides an important share of highway traffic, but that is beyond the purview of this study.

Chapter 1
Land Development and Highway Congestion: The Essential Linkages

Introduction

Three major trends underway across Greater Minnesota are examined in this report:

(1) population and housing change, (2) the restructuring of the state's economy, and (3) changes in daily travel behavior, specifically the journey to work and other daily and weekly personal travel on the state's highways. Based on this examination, we discuss implications of the trends for transportation planning at geographical scales ranging from statewide, to sub-regional, to local. In Minnesota's first century of European settlement and economic development, a rail and road system provided most of the transportation requirements within a hierarchy of urban and rural settlements–from field and forest, to hamlets and villages, to towns and cities, and finally to major metropolitan areas. Following World War I, the Federal Aid Secondary (farm-to-market) state highway systems, and the Federal Aid Primary (city-to-city) U.S. highway system were planned and built. Atop the highway hierarchy, the Interstate (metro-to-metro) highway system got underway in the late 1950s.

The functions of roads in Greater Minnesota have been changing during recent decades. County roads and farm-to-market highways were originally built to connect towns with the countryside, with output of farm and forest marketed through towns, and towns distributing goods and services to rural customers. To be sure, those traditional functions continue, but usage of the system is in transition. The traditional uses of roads in Greater Minnesota are being augmented by their increasing use as "residential streets" serving increasingly dispersed "neighborhoods" throughout a residential countryside. This report discusses some of those uses, with special attention to daily commuting.

Planners, elected officials, activist citizen groups, and the press often assume implicitly that in matters of transportation and land use planning, "*cause and effect normally occur at the same time and place*." For example, a thunderstorm passes–and stream levels rise. A highway lane is closed for repairs–and traffic slows down. A new housing subdivision is completed–and extra kids show up for school. The cause-effect relationships seem pretty obvious. But not always. What is harder to see are chains of cause and effect where the causes and the effects are separated in both space and in time. For example, if we remove forest cover from a wide area today and replace it with buildings, streets, and parking lots, flooding intensity increases downstream tomorrow. If we overbuild new housing on the suburban edge today, we will see softer prices and vacancies in older suburbs and central cities tomorrow. If we consolidate farms today, we can expect to see larger trucks carrying heavier loads of farm products over longer distances tomorrow.

City and county officials, overwhelmed by responsibilities and tight budgets look inward to the areas and activities within their boundaries, grappling with issues that show up inside their jurisdictions. But even the smallest cities and the most sparsely populated counties are linked in many ways not only with adjacent places, but with remote events as well. High prices for housing in the Twin Cities prompt some city households with suburban jobs to relocate to the

countryside and commute in the other direction, adding new traffic loads to existing roads. Manufacturers and distribution centers needing large parcels of land for goods handling and employee parking relocate from the suburbs to small towns or countryside locations, draw their workers from wide areas, and add to traffic loads. Civil wars and economic hardship elsewhere in the country and other parts of the globe displace populations who come to Minnesota for new lives and economic opportunity, and expand the population and economy with their ambition and skills.

Looking ahead, relentless increases in the prices of oil, gasoline, and diesel fuel will increase fuel bills, raise transportation costs, and reduce discretionary spending on other goods and services. Some drivers will shift to more fuel-efficient vehicles or support carpools. These changes also will force reconsideration of tradeoffs involving cheaper land and housing at locations remote from jobs *versus* long-distance commuting.

We cannot predict the future of our state or its sub-areas within with any degree of certainty, but we can describe certain demographic, economic and travel behavior trends underway in Greater Minnesota. We can relate them to trends in society at large, and speculate on what they may portend for state, regional and local transportation planning in the coming years. That is the goal of this report.

The changes occurring throughout Greater Minnesota resemble in most respects the changes in settlement and ways of life outside metropolitan areas across the United States, Canada, and Western Europe, and in the past decade they have been attracting increasing attention from scholars, policy analysts and public officials. One recent study put it this way:

> "Throughout the developed world, rural areas are in economic, social, and visible transition. The traditional economic base provided by resource industries is typically in decline, sometimes in absolute terms, and nearly always relative to other economic sectors. In the orbit of large towns and cities–which in many developed regions means everywhere–the countryside is increasingly a functional extension of the city: hamlets and villages mushroom into bedroom suburbs, back roads suffer a rash of exurban residential development (unless preventive medicine is taken), and golf-courses take over farmland. More intensive still are the mobile-home parks, reservoirs, landfill sites, and heavy industry, for all of which space must be found. Even beyond commuting range, the countryside is increasingly in thrall to the cities, and as land is valued more highly for recreation and tourism, retirement, or natural processes, and less highly for the production of food or fibre."
>
> "We are moving toward a "New Countryside," or rather a variety of new countrysides, with varying legacies from the past, and subject to considerable variation in current conditions. There are clearly some common causes (drivers) that seem ubiquitous in the direction of their impact; examples are the industrialization of agriculture, near-universal automobile ownership, and heightened environmental awareness. But these drivers operate in widely varying natural, social, and political contexts, and at different scales, perhaps producing dramatic change in a province of a given country, while having little impact on a particular village in another country. Depending on their national milieux

> and their scale of enquiry, therefore, rural scholars reach different conclusions about which trends are apparent, which processes are dominant, important, or even present, and which policy options are most appropriate. To compound disagreement, interpretations are coloured by a variety of methodological approaches, philosophical stances, and political leanings." [1]

The changes call into question the traditional ways of describing settlement in the countryside. Distinctions between *metropolitan* and *non-metropolitan*, between *urban* and *suburban*, and between *urban* and *rural* are no longer precise terms, nor as helpful in description and analysis as they once were. [2]

This project and the one that preceded it considered new ways to think about land use, transportation, and emerging settlement types across the country in general and throughout Greater Minnesota in particular. A major focus was to examine the forces driving socioeconomic change in our country, and to illustrate how evidence of those drivers of change appear in the form of landscape modification, and in modified transportation requirements. The present project also demonstrates ways to use specialized Census data sources in analyzing these questions.

Problems

There are two problems that handicap this kind of inquiry. One–to give it a fancy name–we might call the "palimpsest problem." *Palimpsest* is an ancient Greek word for a parchment or the like from which writing was partially or completely erased in order to make room for a newer text. The late transportation geographer, James E. Vance at Berkeley, used this term to describe landscapes and transportation infrastructures of American cities from which old structures were erased or modified to make way for the new. The modifications occurred in stages:

> (a) Before 1890, American cities were pedestrian cities; people walked to work and shop at the downtown center, then walked home to nearby neighborhoods.
>
> (b) When the electric streetcars were added to the pedestrian city after 1889, two things happened: (1) new lands were opened up for development in areas adjacent to thoroughfares beyond the built-up edges as of 1890, and (2) the streetcars crowded into the downtown center using streets that were not designed to carry them. Sometimes the crowding got so bad the tracks had to be elevated or put underground to move them quickly in and out of the center.
>
> (c) By the 1920s, ownership of private cars, especially by people buying new housing on the developing edges, generated automobile traffic trying to get downtown in competition with streetcars along the main thoroughfares, and with pedestrians once they arrived downtown.
>
> (d) The post-war freeways came along in the 1950s, with high-speed cars and trucks pouring into the city, and competing with traffic on city streets and with downtown-oriented transit lines built to serve an earlier era.

By looking back over these successive stages of transportation and land development we can view the metro area as Vance discussed it–*as a palimpsest for a national culture*.

By means of ITS and other engineering applications, can squeeze maximum performance from the traffic channels that we inherited, but it is hard to get ahead of the game because it is prohibitively expensive in economic and political terms to discard what is already here. We can only modify it, or add to it. So that's one problem; we cannot start from scratch, we have to deal with what is here.

The second problem we face is a conceptual one: it emerges when we try to use obsolete vocabularies to describe new phenomena. We faced both of these problems in our two projects– the *palimpsest* problem, and the *conceptual* problem–when we undertook to describe and analyze what we called the "urbanization of the Minnesota countryside." Since the late 1800s, the question of how to classify settlement types has been a topic that has come around for re-examination every 40 to 50 years, so we figured it is time once again. In our current project, we looked first at the problem of classifying settlement types.

Classifying Settlement Types: 1900-1950

Minnesota was settled by European stock in the 19th century, and developed a resource-based economy with a dispersed population based on agriculture, forest products, and later mining. By 1900, however, Minnesota cities with their manufacturing activity, warehousing, banking and railroad transportation were flourishing. Modifications of census practice seriously lagged behind these changes, and hampered its ability to portray the emerging settlement patterns that the Census Bureau was expected to monitor. The Census continued mainly to *count people* within *political units*, and to report some of their characteristics.

Around 1900, the Census Bureau devised some new types of statistics for non-political areas. It delineated *Industrial Districts* (later called *Industrial Areas*) for the nation's four largest cities for use in the 1905 Census of Manufactures, which was itself a response to the new economy. Each district consisted of one or more counties, and district limits followed county boundaries. Metropolitan Districts for cities of 200,000 or more were introduced in 1910, and were composed of aggregations of contiguous Minor Civil Divisions (i.e., MCDs: incorporated cities, villages, boroughs, and towns). Decennial census practice continued to focus on enumerating residents and reporting the totals by administrative unit. Following the counts, the Census classified an MCD as *urban* if its population reached or exceeded 2,500; otherwise it was classed as *rural*. On the basis of this rule and terminology, the 1920 U.S. Census recorded for the first time that the nation's *urban* population exceeding the *rural* population.

Meanings of the Terms *Urban* and *Rural*

These terms originated in academic sociology. At the end of the 19th century, the U.S. census was run by sociologists. In traditional sociological theory, *urban* and *rural* define the ends of a theoretical continuum that societies traversed during the process of modernization. So the terms

adopted by the Census Bureau were derived from a *sociological* concept, not a *geographical* concept or a *settlement* concept.

When the Census Bureau disclosed in 1920 that U.S. *urban* population (defined using the 2,500+ criterion) exceeded 50 percent of the total for the first time; there was still no serious or definitive scholarship by geographers (or others) available that analyzed and portrayed the nature of the settlement forms that were emerging on the American landscape. (A similar conceptual trap accompanies the terms *central city* and *suburb*, but a discussion of that problem and related planning issues lies beyond the scope of the present discussion.)

Meanwhile as cities and towns grew in size and geographical extent, the state of Minnesota and other states struggled to improve road systems to serve the cities and the countryside. Minnesota appointed its first commissioner of roads in 1917, but roads (mostly unpaved) remained in primitive condition until the 1920s. Then, along came the Federal-Aid Primary highway program (linking major cities: the U.S. highway system) and Federal Aid Secondary highway program (for farm-to-market roads: the various state highway systems).

New Settlement Concepts: 1950-2000

For more than two decades (1920 into the 1940s) Census Bureau demographers and geographers realized that the emerging U.S. settlement system was poorly described by its counts and its maps. The *Standard Metropolitan Area* (SMA) and *Urbanized Area* (UA) concepts were devised in the 1940s, and were applied following the 1950 census. Each 1950-based SMA included a central city of 50,000 or more, plus its county, plus any contiguous counties that met certain criteria (e.g., non-agricultural workers; population density; and functional linkage as measured by commuting and telephone traffic).

But the classifications continued to follow the social science thinking of the day, that is, new concepts were added to the old rather than displacing them: *city* and *country*; *urban* and *rural*; *city life* and *country life* persisted in census practice, and in public consciousness. For much of the first half of the 20th century (interrupted by Depression & WWII) the Census Bureau continued grappling with these questions: How is American settlement organized, and how is it related to economic and transportation requirements??

The *Standard Metropolitan Statistical Area* concept (SMSA, using criteria modified from the 1950 SMA definition, and relying more heavily on commuting data) was introduced in order to publish Census 1960 data. The SMSA concept was used again following the 1970 Census. In 1980 and 1990, the need for further revisions was apparent because the commuting fields of adjacent SMSAs increasingly overlapped (e.g., Baltimore-Washington; San Francisco-Oakland; Los Angeles-Long Beach, Milwaukee-Chicago, or Minneapolis-St. Paul and St. Cloud). The response was to distinguish (1) *Metropolitan Statistical Areas* (MSAs) from (2) *Consolidated MSAs* (CMSAs), which contain two or more component *Primary MSAs*.

After the 1990 census and the realization that the concepts used to define modern American settlement were increasingly difficult to apply and defend, the Census Bureau, the Office of

Management and Budget, and the Interagency Committee on Federal Statistics questioned whether *the MA concept* itself was obsolete and should be dropped. After all, it was suggested, the entire nation was now urban, in the sense in which the term was defined theoretically and used in 1900. The basic question asked was: Is a concept based on 1900 thinking and 1900 settlement appropriate for describing settlement and ways of life in 2000?"

Several conferences were held, debates ensued, and publications were produced. Finally it was decided that instead of dropping the Metropolitan Area (MA) idea, the Office of Management and Budget (OMB), working with the Committee on National Statistics, staffed by Census Bureau people, decided to add a new class of MAs—*Micropolitan Areas*—essentially maintaining the traditional *urban/rural* distinction. That is where we find ourselves today, and that is a major rationale for the present study, which examines how contemporary changes in settlement and in society across Greater Minnesota have implications for long-range transportation planning.

Changing patterns of regional population composition, economic production, and personal consumption, which are accompanied by shifting patterns of housing preferences, housing availability and housing use outside the Twin Cities metropolitan area, are transforming the state's regional centers and their adjacent areas. These trends are reshaping the ways that households and business travelers move around and interact within wider communities, but the *nature* of all these changes and their eventual *consequences* for the state, for the underlying *forces* producing them, and for the ways that they relate to *use of the state's trunk highway systems* and *other infrastructure* invite fresh description and analysis.

Regional Centers and Interregional Corridors

In 1995, the Minnesota Department of Transportation published the Minnesota Statewide Transportation Plan "to provide a decision making framework for shaping the state's transportation" into the late 1990s and beyond. [3] The plan was revised in 2003, based in part on an interregional corridor (IRC) study completed in 1999. The IRC study analyzed all the state's 12,000-mile trunk highway system and defined a system of interregional corridors based on community use and traffic volumes. The 2,930 miles of trunk highway thus identified are those that tie together the state's *most important economic centers*. By highlighting their special significance, the study was assisted in identifying investment needs for segments at risk of performing poorly. The IRC study concluded that Mn/DOT should formally establish the system of interregional corridors in order to guide future decisions, and should adopt the system within the State Transportation Plan.

The identification of the state's "most important economic centers" made use of an analysis of the central place structure of Minnesota's urban places at the end of the 1990s. [4] Like the 1963 study of trade centers and trade areas of the Upper Midwest cited earlier, the 1999 University of Minnesota report described a system of central places containing an eight-level hierarchy of urban centers, with metropolitan areas at the top and hamlets at the bottom. Mn/DOT was especially interested in the four classes of urban places at the top of the hierarchy. For example, across the Upper Midwest region:

Level 0: Major Metropolitan Areas (e.g., Twin Cities, Milwaukee, Des Moines)

Level 1: Primary Wholesale-Retail Centers (e.g., Duluth-Superior, Fargo-Moorhead, Cedar Rapids, IA)

Level 2: Secondary Wholesale-Retail Centers (e.g. Bemidji, Mankato, Iowa City, IA)

Level 3: Complete Shopping Centers (e.g., Wahpeton, ND, Montevideo, Livingston, MT)

Within Minnesota there were 50 regional centers of level 0-3, with 49 of them outside the Twin Cities area (Figure 1.1). The trade areas of regional centers overlap the boundaries of the state of Minnesota in a number of instances. Trade areas of centers such as Fargo-Moorhead, Grand Forks-EGF, and Duluth-Superior are obvious examples, but there are others that are less obvious until we look across the border. Sioux Falls, SD, draws business from counties in the southwestern corner of Minnesota, which explains the absence of a large central place in that part of the state. Mason City, IA, traditionally competed with Rochester and Mankato to deliver intermediate-order goods and services delivered to Freeborn County (Albert Lea area). LaCrosse, WI, serves a trade area that extends into Houston County in the southeastern corner of Minnesota. Meanwhile Eau Claire/Chippewa Falls, WI does business westward to the Minnesota-Wisconsin border even as the Twin Cities extends its reach eastward to deliver intermediate-order goods and services to the Wisconsin border counties.

It is from this set of 49 regional centers and nodes, which are the principal nodes on the interregional corridor system, that we selected 26 and their tributary commuting fields for analysis in this report (Figure 1.2). The 26 represent all parts of the state and present different growth experiences during the 1990s. Each sample *regional center* is located in what we term a *central county*. In the few cases where the center is composed of a *pair* of cities located in separate counties (e.g., Fargo-Moorhead, or Duluth-Superior), we refer to the larger city as the *key* city, and its county is the central county. Any adjacent county or nearby county that sent 5 percent or more of its daily commuters in 2000 to the county or counties containing the regional center was included in the regional center's *commuting field* (Figure 1.3). Those 26 commuting fields form the *study areas* examined in this study. [5]

Around each sample regional center we define a study area, using the same procedures employed in our previous study. The study area is defined as a commuting field composed of one or more counties, each of which sends at least five percent of its daily commuters to jobs in the county containing the regional center. Most such jobs are within or close to the regional center itself. Overlapping commute fields reflect higher population densities around centers. (Retirees and other non-employed persons are not reflected within this metric, as they do not commute.) Closer spacing of regional centers usually represents a prosperous local farm economy at the end of the 19th century and early 20th century, with smaller farms closer to transportation and markets and higher disposable incomes per farm operation.

© The area of each county is composed of incorporated cities and towns, and unincorporated townships, all of which are legally defined entities referred to as Minor Civil Divisions (MCDs).

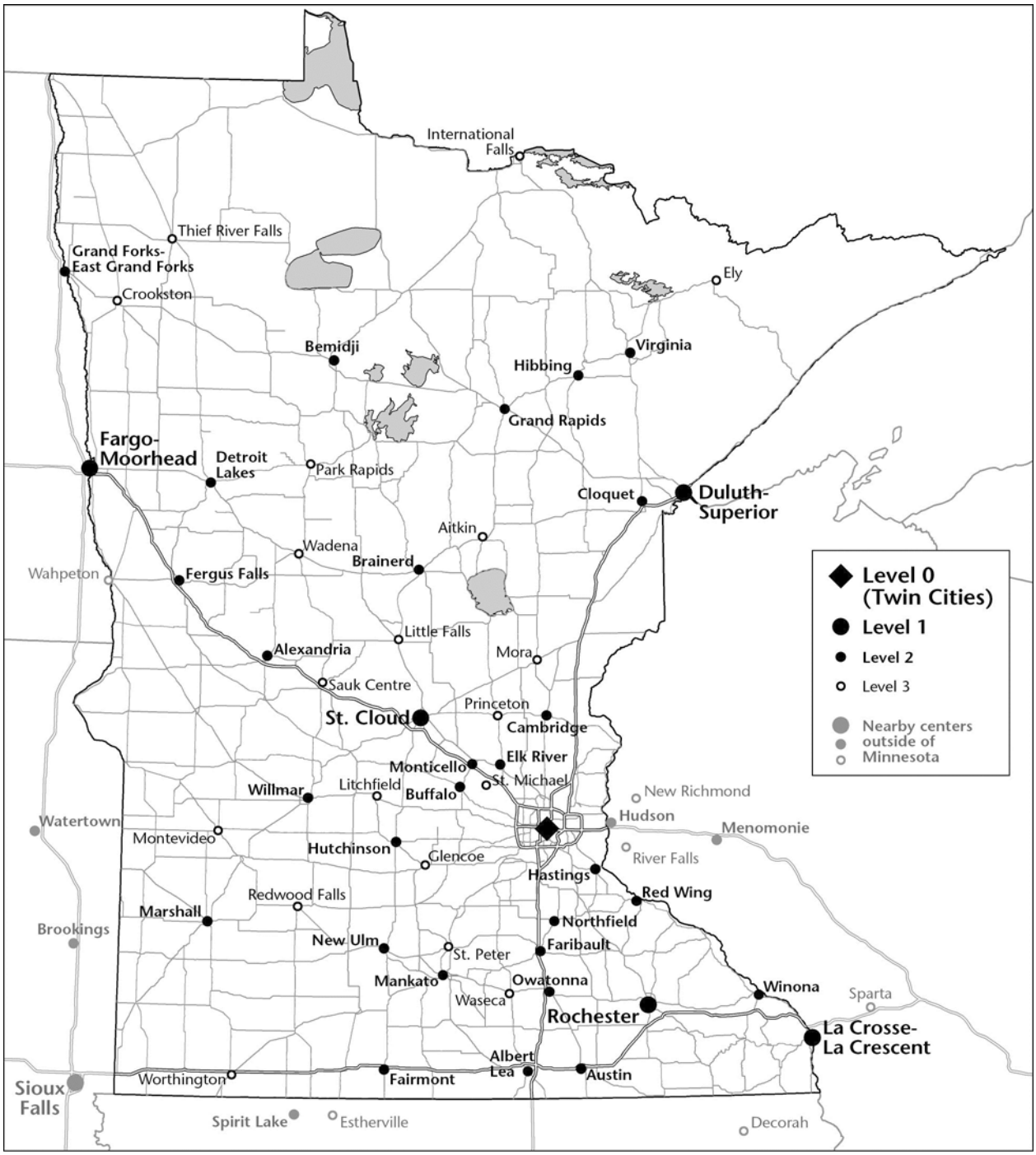

Figure 1.1. Minnesota's Regional Trade Centers, Levels 0-3, 2003.
Source: Cartography Laboratory, University of Minnesota. Adapted from Trade Centers of the Upper Midwest. 2003 Update. Prepared for Mn/DOT by SRF Consulting Group, Inc. St. Paul: Minnesota Department of Transportation, 2003.

Figure 1.2. Twenty-Six Regional Centers.
Source: Cartography Laboratory, University of Minnesota.

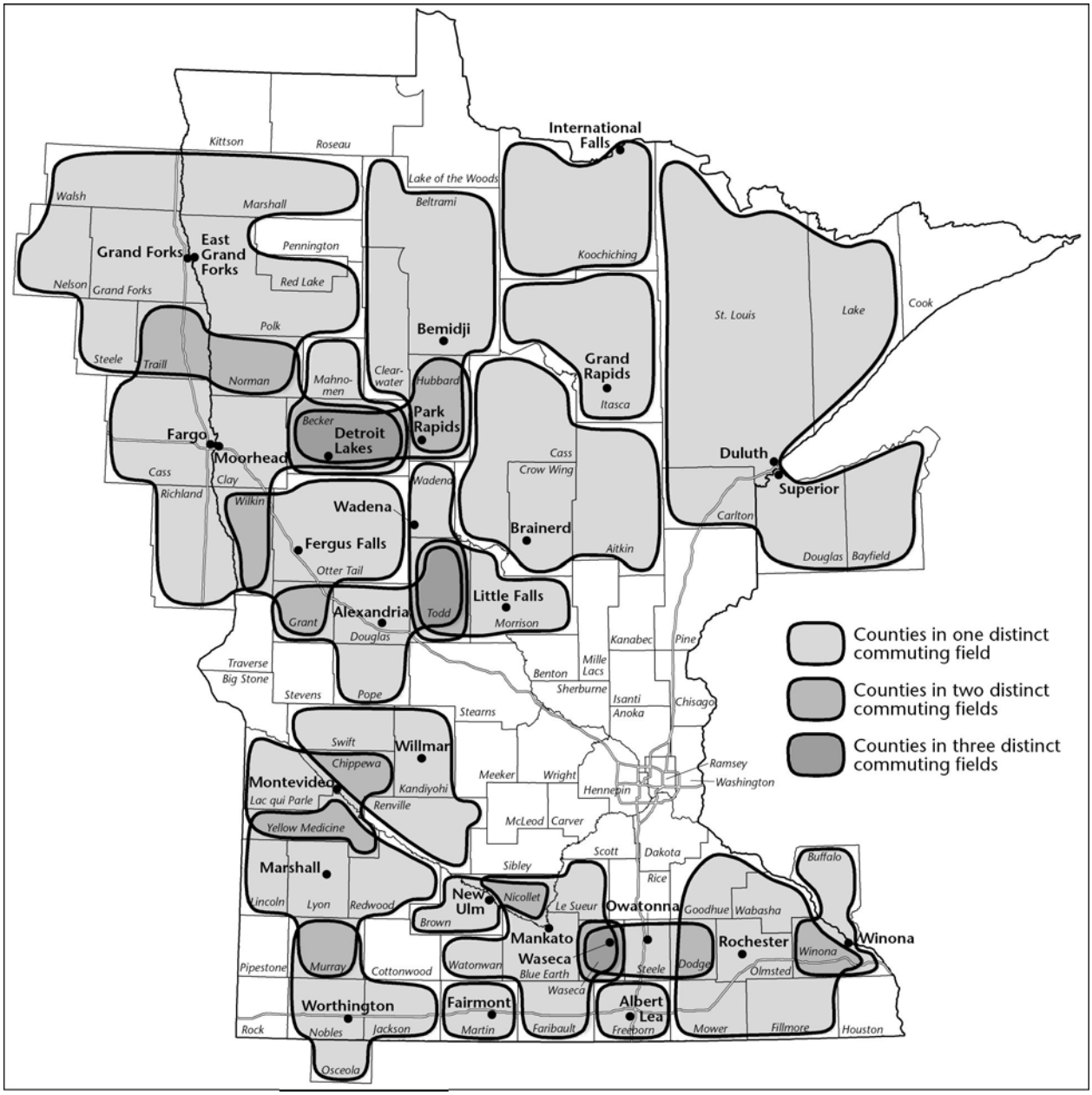

Figure 1.3. Twenty-Six Regional Centers and Their Commute Fields.
Source: Cartography Laboratory, University of Minnesota.

In each study area we designate a "key city." The key city is understood as the major city in the commuting field, the functional center of the study area, and the largest single job center.

Chapters 2, 3 and 4 in this report examine *regional centers* and their *adjacent commuting fields* (also called or *commute sheds*), and present profiles, analysis, interpretations, and forecasts of the following:

- © Population change—in population and household composition, and associated dynamics of local housing markets and patterns of housing consumption (Chapter 2);

- © Economic change—in the occupational and industrial composition of local labor forces, and associated trends in sources and composition of household income (Chapter 3); and

- © Travel behavior change—especially in the journey to work, and journey to recreation (Chapter 4).

Each pair of data sets implies relationships and issues that are explored in chapters 5, 6 and 7 using illustrations from Census-provided public use microdata sample (PUMS) files as follows:

- © *Population* and *economy*—what can Census data tell us about how new working-age populations of different backgrounds (e.g., different ages, Hispanic origin) are participating in the job opportunities in our sample study areas (Chapter 5)?

- © *Population* and *travel*—what can Census data tell us about patterns and trends in travel behavior (e.g., time spent commuting by different household members) by different subsets of the population (e.g., grouped by income) in diverse sub-regions of Minnesota (Chapter 6)?

Economy and *travel*—what can Census data and highway traffic data suggest about how the reshaping of local economies in rural areas of the state relate to commuting patterns and contribute to changes in trunk highway traffic volumes (Chapter 7)?

Highway Congestion: A Mismatch between Demand and Supply for Highway Capacity

Underlying this study is the question whether the trunk highway system serving Greater Minnesota is likely to be sufficient to handle the increasing loads that a changing society, expanding economy, and new travel patterns will be imposing on it in the years ahead. In Chapter 4 we observe that the urbanization of the Minnesota countryside outside the Minneapolis-St. Paul commuting field during the past three decades is associated with a steady transformation of local populations and the local economies that support them. It has been accompanied by a dispersal of jobs and housing, additional vehicular traffic, and commutes that are longer in time and distance. Why are we interested in this set of relationships throughout Greater Minnesota? As noted in Chapter 4, we are interested in assessing the extent to which

development trends and mounting traffic problems currently confronting the Twin Cities area might eventually be duplicated elsewhere in the state.

Our speculations arise from the Transportation and Regional Growth (TRG) Study, sponsored by Mn/DOT, which was launched in the late 1990s to assess relationships between steady Twin Cities-area population growth, economic expansion and dispersal, on the one hand, and emerging highway transportation needs across a commuting field centered on the Minneapolis-St. Paul area, on the other. That commute field encompassed 24 counties in 1990 (including four in Wisconsin), and had expanded to 25 counties with the addition of Aitkin County, Minnesota, by 2000. The TRG study was conceived in the early 1990s when Mn/DOT officials recognized that the capacity of the Twin City-area regional highway network was insufficient to handle the incremental demands being made upon it, and that the gap between expanding demands on the road system and the available capacity to handle it was almost certainly going to widen.

At the same time that the greater Twin Cities area was confronting increasing congestion on its trunk highways, economic activity and real estate development in and around Minnesota's 49 regional centers outside the Twin Cities area, and located at the principal nodes on the state's interregional trunk highway corridor system, seemed to be sprawling outward in the same ways that low-density growth at and beyond the built-up edges of the Twin Cities area was occurring, on a smaller and more localized scale.

Even though overall Minnesota population has continued growing steadily, with most of the growth in recent years concentrated in the Twin Cities area, 20 percent of the state's population growth in the 1990s occurred in Greater Minnesota. Greater Minnesota had a net increase of over 100,000 persons in the 1990s, with some counties adding population while others lost. In fact, growth was concentrated in certain regional centers, in certain commuting areas surrounding selected regional centers, and sometimes in both. The central issue we are trying to illuminate is whether and how demographic and economic change in Greater Minnesota might be linked with incremental demands that might cause problems on trunk highways in different parts of the state.

In one line of analysis, some observers, noting that (a) rapid demographic and economic growth of the Twin Cities area, which was accompanied by (b) low-density land development on the edge *and* (c) increasing vehicle miles traveled, greater volumes of highway travel, and intensifying highway congestion, speculated that (b) was contributing significantly to (c). That is, they reasoned that the steady dispersal of population, jobs, homes, and businesses to lower-density settings meant longer trips, and was adding to traffic loads on highways at rates that were exceeding overall economic and demographic growth measures.

To the extent that this supposed relationship (i.e., overall growth of the metropolitan population and economy that is accompanied by low-density development aggravates congestion) might be true, it argued in favor of constraining sprawl and encouraging infill development along with redevelopment inside built-up areas, *plus* higher development densities on the edges of the built-up area with the expectation that this would reduce trip length and total vehicle miles traveled. The assumption implied but not stated in this argument is that road capacity would not rise sufficiently to accommodate the extra demand accompanying the low-density development. The

major alternative option–significant expansion in metro-area trunk-highway capacities–seemed unlikely because of intractable political and financial obstacles. Meanwhile, other responses encounter their own challenges to implementation; for example, rebuilding major bottlenecks, HOT lanes, congestion pricing, coordinating work schedules by major employers along a highway as is done in large office buildings with limited elevator capacity, or a "Smart-Growth" focus leading to a reorganization of local land use plans to support mixed-use developments thereby making it easier to live and work in a smaller area and thus reduce daily demand for long-distance travel.

Others challenged the argument above and its conclusion by means of a statistical analysis of the relationship between population density and traffic congestion in the 31 largest metro areas, and showed that congestion was greatest in the high-density areas. [6] While it seems to be a valid generalization that average land use density at the metro area scale is correlated with average rates of congestion, that fact may not be especially informative. Traffic congestion on selected stretches of trunk highways in the Twin Cities area–or elsewhere in Greater Minnesota–reflects a relationship between the supply of and the demand for road capacity at the locations where congestion and bottlenecks occur. Density of population, housing, or economic activity is a separate matter unless it is shown that density itself is closely related either to demand for highway capacity, or to supply of road capacity, or both. [7]

During the 1990s and into the 21st century, urban planners and landscape architects promoted a set of new concepts under the umbrella term “Smart Growth,” arguing that whereas land use densities and zoning practices that were common throughout the 20th century had been a response to the old city’s “inhumanly dense concentrations of people and industry,” today’s metropolitan region “suffers from “sprawl,” what Peter Calthorpe traces to the inefficient and environmentally degrading spread of population. Where the old city suffered from very visible forms of smoke and water pollution, the new region is prey to more insidious forms of pollution and the continuing destruction of the natural environment.” [8] Added to the problems of sprawl that planning and zoning practice fostered were the extra travel demand that occurred when land uses of different types (i.e., high-density residential, low-density residential, commercial, office, heavy industrial, light industrial, open space, etc.) were separated. Smart Growth advocates argue that combining a mixture of different uses (residential, commercial, office, recreational, etc.) at specific sites or along transit corridors could (*theoretically*) not only reduce household travel requirements but also achieve other community-building and environmental protection objectives as well. In other words, land use planning at local and regional levels and transportation planning *could be done* as a single enterprise, yielding outcomes that would be superior to what evolves when they are done independently.

Currently, land use planners and developers often follow transportation planners, while transportation planners run to catch up with development in fast-growing areas. Local officials often report a lack of funds for local road improvements, while state transportation planners face lowered budgets, deferred projects, and pressure to find ways to meet new road capacity demand other than expanding capacity (e.g., do nothing, to discourage further growth) with land use planners and developers following transportation planners while transportation planners run to catch up with development in fast-growing areas. Results of analyses of the effects of land-use planning concepts like Smart Growth in other areas of the country are mixed. The effects on

travel behavior and congestion are localized within metro areas, and place-dependent. Smart Growth would help the congestion problem if it were sufficiently comprehensive, spatially. As long as the dominant pattern remains "sprawl", Smart-Growth developments alone will not be able to remediate congestion.

Urban Area Size, Age, and Highway Congestion

When demand for highway capacity at certain times exceeds the carrying capacity of the roads within a region at those times, congestion will result, whether in metro areas, in Greater Minnesota, or elsewhere. The fact that America's largest metro areas experience the greatest average levels of congestion merely reflects the fact that the degree to which demand for existing facilities exceeds supply generally rises along with metro area size. This outcome is a legacy or artifact of how we have built, inherited and used urban areas in the U.S. over the past two centuries, supported and constrained by several generations of urban transportation technologies, beginning with the pedestrian city and the electric streetcar, followed by the widespread ownership and use of private cars, to today's reliance on high-speed freeways. Each new technology (e.g., Interstate highways within built-up areas) must push or squeeze its way into landscapes built up earlier according to older means of moving people and freight.

In general, the largest metro areas have the strongest economies, so they attract more people, investment and business activity, but because of physical and political constraints they have limited means available to expand road capacity *in already-built-up areas*. Hence, congestion intensifies. This outcome is especially vivid in the oldest, largest, and most densely built-up urban areas in the Northeast, which achieved great size and density long before the modern automobile era. Congestion develops as a function of the difference between two rates of change–i.e., change in demand for road capacity on a stretch of roadway vs. change in supply of road capacity. If the rate of change in road capacity matches or exceeds demand for extra capacity in the short term, then congestion will be avoided. Measures of development density at a time and in a place are a separate matter, and may or may not be correlated with the differences from place to place (e.g., from central city core, to suburban and exurban settings, to low-density areas in Greater Minnesota) in the rates of change just described.

The patterns observed in other large U.S. metro areas in no way vitiate the claim that *if* the Twin Cities area continues on its recent course of steady growth, and *if* population and economic activity continue to disperse at lower and lower density, and *if* vehicle miles traveled each day continue to rise while incremental highway capacity fails to keep up, *then* there will be increasing rates of highway congestion. On the other hand, *to the extent that* higher development densities of mixed uses on new land, and infill development of mixed-uses in already built-up areas, contribute to muting the rate of increase in vehicle miles traveled because these new uses permit and encourage fewer trips or shorter trips as suggested by Smart Growth advocates, then the gap between demand and supply for highway capacity *could* be narrowed from what otherwise would occur. But there is no guarantee that higher development densities in themselves will directly affect vehicle miles traveled; there are too many additional associated and intervening variables involved. For example, total gridlock can occur in extreme cases of

excessive in-fill development at extremely high densities without a corresponding increase in supply of road capacity, transit capacity, and other movement options,

Why include a discussion on Twin Cities-area suburbs in a report focused on growth and change in Greater Minnesota? The answer is that the principles surrounding road congestion apply in the same way to large metropolitan areas as they do to Minnesota's smaller regional centers and their tributary areas. It boils down to the relationship between the *demand for road capacity at specific times and places* compared with the *supply of road capacity at those times and places*. One of our advisers, noting the suggestion in Chapter 4 that continued low-density development on the edges of a metro area might aggravate congestion on suburban roads linking those developments with other places, correctly observed that,

> "The important question is whether fully developed suburbs have more congestion than the high-density central cities. It is important because fully developed suburbs are how suburbs will eventually be developed. My review of studies on this issue indicates that higher-density central cities (e.g., Minneapolis and St. Paul) have more traffic congestion than lower-density suburbs, both fully developed and still developing." [9]

A study by Barnes additionally observed that, "In general, all types of density (employment, retail and population) have the effect of reducing speeds as they increase." [10] Of course, Barnes implicitly assumes that road capacity, transit options, and other aspects of land use, traffic management, and travel behavior remain constant as density increases, in which case the conclusion is undoubtedly accurate. That is, *if density and traffic generation per unit area rise in a place and none of those other features changes*, then demand that is imposed on roads in and near that place are likely to rise and traffic loads on those roads will intensify.

An Old Example Linking Density and Congestion

Consider an alternative case in which *density dropped* but *traffic increased*. At the end of World War II, the population of the city of Minneapolis exceeded a half million persons. In the late 1940s and early 1950s, population was rapidly dispersing to first-ring suburbs just as the electric streetcar system was being dismantled and private car ownership was expanding. South Minneapolis commuters began driving downtown just as increasing numbers of commuters from first-tier Richfield and second-tier Bloomington were doing the same.

What was the result? The main north-south thoroughfares linking the Southside and south suburbs with the Minneapolis downtown quickly became congested. In other words, as the population density of South Minneapolis *declined*, traffic congestion in South Minneapolis *rose*.

What is the conclusion? Demand imposed on Minneapolis thoroughfares rose due to population growth in suburban areas south of Minneapolis; capacity of thoroughfares remained constant; population density in South Minneapolis dropped (although density in Richfield and Bloomington rose); and Minneapolis commuters who formerly used streetcars to get downtown to work switched to cars. In response to the congestion (and in support of Chamber of Commerce efforts to maintain a strong downtown) the city of Minneapolis converted Park

Avenue (north bound) and Portland Avenue (south bound), along with First Avenue (north bound) and Blaisdell Avenue (south bound), to one-way streets to alleviate congestion. A third pair of one-way streets (Emerson Avenue, north bound) and Fremont Avenue (south bound) was converted to serve North Minneapolis. The one-way streets (with signals timed and rush-hour parking restrictions, which were standard post-war engineering solutions to city street congestion) expanded road capacity many times, and sharply reduced congestion on the Southside during the remainder of the 1950s.

The foregoing examples illustrate the earlier point that congestion on a roadway develops as demand for road capacity exceeds supply along the route where the congestion develops. That demand may originate at sites adjacent to the congested road, or it may originate elsewhere and then impose demand on the roadway linking origin and destination.

A Current Example of Highway Congestion in Greater Minnesota

Mn/DOT traffic counts report that "On Fridays in June, July and August, the two key routes out of town–Interstate 94 to the northwest and I-35 to the northeast–are carrying 50 to 60 percent more cars than a decade ago. And Thursdays are often as busy as Fridays." [11] The combination of a larger and more affluent Twin Cities population coupled with a steady increase in the popularity of outdoor weekend life in Minnesota's northern Lake District means more traffic connecting the two areas–traffic that runs near or through the cities and towns between the Twin Cities and "The Lake." One of the state's worst bottlenecks for weekend traffic for many years, MN371 between Little Falls and Brainerd, is being alleviated by the widening of the road from one lane to two in each direction, but congestion continues to build elsewhere.

- © On US169 near Onamia at the south edge of Mille Lacs in Mille Lacs County, average daily traffic counts on Thursdays in June, July and August rose 18 to 29 percent between 1996 and 2004.

- © On US10 north of Rice in Benton County on the way to Little Falls, Thursday northbound traffic rose between 74 and 79 percent in summer months between 1990 and 2004, while Friday traffic was up 36 to 59 percent.

- © On I-35 near Wyoming in Chisago County, the Thursday traffic was up between 91 and 107 percent on Thursdays, and 48 to 63 percent on Fridays during the same period. [12]

During peak times on these routes, bumper-to-bumper traffic backups that extend for many miles are increasingly common, not because of what is *in* the places experiencing the congested routes, but because these routes connect places of origin and destination located elsewhere. The conclusion here is that what is happening in the relationship between demand and supply of road capacity in a place and at a time must be examined within wider geographical contexts.

In another example, the results of the Twin Cities 1990 Travel Behavior Inventory indicated

> "that work-commute trips, as well as other type trips, are faster in the fully developed suburbs (25 mph) and in still developing suburbs (28.7 mph) than the central cities (21.8

mph). In addition, the distances of commutes are basically the same in central cities (8.14 miles) and in fully developed suburbs (8.32 miles). To be sure, commuting distances in the still-developing suburbs are longer (9.99 miles). But after all, that is to be expected because they are still developing and will add jobs, retail and services that, in time, will tend to shorten trip distances of all types of trips." [13]

These results are easily explained in terms of the demand/supply relationship spelled out above. If there is sufficient road capacity to handle the traffic, speeds will be higher; if demand exceeds capacity, average speeds will drop. The density of development is only one part of the equation.

Metropolitan Area Growth Rates and Highway Congestion in the U.S.

Gordon and Richardson observed that "the weight of the evidence suggests that modern cities have avoided worsening congestion by spreading out." [14] Unfortunately, the fact that many large U.S. metro areas with low levels of congestion are also places that have been spreading out does not prove that the former feature is a result of the latter. There are other variables at play here. Among the major Metropolitan Statistical Areas of the United States in the 1990s, few added population faster than the Minneapolis-St. Paul area (16.9 percent increase). Of the twenty largest metro areas in 2000, only seven grew faster than Minneapolis-St. Paul (Dallas-FW, Miami, Houston, Atlanta, Riverside, Phoenix, and Seattle). Taking into consideration their vintage (i.e., internal structures, street designs, road capacities, and layouts) and local topographical obstacles preventing unfettered expansion outward, it is easy to see why the Seattle and Atlanta areas encounter congestion problems different from the other five, which occupy different kinds of settings and possess internal layouts dating largely from the post-WWII auto-and-freeway era.

© The Seattle-Tacoma-Everett-Olympia area is expanding fast but is constrained from sprawling outward by Puget Sound on the west, and mountains on the east. Land development to the north and south means longer trips to the core, and more vehicle miles on a road system (especially I-5 and I-405) that is used beyond capacity and cannot easily expand without expensive and politically disruptive competition with other land uses for scarce space.

© Atlanta's explosive growth completely overwhelmed the local trunk highway system as population grew from 1.7 million in 1970, to 2.1 million (1980), to 3.1 million (1990), to 4.2 million in 2000, a 38.4 percent increase in the 1990s. A dozen major Interstate and U.S. highways focus highway traffic *to* and *through* the Atlanta area, but adding sufficient new road capacity is hampered by deficient regional planning, inadequate budgets, powerful county governments, political fragmentation at the local level, rough terrain, and high population densities in a countryside that objects to disruptive major road construction through their neighborhoods.

At the other extreme, seven metro areas among the top 20 had population growth rates in the 1990s under ten percent (NY, LA, Philadelphia, Detroit, St. Louis, Baltimore, and Pittsburgh–

which actually lost population). Slow growth (or no growth) goes a long way toward alleviating congestion.

A further feature distinguishing the Twin Cities from other metro areas among the top 20 is the continuing strength of the Minneapolis downtown, which has managed to hold its own against competition from various suburban "Edge Cities" while contributing to daily traffic congestion on routes leading to the downtown area, congestion that is aggravated by traffic *through* the downtown area because major routes that were built to focus *on* the downtown continue to do so even if the destination of vehicles is elsewhere. Gordon and Richardson are correct that all metro areas are spreading out (if they can), but that is only part of the story. In many cases the fact of spreading out is less informative than the size and internal structure of built-up area in 1950, recent metro-area growth rates, topographical setting, terrain, and obstacles to expansion (e.g., bodies of water, mountains, population densities in the countryside, or adjacent built-up areas as are common in New England).

Suburbs and Suburbanization

Finally, the term "suburb" can be a source of confusion in discussions of metropolitan area growth and highway congestion. "In early days suburbs collected activities that either were pushed out of the city (like brothels, obnoxious factories, and rude artisans) or were attracted outward (like the country homes of the elite). Seldom were they coherent settlements in their own right. Today, the old streetcar suburbs, the planned industrial suburbs, the exclusive residential enclaves of the rich, and the formerly remote rural service centers and county seat towns that have been engulfed by metropolitan expansion are all termed suburbs. The word has lost any precise meanings that it once may have enjoyed." [15] Social science literature of the early and mid-20th century often distinguished ways of life in central cities from those of suburban areas, and then used census data to document their arguments and distinctions. The problem is that these distinctions are far from sharp. Over-bounded cities at the end of World War II (such as St. Paul, MN) filled in large vacant areas with "suburban-style" housing and households between 1945 and 1960. On the other hand, there are suburbs of central cities in New England that date from the 19th century, and possess internal characteristics that predate those of central cities of the West and Southwest.

At the other extreme in the Southwest today, a suburb may be largely indistinguishable in age and character from its nearby central city because both may have developed at the roughly the same time. In Texas, developments that might have become suburban municipalities in another state have been annexed to the central city (e.g., Dallas, Houston) due to Texas's distinctive annexation law, which permits central cities to easily annex adjacent developing areas. In parts of the Northeast, some industrial suburbs are municipalities that were separately incorporated years ago to avoid central city taxes. [16]

Conclusions

To summarize, major changes are underway in Greater Minnesota, and each of them may have relevance for the next two decades of highway planning at scales from the state to the local level. This chapter has presented an overview of major trends affecting Minnesota's countryside, and their implications for highway transportation. Looking ahead, increases in fuel prices raise transportation costs, cut discretionary spending on other goods and services, and prompt reconsideration of tradeoffs involving cheaper land and housing at locations remote from jobs *versus* long-distance commuting. We cannot predict the future with any degree of certainty, but we can describe selected demographic, economic and travel behavior trends underway in Greater Minnesota. We relate them to trends in society at large, and speculate on what they may portend for state, regional and local transportation planning in the coming years.

This project and the one that preceded it present new ways to think about land use, transportation, and emerging settlement types across the nation in general, and throughout Greater Minnesota in particular. The reports identify major forces driving socioeconomic change in the U.S., and illustrated how evidence of those drivers of change appear in the form of landscape transformations, and in modified patterns of highway use. The present project builds on that earlier study and demonstrates ways to use specialized Census data sources in analyzing these topics. Major changes are underway in Greater Minnesota, and each of them may have relevance for the next two decades of highway planning at scales from the state to the local level.

Chapter 2 presents and discusses data from Census 2000 on trends in population and housing in and around 26 of 49 regional centers throughout Greater Minnesota. We describe how population age structure and household composition within 26 sample study areas changed between 1970 and 2000, and suggest what some of the trends imply about labor force participation and housing needs and wants in the years ahead.

Chapter 3 discusses changes in employment levels within the 26 study areas between 1970 and 2000. Employment changes are examined in terms of *industry* of employment as well as by the changing mix of *occupations* pursued. The 26 study areas are grouped into (1) fast-growing recreation and retirement areas, located mainly in northern lake districts; (2) areas with mixed economies and moderate job growth; and (3) slow-growth areas in the west and southwest parts of Minnesota that depend on a weak farm economy, plus northern areas supported largely by mining and forest products industries. Some causes and consequences of those changes are summarized. Structural changes in the regional economies bring about changes in household activity within those sub-regions, and vice-versa. Along with changes in economic activity and household behavior come changes in daily travel behavior, which yield corresponding impacts on the state's trunk highways.

Chapter 4 focuses on changes between 1980 and 2000 in commuting behavior, including the share of all workers who commuted to jobs away from home, workers commuting to jobs outside their county of residence, and the share of commuters driving alone to work. In addition, the chapter presents average commute times within each of the 26 study areas, showing how times grew in each study area in the 1980s and continued growing in every one of the study areas in the 1990s.

Chapter 5 asks how demographic characteristics of workers (i.e., age, ethnic origin) vary by occupation and by industry in different parts of Greater Minnesota as revealed by public use microdata samples (PUMS) as they apply to public use Census-defined microdata areas (PUMAs). On the basis of PUMS data for three sample PUMAs, which contain the Brainerd, the Willmar and the Montevideo study areas in 2000, the profiles of (1) workers by occupations arrayed by age groups, and (2) by industry arrayed by ethnic origins appear to be much more similar than different. The chapter concludes by acknowledging that the PUMAs cover a much larger area than the study areas that they contain, and with increased area size there is bound to be a muting of local differences in economic activity that would otherwise be revealed in county-level or study-area-level cross-tabulations with dimensions of the sort presented above. On the other hand, as the regional economies of Greater Minnesota increasingly focus primarily on services, consumer-orientation, personal care, and life-style emphases, we probably should not be surprised to observe more similarities than sharp differences.

Chapter 6 exploits PUMS files to disclose relationships between population characteristics and travel behavior, with examples at the *individual* level of relation between commuting and income, between commuting and education, and at the *household* level of total commuting time by household for households with different numbers of workers.

Chapter 7 investigates ways to exploit PUMS data files for regional analysis in transportation planning. PUMS data are provided for public use microdata areas (PUMAs), which are decennial census areas for which the Census Bureau provides specially selected extracts of raw PUMS data from a small sample of long-form decennial census records that have been screened to protect confidentiality.

Chapter 2

Urbanization of Minnesota's Countryside

Background

Population composition, production activity, consumption patterns, and local housing markets in Greater Minnesota (beyond the Twin Cities area) are changing in ways that are transforming the state's regional centers and daily life in the countryside. In many areas, the countryside is being repopulated; as one set of households moves out another moves in, pushing up demand for housing, raising prices, and gentrifying villages. Land uses change as large corporate agribusinesses replace small family farms. Conservation movements promote forest expansions and reforestation of marginal farmlands. Industry shifts in and out while household consumption patterns change. Recreational uses of the countryside replace other uses. Meanwhile service provision adjusts as demographic and economic trends provide better housing and health care for some, while poverty and social deprivation afflict others. [17]

These trends and others are reshaping ways that households and businesses interact within the daily commuting fields surrounding the regional centers, and in response to weekend and seasonal visitors. Although we recognize that important changes are underway, the *nature* of the changes, their *consequences* for the state, the *underlying forces* producing them, and how they relate to *use of the state's trunk highway systems* and *other infrastructure* invite fresh description and detailed analysis. These trends and their implications for Minnesota's transportation system are the focus of this chapter, and the chapters that follow.

The demographic and economic changes occurring throughout Greater Minnesota along with their housing market impacts are a response to challenges facing those areas while they trigger new ones. [18] Nationwide, 21 percent of the population lives in non-metro areas; in Minnesota the share is 29 percent—1.4 million persons. **Minnesota is a large state**—only 12 extend over larger areas, and outside the Twin Cities area much of the state's expanse is sparsely settled.

Minnesota is a diverse state. Of the 274 non-metro counties in the 9th Federal Reserve District (MN, MT, ND, SD, N.W. WI and MI Upper Peninsula), five in Minnesota were among the *top* 30 percent in both population growth and per capita personal income [Beltrami (Bemidji), Carlton (Cloquet, Duluth area), Douglas (Alexandria), Goodhue (Red Wing), Le Sueur (exurban Twin Cities)], yet four were among the *bottom* 30 percent [Kittson (NW corner of MN), Lincoln (W of Marshall), Norman (N of Moorhead), Traverse (W of Morris on the MN border)]. [19] **Top-performing counties had larger average populations** with more large employers than bottom counties. **Top counties were typically near growing metro regions** and major regional centers, and captured some of their suburban sprawl. Top performing counties depend more on manufacturing, while **bottom counties were more dependent on agriculture**.

In acknowledging some of these issues, Congressman James Oberstar recently noted that:

> "The success of our rural roadway system has also created new challenges: a rural society structured around the automobile, land use patterns that depend on a vehicle for mobility,

> and isolation—again—for the elderly, young, and low-income people who do not have access to the automobile."
>
> "The changing economics and changing demographics of rural America clearly have transportation implications. While rural jobs several decades ago were mostly on the farm, our rural population today must have transportation to jobs that are located in the next town, the next county, or beyond. In addition, many have more free time to engage in shopping, recreation, and other leisure-time pursuits. All involve more trips, longer drives, and a demand for greatly improved surface transportation." [20]

In non-metro Minnesota incomes lag compared with metropolitan areas. They are more dependent on manufacturing, government, and transfer payments. Thinning of population weakens small trade centers, and current trends favor growth of larger, higher-order ones. [21] Minnesota's population is aging. The trend toward higher proportions of elderly due to declining birth rates and out-migration of young adults is a special concern in non-metro counties, where more than 20 percent of the population will be over 65 by 2025 if present trends continue. These trends mean continued declines in school enrollments in many areas. Counties with lake and forest amenities are generally growing, but agricultural counties in the southwest and western parts of Minnesota face continued declines without significant domestic or foreign in-migration. As average farm size grows and farm populations drop, the retail base supporting low-order central places has shrunk. Recurring crises in the agricultural economy have shrunk the buying power of many farm operators who remain in the business. Many small, locally owned businesses in the low-order central places have been replaced by the large chain stores and superstores.

Other regional development, transportation and management issues confronting non-metro Minnesota include:

- A debate: get used to non-metro decline? Or fight back? As large numbers of Midwestern counties experience chronic out-migration and languishing economic activity, a debate continues about what, if anything, to do about it. One side argues for a "New Homestead Economic Opportunity Act" while another extreme suggests that part of the Great Plains in the Dakotas be transformed into a vast ecological preserve of managed wilderness. [22]

- Human capital disparities. High human-capital places grew in the 1990s, as did places with wealthier residents. [23] Much of the literature on growth focuses on cities and human capital. A community's human capital has generally been measured by the median level of schooling for the population age 25 and older, or the percentage of that age group with college educations. The average skill level in a community is a good indicator of whether that community will rise or fall. Skilled communities rise; unskilled communities fall.

- Economics vs. ecology. How can we balance the requirements of economically vibrant communities with the demands of landscape health and biodiversity? If marginal farmland is enrolled in a conservation reserve program, meager farm income may drop further. But around bustling regional centers where low-density development proceeds energetically, the local natural environment often takes a hit.

- Modern communications needs. At present, even though new technologies (i.e., broadband over cable, and DSL broadband over phone lines) have emerged that promise to help non-metro areas bridge the digital divide, much of non-metropolitan America trails the rest of the country in broadband access because too few residents must share the high cost of new high-speed infrastructure. This disparity means that metropolitan areas have an advantage that multiplies its benefits, while non-metropolitan areas lacking service fall further behind. [24]

- Opportunities for wildlife recreation. Some places that are slowly losing one resource-based industry may have prospects for replacing it with another. For some regions of Minnesota—especially communities with existing entertainment amenities—tomorrow's economic opportunity may lie in expanded wildlife-related recreation beyond fishing and hunting (e.g., bird-watching). [25]

- Industry cluster opportunities. Advanced transportation and communications technologies provide opportunities for new strategic models at the firm level, but much remains unknown about how these technologies might support development of healthy industry clusters in non-metro Minnesota, such as the recreational vehicle industry in northwestern Minnesota led by Polaris and Arctic Cat. [26]

- Global competitors. As resource-based industries (forestry, mining, agriculture) waned in non-metro Minnesota, many localities saw manufacturing fill the gap, with low-cost land and labor providing critical inputs. To compete in the 21st century, non-metro industries must innovate to find business solutions that supersede low-cost land and low-cost labor. Globalization brings new competitors to the non-metropolitan landscape, so non-metro manufacturers now compete with foreign manufacturers that enjoy even lower-cost land and labor, in addition to facing intensified competition from factories in American cities. Meanwhile, Minnesota farmers face increased competition from South American soybean and other producers serving global markets. [27]

- Amenities and skill levels in regional development. Even though non-metro places feature economies that have become more service oriented in recent years, they often have trouble recruiting or retaining high-wage producer-service activity because they are often small and remote. Nevertheless, in the face of such competitive disadvantages, some have been able to use scenic and quality of life amenities to recruit producer-service firms selling to non-local markets. Another option for communities with fewer amenities lies in focusing on upgrading skills of the regional labor force, and improving the technological capability of local firms. Community and technical colleges or regional universities are often the primary resources for improving labor force skills and moving local business up the technology ladder. For example, Hibbing Community College helped the region become home to multiple back-office information and data processing operations for major corporations. [28]

- Emerging non-metro regions. As the 1990s economic boom drained non-metro areas of population and resources, many of them struggled to maintain a critical mass of workers and minimum threshold markets for businesses and government services. In general, locales losing people, businesses, and services may find it impossible to compete effectively in the global economy if they try to go it alone. But in the face of needs to produce and deliver essential

services in low-density metro areas, service markets can regionalize provided that transportation infrastructure is adequate to support them. Rural school districts consolidated, as did hospitals and clinics that now serve much wider areas. Circuit-riding public administration and social welfare professionals work with several jurisdictions delivering quality service at manageable cost. Across the Midwest, committed groups of local leaders have crafted regional alliances to develop new economic opportunities, and former competitors emerge as partners. [29] On the other hand, the front-end investments needed to improve local water and sewer systems are harder to regionalize and external help may be required. [30]

All the above items relate directly or indirectly to the transportation and communications needs of a rapidly transforming countryside. Additional concerns include:

- Rural highway safety. Nationwide, a disproportionate number of injuries and fatalities occur on non-metro highways, and in Minnesota the share is even higher—69 percent compared with 61 percent for the nation. [31]

- Intercity bus service. In June 2004 Greyhound Corporation announced cancellation of service to dozens of Minnesota (and other Midwestern) cities and towns, citing higher fuel costs, lower patronage, and a continuing precarious financial health due to continuing losses. Jefferson Lines will replace part of the former Greyhound service, but some places formerly served will be bypassed.

- Road mileage vs. vehicle miles traveled. Although vehicle miles traveled are increasing on all types of roadways, highway travel is becoming more concentrated on Interstates and other principal arterials. The 12,000 miles of Minnesota trunk highways comprise only 9 percent of all roadway miles, but carry 61 percent of vehicle miles traveled. Of the approximately 132,000 miles of Minnesota roadways, county roads account for 11 percent of the total, township roads another 40 percent, but the two together carry only 4 percent of daily vehicle miles traveled. [32]

- Transit in "Small Urban" and "Rural" Minnesota. Although the percentage of Minnesota households lacking a motor vehicle dropped to 7.7 percent in the 1990s and the number and percentage of Minnesota commuters driving alone increased to 78 percent, the number of commuters using public transit and carpooling also increased statewide. Meanwhile, transit service in non-metro counties and cities under 2,500 population has increased dramatically. There were 49 systems that carried two million passengers in 1990, and 61 systems carried 2.9 million in 2000. [33]

Questions Raised

A 2003 publication from the University of Minnesota's Center for Transportation Studies—*Urbanization of the Minnesota Countryside: Population Change and Low-Density Development Near Minnesota's Regional Centers, 1970-2000*—described population change in and around twenty regional centers across Minnesota, and suggested how those job centers and their tributary areas were undergoing change in their economic roles, and how those changes were

affecting local housing markets and the geographical distribution of population. [34] Towns, villages and hamlets located within convenient commuting ranges of job centers seemed to be emerging as bedroom suburbs, while non-farm incomes were supplying fresh vitality to Main Street. In small towns and unincorporated townships close to regional centers or adjacent to the state's lakes, new houses were going up for retirees, weekenders, and commuters—especially along major and minor highways and country roads that provide easy access to nearby shopping malls.

The present chapter uses data from Census 2000 to provide a closer look at trends in population and housing in and around 26 of Minnesota's 49 regional centers. The questions raised in our earlier study are addressed below with fresh data from the 2000 Census of Population and Housing for non-metropolitan Minnesota, and are interpreted with respect to trends in Minnesota settlement and the likely impacts of those trends for trunk highway usage in the years ahead.

We describe how population age structure and household composition within 26 sample study areas changed between 1970 and 2000, and suggest what the trends since 1990 imply about labor force participation and housing needs and wants (location, setting, price, style) in the coming decade. Other topics explored in this and later chapters include:

- How did housing inventories within the study areas change in the 1990s?
- How did commuting fields adjacent to regional centers change in the 1990s compared with changes between 1970 and 1990?
- How have occupational and industrial structures of regional labor forces outside the Twin Cities changed in recent decades?
- How have sources and levels of personal income—wages and salaries, dividends, interest, rentals; transfer payments, etc.—changed since 1970, and with what consequences for regional economies of study areas?
- Do low house-price incentives attract retirees to such settings, or alternatively does steady in-migration into selected study areas raise housing prices in ways that disadvantage local residents?
- Would larger supplies of modestly priced housing opportunities in outlying areas wield much influence on the stability of populations and health of the economies of those areas?
- Do declines in housing values in areas of net out-migration provide incentives for workers to engage in long-distance commuting, that is, trading off commuting expenses in time and money for lower housing costs plus agreeable life in small towns and other low-density settings, which in turn helps stabilize populations in those small places?
- How does weekend recreation-based travel impose strains on the trunk highway system at selected regional centers and at nearby locations?

Our principal objectives are to interpret new aggregate data (county, enumeration district, minor civil division) and public use microdata samples (i.e., PUMS data on individuals and households) from Census 2000 to create up-to-date profiles of three intersecting aspects of change in 26

representative Minnesota regional centers and their tributary rural areas, namely (1) population, household and housing change; (2) regional economic change; and (3) journey to work. We interpret those changes with regard to long-range highway transportation planning, land use and environmental issues emerging in 26 selected study areas in non-metropolitan Minnesota.

The First Hundred Years: Minnesota's Urban Centers Emerge

Minnesota sits astride one of the major physical geographic boundaries of the world, featuring a sharp transition from pine forests of the northeast, through a band of deciduous hardwood forest running from northwest to southeast, to the prairie lands of the southwest (Figure 2.1). The terrain across most of Minnesota was shaped by glacial activity, which left behind *till plains* deposited under glacial ice or during rapid ice melting, *moraines* marking zones where advancing ice melted and deposited its burden of sand, gravel, pebbles, clay and boulders, *outwash plains* sloping *away* from higher, adjacent moraines, and *lake plains* formed at the bottom of former glacial lakes. Ice action scoured the Arrowhead region of Minnesota, where hilltops and upper slopes of hills are often little more than bare rock. This glacial history means that most of Minnesota's 15,000+ lakes are located in the pine/fir and hardwood forest areas of the state. In the stream-dissected southeast corner of Minnesota, which was missed by recent glacial advance, gently sloping, long ridge tops stand between deep valleys of major streams, while flat flood plains form the valley floors.

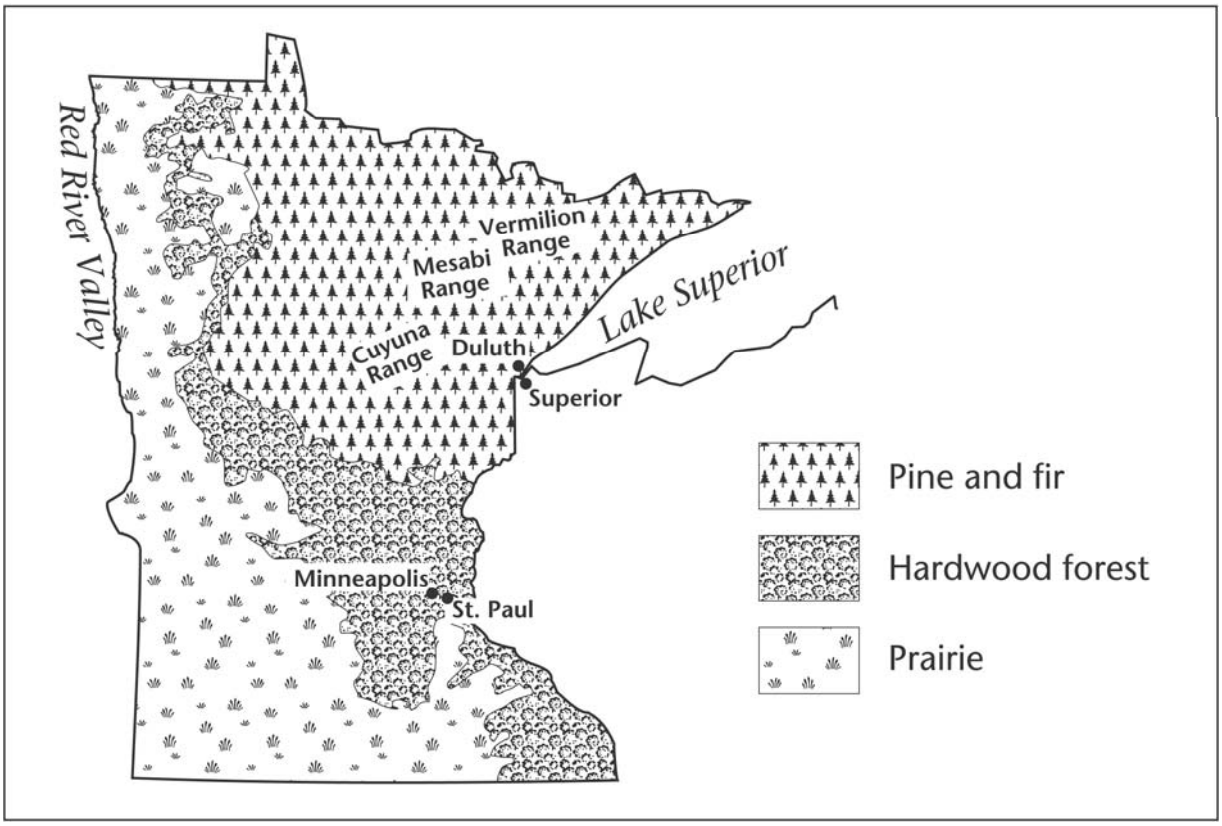

Figure 2.1. Minnesota's Vegetation at the Time of European Settlement

Source: Cartography Laboratory, University of Minnesota

On this variegated surface, Minnesota pioneer settlement advanced after 1850, regulated by soils, vegetation, climate and proximity to previously settled lands to the east and south. [35] One frontier of resource exploitation thrust into northeastern Minnesota from Wisconsin, led by Yankee lumbermen and land speculators attracted by the virgin pine forests. Once the pine forests were harvested and fires swept through the cutover regions, farming followed in some areas, but it proved to be a marginal enterprise. A second frontier of agricultural settlement advanced into the southeastern corner of the state from Wisconsin and Iowa, first into areas of mixed hardwood forest and prairie, and eventually out onto the rich prairie lands farther west and north.

European-origin population spread rapidly over Minnesota after 1850—the date of the first census when only 6,000 non-Indians were counted. By 1870, twelve years after statehood, the population had reached 440,000, then 1,310,000 by 1890, reaching 2,076,000 by 1910 as most parts of the state were settled. Rural population outnumbered urban by a ratio of three to two in 1910, with non-whites (including Indians) accounting for well under one-percent of the total. [36]

Natural Resources: The Basis for Early Settlement

Natural resources and agricultural output provided the major base for the 19th century economy, supplemented by railroads and the processing of raw materials (timber, grain, livestock). As iron ore deposits were developed in the three iron ranges after 1880 (Mesabi, Vermilion, Cuyuna), another major chapter got underway in the development of Minnesota's economy and settlement system. [37]

In the early decades of Minnesota settlement, few problems caused bigger headaches for loggers, farmers, and businessmen than inadequate transportation, especially as they advanced outward from river banks, river forks, and water power sites. Every interest—industry and trade, agriculture, government, mail service, and so forth—applauded each advance in transportation services from the era of canoe travel, river rafts, steamboats, trails and ox carts, roads, and railroads. Points of convenient access on early transportation channels (rivers, overland trails) were the first to support permanent settlement. Examples include Winona, Wabasha, Red Wing, St. Paul, St. Anthony, Minneapolis and St. Cloud on the Mississippi River, St. Peter on the Minnesota River, Stillwater on the St. Croix, and Pembina on Red River of the North. Interactions among settlements reinforced their economic importance while at the same time it expanded traffic among them. As permanent agricultural settlement advanced, the initial railroad plans of 1857-62 further reinforced earlier settlement imprints on the Minnesota landscape, directing investment and settlement while reflecting and reinforcing what had preceded it. [38]

Central Places and Regional Centers Emerge

Today's geographic distribution of urban places in Minnesota is essentially identical to the distribution in 1900, which at that time was highly correlated with agricultural opportunity and iron mining. Agricultural settlement was densest in the south central part of the state where agriculture was most productive, and steadily waned as soil fertility diminished to the northeast,

as precipitation became unpredictable to the west, and as the growing season shortened moving north. Sizes of urban places have changed since 1900—some are much larger and some smaller—but few have disappeared. The location patterns on the two maps are essentially identical. [39]

Throughout Minnesota, the system of urban centers that emerged on the land is best characterized as a system of *central places*, with their sizes and geographical distribution understood in terms of *Central Place Theory*. The structure of Central Place Theory rests on three principles, namely market *threshold*, the *range* of a good or service, and the *marketing principle*. [40]

The *threshold* for a good or service is simply the minimum amount of sales revenue or number of clients needed per time period to bring a provider of a good or service into existence, and to keep it going. Threshold is based on the number of households and their purchasing power, supplemented by local businesses as buyers of goods and services. Thresholds obviously vary for different functions. What we call *low-order* functions require only a small threshold market. In 1900, a low-order function would be a general store, a grain elevator, a country church, or a one-room school, while a higher-order function would be a county courthouse, a bank, or a farm machinery dealer.

The *range* of a good or service is the maximum distance that an average customer will travel to obtain it. A century ago (before the days of Amazon.com and Federal Express) a farm family "went to town" to buy or otherwise obtain what they needed. Itinerant peddlers occasionally visited homes and businesses to market their wares, and eventually the catalogue mail-order business thrived, but the cost of distance generally regulated sales and distribution of goods and services. Customers were willing to travel only short distances to purchase everyday, low-order goods and services. Less-frequently needed higher-order goods and services like legal help, bank loans, or major equipment purchases usually required longer trips, but customers were willing to invest the extra time and expense on occasion to obtain what they needed.

The lowest-order central places, called *hamlets*, emerged on the landscape, evenly spaced and normally six to eight miles apart (about one per township, 6 miles square, or 36 square miles). Spaced in this way, every farm household lived within a hour or so travel time from one of these small centers, which provided only the lowest-order goods and services to the 150 or so households living nearby on farms averaging 160 acres—the typical size of homesteads throughout much of Minnesota in 1900. [41]

Some goods and services were needed less frequently than daily or a few times per week, so selected hamlets emerged as *villages*, taking on an additional set of higher-order functions, selling a more select array of goods and services that needed higher thresholds but which were associated with wider ranges. According to Central Place Theory, about three times as much market size and market area were needed to support village-level functions compared with a hamlet-sized market.

Again, some goods and services were needed so infrequently that a village-level trade area was insufficient to support them, so some villages emerged as *towns* and provided those higher-order

functions requiring perhaps three times the market size that would support a village. On average, a town might serve 1,350 farm households, more or less (i.e., nine times the market supporting a hamlet). Towns were characterized by selling hamlet-level functions within a nearby market; village functions to a wider market, and town-level functions to a still more dispersed clientele (Figure 2.2).

On average, if hamlets were six to eight miles apart, towns would be separated by three times those distances. They would be situated more closely in densely settled areas and spaced farther apart in more sparsely settled areas. Higher up the urban hierarchy, cities emerged and grew, so

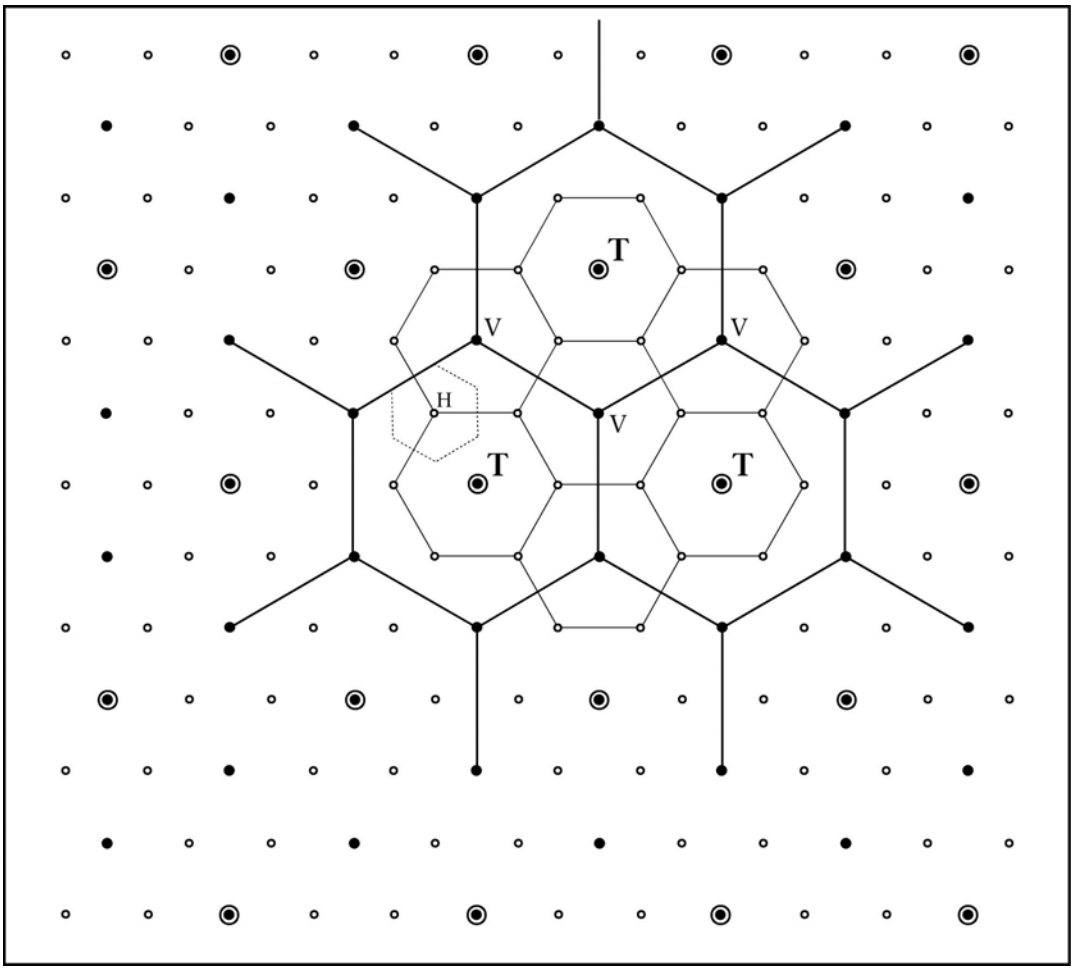

Figure 2.2. Idealized distribution of hamlets, villages, and towns within the central place model. Centers of each order serve trade areas of the same order.
Source: Abler, Ronald, John S. Adams and Peter Gould. 1972. Spatial Organization. The Geographer's View of the World. Englewood Cliffs, NJ: Prentice Hall, p. 371.

that by mid-20th century still larger and more widely separated regional centers like Duluth-Superior, and regional capitals like the Twin Cities dotted the landscape of America's northern heartland. [42]

In 1960, Minnesota counted 853 hamlets, 222 villages and towns, 88 small cities, and 5 major centers including Minneapolis-St. Paul and Duluth-Superior at the top of the hierarchy. [43]

If we look at the size distribution and geographical distribution of urban places in Minnesota, we can observe the consequences of what is termed the *marketing principle* of Central Place Theory. The marketing principle states that lower-order central places can establish themselves successfully on the margins of a higher-order trade area. We can observe this arrangement as we travel along a trunk highway between two cities. Approximately midway between the cities we can expect to see the successful establishment of a town; between two towns, a village; and between villages hamlets survive.

Agricultural landscapes that feature homogeneous soil, climate, precipitation and uniform population distributions generally have supported systems of central places that closely match what theory anticipates. Departures from those underlying conditions or the presence of rivers, trails, railroads and trunk highways distort spatial patterns, but the principles still operate to regulate the size and spacing of central places.

To summarize, Minnesota agriculture (and mining on the Iron Ranges) provided the principal sustained basis for the emergence of lower-order central places during the last half of the 19th century. Once established, those places continued to perform their central functions up through 1950, while manufacturing and high-order central functions expanded and flourished in major cities like Minneapolis, St. Paul, and Duluth. Then during the quarter century following World War II (1945-1970), Minnesota's farm-based economy and its associated settlement system of farm populations and central places underwent a radical reorganization, and set the stage for the era currently underway—the subject of our present study.

Minnesota's Trade Centers and Trade Areas, 1945-1970

Between the mid-1930s and the 1960s, Minnesota's farm population dropped by almost half (934,000 to 502,000), while the number of farms declined by more than half (215,000 to 111,000). As farm consolidation occurred due to mechanization and expanding opportunities for lucrative off-farm employment, marginal farms in the cutover regions of the north and east were abandoned, Minnesota land in farms dropped from 32.8 million acres in 1935 to 28.8 million acres in 1969, and average farm size rose from 161 acres to 261 acres. [44]

Meanwhile, prosperity of the typical farm operation rose from an average Minnesota farm value of $6,803 in 1935 to $58,803 (both in current dollars) at the end of the 1960s. In constant dollars, the average value increased from $22,160 to $44,276. [45] During the quarter century from 1945 to 1970, household and per capita incomes rose, personal mobility improved, and migration from farms and small centers to larger centers drained the countryside of a good share of its post-war baby boom. The American economy shifted from an economy focused on production and supporting only modest levels of living, to an economy of abundance where domestic agendas focused increasingly on discretionary consumption and on lifestyle agendas. As these shifts occurred, central places across Minnesota slowly metamorphosed away from an emphasis on serving farm populations and emerged as production and residential settings closely

linked with the consumer culture of the rest of the state, the region and the world. Accompanying the reorganization of Minnesota settlement, livelihood and lifestyles, came a new and intensified set of demands on the state's trunk highway system.

Transformation of Work and Life in Sub-areas of Commuting Fields

As Minnesota's agricultural lands, mining districts and forested areas underwent a transformation that included consolidation of farms and industrialization of agriculture (e.g., feedlots, mass production of poultry, etc.), there occurred a convergence of household lifestyles such that earlier distinctions between the *urban* and the *rural* are much less useful today. For example, many of today's households continue living on farmsteads, but they may or may not own the adjacent agricultural land. If they own it, they often rent it to a neighboring farm operation, but often they own or rent only the farmstead, and commute daily to jobs in town or at industrial sites that today are scattered across the countryside. Meanwhile, the farm operator may derive the majority of his or her annual income from off-farm employment. Other households have purchased several acres of farmland or forestland and have built suburban-style homes to create a type of ultra-low-density scattered-site exurban development that differs little if at all in style and function from conventional automobile-oriented suburbanization. What is deceptive in observing and analyzing this phenomenon is the distracting visual impact of agricultural activity surrounding what is basically modern, city/suburban-style housing, which accompanies the modern, urban-type daily activity patterns of residents. [46]

Transformation of Minnesota's Central Place Hierarchy

From early days of settlement up through the 1950s, Minnesota's major cities evolved to become centers of manufacturing and wholesale trade, along with transportation, finance and business management activity that linked the state with other regional economies of the United States and the world. Meanwhile the principal business of smaller central places was to provide goods and services to a surrounding markets supported mainly by agriculture.

Since 1950, and increasingly after 1970, the settlement pattern and the economy of Minnesota have changed in significant ways. Today we see that the "urbanization of the countryside" is essentially complete in functional terms, while the settlement system is catching up with the economic and social transformations that have already occurred. According to 1990 5-percent county-to-county daily commuting patterns, the greater Twin Cities area spread over 24 counties in Minnesota and Wisconsin. Similarly, the smaller cities and towns in Minnesota also experienced a form of suburbanization, whether or not local populations have increased. The towns, villages and hamlets within highway commuting ranges of regional centers often have become bedroom suburbs. Meanwhile, in the unincorporated townships surrounding the regional centers, new houses are going up along major and minor highways and country roads to meet the wants of households for country living—but within a convenient automobile ride to work, school, Main Street and Wal-Mart.

Transportation and Development

Our previous report emphasized how economic activity depends on accessibility, while accessibility facilitates economic development. [47] We recalled that from earliest days of Minnesota's exploration by European-Americans, there has always been a close and reciprocal relationship between transportation and development. Early transportation routes (rivers, lakes, trails) were developed and improved to exploit the resources of the natural environment (furs, timber, agriculture), then used to pursue additional forms of economic activity. Once natural resource exploitation and trade were well underway, existing routes and settlements along them influenced the course of later development of railroads and highways, while infrastructure already in place guided later investments in land development. Population distribution follows economic opportunity, but population concentrations once in place generate additional economic activity. This reciprocal process has continued to the present, with places that are growing attracting additional people and investment, which nurtures additional growth as the process rolls along.

Our previous study illustrated that MCD population increases between 1970 and 2000 were greater for places closer to the sample regional centers, and smaller or negative in places farther away. For regional centers and parts of Minnesota experiencing slow growth or decline, places closer to the regional center are doing better than places farther away. There exists in Minnesota a *crescent of growth* extending from southeast of Rochester, northwest through Mankato and the greater Twin Cities area, northwest through St. Cloud, and into the lake district north to Park Rapids and Bemidji. For regional centers and parts of Minnesota within that zone, the patterns of growth are mixed, with MCD growth not necessarily corresponding with distance from regional centers. Many of the fast-growing study areas are in the lake and outdoor recreation areas of the state, so location of the amenities provides a pull in the opposite direction, and dilutes to some extent the effect of highway distance from regional centers and their job opportunities. In other parts of the fast-growing region of the state, the regional centers are closely spaced, and their respective commuting fields overlap one another.

No one can know whether the fast-growth experience of Minnesota in the 1990s will be repeated during the present decade, but whether population and economic growth rates speed up or slow down, it is likely that the state's map of residential population distribution in 2010 or 2020 will resemble the map of today. But stability in spatial patterns is not the important story. Even though today's map appears to have changed little in recent decades, ways of life across the state appear to have converged, and daily and weekly travel behavior have changed significantly. The aim of the present study has been to explore these changes in greater detail.

Changing Population Characteristics and Household Composition

This chapter illustrates the population age structure and household composition within the sample regional centers and throughout their tributary commute fields in 2000, and illustrates how they have changed since 1970.

A graph is used to portray the various ways in which regional centers and study areas differed in their population changes during the 1990s (Figure 2.3).

Interpretive discussion follows on the following topics:

- © Regional Centers and Commute Fields (Table 2.1)
- © Population Change, Regional Centers and Commute Fields, 1970-2000 (Table 2.2)
- © Race and Ethnicity, Regional Centers and Commute Fields, 1990-2000 (Table 2.3)
- © Population Age Structure, Regional Centers and Commute Fields, 1990-2000 (Table 2.4)
- © Household Composition, Regional Centers and Commute Fields, 1990-2000 (Table 2.5)
- © Single-Person Households, Regional Centers and Commute Fields, 1990-2000 (Table 2.6)

The 26 regional centers of this study are arrayed within the quadrants in Figure 2.3. Each of the centers is positioned according to the population growth rate from 1990 to 2000 of the **center itself**, and the population growth rate of the **remainder of the commute field without the center**. The resulting position tells us whether the area has:

(A) a rapidly growing center and surrounding commute field (15);

(B) a center with declining population within a commute field where population is increasing (4);

(C) a regional center that is growing, within a commute field with declining population (4); or

(D) declining population in both the regional center and surrounding commute field (3).

The majority of the study areas experienced growth in both the regional center and surrounding commute field during 1990-2000. Within the quadrant (A), the 1st-order centers of Fargo-Moorhead and Rochester experienced strong growth (over 15 percent), as did the 2nd-order center of Owatonna. Owatonna's commute field grew faster than those of the first-order centers. Duluth-Superior, the other 1st-order center in the quadrant, got most of its (A) status from modest growth within its commute field, and almost no population increase in its two centers. 2nd-order Bemidji saw strong growth in its surrounding area, and modest growth in the center itself.

The group in quadrant (B) includes Brainerd, Detroit Lakes, Grand Rapids, and Hibbing (all 2nd-order). Their centers actually lost population, while their commute fields gained, reflecting recreation and retirement settlement in the area, particularly around Brainerd.

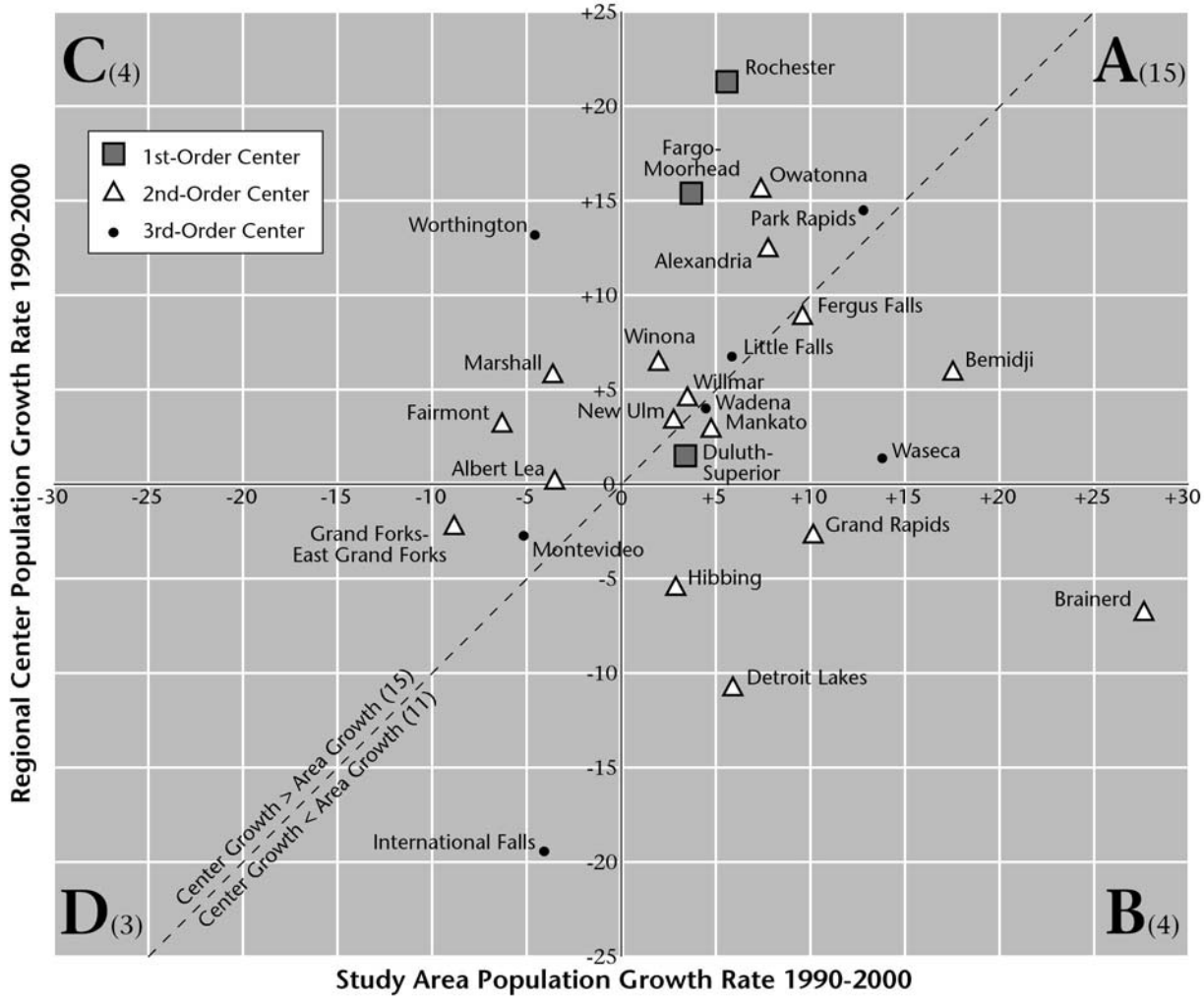

Figure 2.3. Population Growth Rates, Regional Centers and Commute Fields, 1990-2000.
Source: authors.

The four centers in the (C) quadrant include 2nd-order Albert Lea, Fairmont, and Marshall, and 3rd-order Worthington, whose centers grew while their commute field populations experienced decline. Worthington saw the most growth, at about 13 percent. Marshall and Fairmont experienced modest growth, while their commute fields lost population. Albert Lea's population remained nearly steady, but its commute field also experienced modest decline.

The three study areas in quadrant (D) lost population in both their centers and commute fields. International Falls (3rd-order) suffered the most extreme decline, with the center losing 19 percent of its population and its commute field about 5 percent. This likely is an anomaly, reflecting the departure of a temporary population of construction workers drawn to the city by a large building project during the 1980s. The other 3rd-order center in the quadrant, Montevideo,

experienced similar decline in its commute field, but lost only about 3 percent of its population during the decade. Second-order center Grand Forks/East Grand Forks had a comparable experience in the 1990s, with 2-3 percent population decline in its centers, and 5-10 percent declines within its commute field.

In plotting study areas in Figure 2.3, we separated the **regional center's population** from the **remainder of the commute field population** in order to calculate their respective rates of population change during the 1990s. An alternative approach to constructing Figure 2.3 would be to plot the regional center population change against the *total* commute field population change (including the center's population). It is unclear to us which approach is superior for shedding light on the nature of suburbanization of the Minnesota countryside. That is why, in Table 2.2, we distinguish between population of the regional center, its central county, and the entire study area. In tables that follow, the center population is included in the commute field population.

A regional center is a municipality with well-defined boundaries within which its population may rise or fall. Adjacent municipalities and townships located outside the regional center boundaries but clearly linked with the economy and life of the regional center should be (according to the argument of this study) should be thought of as part of an emerging low-density "urbanized area" focused on the regional center. The problem is how to exploit existing census data to describe and summarize patterns of population change within our 26 study areas and within our regional centers.

Population growth within a regional center, due to natural change and migration change, is accommodated in one or more of the following ways. (1) The growth can occur within the city limits if the center contains undeveloped land within its borders so that new residential and other land development can occur within the center rather than outside. (2) If the center lacks vacant land or opportunities for redevelopment, the growth must spill over into adjacent or nearby areas and will not be recorded as growth of the center even though it is integral to it. (3) In still other cases, a center might annex adjacent unincorporated areas, as some centers have, and any associated population in these annexed areas will be reported as city growth.

Table 2.1 indicates the county within which each regional center is located, the other counties that constitute the commute field for the central county; other trade centers (of any order) within the commute field; and the Mn/DOT Districts and MN Plan regions within which the center is located.

Table 2.2 depicts population in the 26 study areas from 1970-2000, and change from 1990 to 2000. The “Growth Rate Index” in the table places each regional center and study area within a range of growth rates for 1990-2000:

1 = 3% or greater growth

2 = less than 3% decline to less than 3% growth

3 = 3% or greater decline

Table 2.1. Regional Centers and Commute Fields

Regional Center	Central County	Other Counties within Commute Field	Other Trade Centers within Commute Field*	Mn/DOT District	MN Plan Region
Albert Lea	Freeborn			6	SE
Alexandria	Douglas	Grant, Pope, Todd		4	NW
Bemidji	Beltrami	Clearwater, Hubbard		2	NW
Brainerd	Crow Wing	Aitkin, Cass	Aitkin (3)	3	NW
Detroit Lakes	Becker	Mahnomen		4	NW
Duluth-Superior	St Louis	Carlton, Lake (Douglas, Bayfield, WI)	Cloquet (2), Ely (3), Virginia (3)	1	NE
Fairmont	Martin			7	SW
Fergus Falls	Ottertail	Grant, Wilkin		4	NW
Grand Forks/ East Grand Forks	Polk	Norman, Red Lake, Marshall (Grand Forks, Nelson, Steele, Traill, Walsh ND)	Crookston (3)	2	NW
Grand Rapids	Itasca			1	NE
Hibbing	St. Louis	Itasca	Ely (3), Virginia (2)	1	NE
International Falls	Koochiching			1	NE
Little Falls	Morrison	Todd		3	NW
Mankato	Blue Earth	Faribault, Le Sueur, Nicollet, Waseca, Watonwan	Faribault (2)	7	SW
Marshall	Lyon	Lincoln, Murray, Redwood, Yellow Medicine	Redwood Falls (3)	8	NW
Montevideo	Chippewa	Lac qui Parle, Yellow Medicine		8	SW
Fargo/Moorhead	Clay	Becker, Norman, Wilkin (Cass, Richland, Traill ND)		4	NW
New Ulm	Brown	Nicollet	St. Peter (3)	7	SW
Owatonna	Steele	Dodge, Steele, Waseca		6	SE
Park Rapids	Hubbard	Becker		2	NW
Rochester	Olmsted	Dodge, Fillmore, Goodhue, Mower, Wabasha, Winona	Austin (2) Red Wing (2)	6	SE
Wadena	Wadena	Todd		3, 4	NW
Waseca	Waseca			7	SW
Willmar	Kandiyohi	Chippewa, Renville, Swift		8	C
Winona	Winona	(Buffalo WI)	La Crescent (1)	6	SE
Worthington	Nobles	Jackson, Murray (Osceola IA)		7	SW

*This column lists regional centers in 2003, rank 0-3, outside of the Twin Cities 24-county metropolitan area (as defined by 5% commuting patterns), that are not included in the study sample.

Sources: Minnesota Department of Transportation. May 2003. Trade Centers of the Upper Midwest. 2003 Update. SRF No. 0024680. St. Paul, Minnesota: Minnesota Department of Transportation. Minnesota Department of Administration.

Table 2.2. Population Change, Regional Centers and Commute Fields, 1970-2000

Regional Center/ Central County/ Commute Field*	1970	1980	1990	2000	Change 1990-2000		Growth Rate index*
					No.	%	
Albert Lea	19,418	19,200	18,310	18,356	46	0.3	2
Freeborn County	38,064	36,329	33,060	32,584	-476	-1.4	
Commute Field	38,064	36,239	33,060	32,584	-476	-1.4	2
Alexandria	6,973	7,608	7,838	8,820	982	12.5	1
Douglas County	22,910	27,839	28,674	32,821	4,147	14.5	
Commute Field	63,593	71,658	69,028	74,772	5,744	8.3	1
Bemidji	11,490	10,949	11,245	11,917	672	6.0	1
Beltrami County	26,373	30,982	34,384	39,650	5,266	15.3	
Commute Field	44,969	53,841	57,632	66,449	8,817	15.3	1
Brainerd	11,667	11,489	12,353	13,178	825	6.7	1
Crow Wing County	34,826	41,722	44,249	55,099	10,850	24.5	
Commute Field	63,552	76,176	78,465	97,550	19,085	24.3	1
Detroit Lakes	5,797	7,106	6,635	7,348	713	10.7	1
Becker County	24,372	29,336	27,881	30,000	2,119	7.6	
Commute Field	30,010	34,871	32,925	35,190	2,265	6.9	1
Duluth-Superior	132,815	122,382	112,627	114,286	1,659	1.5	2
St Louis County	220,693	222,229	198,213	200,528	2,315	1.2	
Douglas County, WI	44,657	44,421	41,758	43,287	1,529	3.7	
Commute Field	306,773	309,629	279,645	286,544	6,899	2.7	2
Fairmont	10,751	11,506	11,265	10,889	-376	-3.3	3
Martin County	24,316	24,687	22,914	21,802	-1,112	-4.9	
Commute Field	24,316	24,687	22,914	21,802	-1,112	-4.9	3
Fargo/Moorhead	83,052	91,381	106,406	122,776	16,370	15.4	1
Clay County	46,608	49,327	50,422	51,229	807	1.6	
Cass County, ND	73,653	88,247	102,874	123,138	20,264	19.7	
Commute Field	238,298	262,901	273,990	296,651	22,661	8.3	1
Fergus Falls	12,443	12,519	12,362	13,471	1,109	9.0	1
Ottertail County	46,097	51,937	50,714	57,159	6,445	12.7	
Commute Field	62,948	67,562	64,476	70,586	6,110	9.5	1
Grand Forks/ East Grand Forks	46,615	52,302	58,083	56,822	-1,261	-2.2	2
Polk County	34,435	34,844	32,498	31,369	-1,129	-3.5	
Grand Forks County, ND	61,102	66,100	70,683	66,109	-4,574	-6.5	
Commute Field	159,371	162,155	156,096	146,213	-9,883	-6.3	3
Grand Rapids	7,247	7,934	7,976	7,764	-212	-2.7	2
Itasca County	35,530	43,069	40,863	43,992	3,129	7.7	
Commute Field	159,371	162,155	156,096	146,213	-9,883	7.7	1
Hibbing	16,104	21,193	18,048	17,071	-977	-5.4	3
St. Louis County	220,693	222,229	198,213	200,528	2,315	1.2	
Commute Field	256,223	265,298	239,076	244,520	5,444	2.3	2
International Falls	6,439	5,611	8,325	6,703	-1,622	-19.5	3
Koochiching County	17,131	17,571	16,299	14,355	-1,944	-11.9	
Commute Field	17,131	17,571	16,299	14,355	-1,944	-11.9	3

Table 2.2. Population Change, Regional Centers and Commute Fields, 1970-2000

(continued)

Regional Center/ Central County/ Commute Field	1970	1980	1990	2000	Change 1990-2000		Growth Rate index*
					No.	%	
Little Falls	7,467	7,250	7,232	7,719	487	6.7	1
Morrison County	26,949	29,311	29,604	31,712	2,108	7.1	
Commute Field	49,063	54,302	52,967	56,138	3,171	6.0	1
Mankato	30,895	28,651	31,477	32,427	950	3.0	1
Blue Earth County	52,322	52,314	54,044	55,941	1,897	3.5	
Commute Field	149,029	153,200	152,057	158,721	6,664	4.4	1
Marshall	9,886	11,161	12,023	12,735	712	5.9	1
Lyon County	24,273	25,207	24,789	25,425	636	2.6	
Commute Field	79,471	77,915	70,277	68,914	-1,363	-1.9	2
Montevideo	5,661	5,845	5,499	5,346	-153	-2.8	2
Chippewa County	15,109	14,941	13,228	13,088	-140	-1.1	
Commute Field	40,796	39,186	33,836	32,235	-1,601	-4.7	3
New Ulm	13,051	13,755	13,132	13,594	462	3.5	1
Brown County	28,887	28,645	26,984	26,911	-73	-0.3	
Commute Field	53,405	55,574	55,060	56,682	1,622	2.9	2
Owatonna	15,341	18,632	19,386	22,434	3,048	15.7	1
Steele County	26,931	30,328	30,729	33,680	2,951	9.6	
Commute Field	56,631	63,549	64,539	70,937	6,398	9.9	1
Park Rapids	2,772	2,976	2,863	3,276	413	14.4	1
Hubbard County	10,583	14,098	14,939	18,376	3,437	23.0	
Commute Field	34,955	43,434	42,820	48,376	5,556	13.0	1
Rochester	53,766	57,890	70,745	85,806	15,061	21.3	1
Olmsted County	84,104	92,006	106,470	124,277	17,807	16.7	
Commute Field	260,413	273,439	300,908	328,917	28,009	9.3	1
Wadena	4,640	4,699	4,131	4,294	163	3.9	1
Wadena County	12,412	14,192	13,154	13,713	559	4.2	
Commute Field	34,526	39,183	36,517	38,139	1,622	4.4	1
Waseca	6,789	8,219	8,385	8,493	108	1.3	2
Waseca County	16,663	18,448	18,079	19,526	1,447	8.0	
Commute Field	16,663	18,448	18,079	19,526	1,447	8.0	1
Willmar	12,869	15,895	17,531	18,351	820	4.7	1
Kandiyohi County	30,548	36,763	38,761	41,203	2,442	6.3	
Commute Field	79,973	85,025	80,386	83,401	3,015	3.8	1
Winona	26,438	25,075	25,399	27,069	1,670	6.6	1
Winona County	44,409	46,256	47,828	49,985	2,157	4.5	
Commute Field	58,152	60,565	61,412	63,789	2,377	3.9	1
Worthington	9,916	10,243	9,977	11,283	1,306	13.1	1
Nobles County	23,208	21,840	20,098	20,832	734	3.7	
Commute Field	58,623	55,408	48,702	48,268	-434	-0.9	2
Minnesota	3,806,103	4,075,970	4,375,099	4,919,479	544,380	12.4	1

*Growth rate index refers to rate of growth or decline of each center and total commute field (including center) between 1990 and 2000.

1 = 3% or greater growth; 2 = less than -3% decline to less than 3% growth; 3 = 3% or greater decline

Source: U.S. Department of Commerce, Bureau of the Census.

and provides the specific growth data for the regional center, central county, and study area (including its center). The study areas of Grand Rapids and Waseca had a higher growth rate index than their regional centers alone, and the regional centers of Marshall, New Ulm, and Worthington had a higher growth rate index than their study areas overall. The fastest growth between 1990 and 2000 was experienced in the Brainerd study area (24.5%), Hubbard County within the Park Rapids study area (23%), and the city of Rochester (21.3%, likely in part the result of annexations). These places outpaced population growth in Minnesota as a whole (12.4%), as did the regional centers of Fargo/Moorhead, Owatonna, Park Rapids, and Worthington.

Table 2.3 documents changes in non-white and Hispanic populations within the 26 study areas from 1990 to 2000. [48] The largest percentage increases were found in places with relatively small and homogeneous populations, so that even a small increase in absolute numbers yielded a dramatic change in percentages, more than doubling in some cases. Even in such cases, the percentage of non-white and Hispanic remain a small proportion of the area's total population. The largest percentage increases in non-white population during the 1990s were seen in the smaller centers of Detroit Lakes, Fairmont, Fergus Falls, Montevideo, Owatonna, Winona, and Worthington; the commute fields around Alexandria, Little Falls, Waseca and Willmar, and in the core counties of Brown, Lyon, Hubbard.

The city of Rochester saw significant gains in both non-white and Hispanic populations (161.7% and 212%, respectively). While absolute increases in these areas were small, the growth rates that they represent in many cases far outpaced the state as a whole (111.4% and 163.1%, respectively). Few areas lost non-white and Hispanic populations during this period, and those that experienced general population decline as well, such as in International Falls (-28% non-white; -65.3% Hispanic). Much of the general population growth found in the study areas during the 1990s can be attributed to increases in non-white and Hispanic populations.

An examination of the changing age structure of the study areas (Table 2.4) supports the assertion that at least a good portion of their 1990s net population growth reflected in large part growth in non-white and Hispanic populations, which in Minnesota currently tend to be younger than the resident populations. The population under 16 years of age declined in nearly all of the study areas between 1990 and 2000. Areas experiencing high percentage increases in non-white and Hispanic populations in the 1990s also saw growth in the percentage of persons under age 16. Fargo/Moorhead saw an increase of 14.3 percent, and Detroit Lakes was not far behind at 13.2 percent. Other strong gainers in this category included Alexandria (6.8%), Bemidji (7.9%), Fergus Falls (5.1%), Marshall (8.9%), Willmar (5.4%), Winona (6.0%). Those areas that outpaced the state as a whole (18.2%) included Worthington (21.8%). Owatonna (23.3%), Park Rapids (20.4%), and Rochester (25.2%).

Table 2.3. Race and Ethnicity, Regional Centers and Commute Fields, 1990-2000

Regional Center/ Central County/ Commute Field	Non-White Population		Change in Non-White Population		Hispanic Population		Change in Hispanic Population	
	1990	2000	No.	%	1990	2000	No.	%
Albert Lea	667	1,322	655	98.2	897	1,740	843	94.0
Freeborn County	843	1,556	713	84.6	1,076	2,049	973	90.4
Commute Field	843	1,556	713	84.6	1,076	2,049	973	90.4
Alexandria	75	182	107	142.7	40	71	31	77.5
Douglas County	209	495	286	136.8	78	193	115	147.4
Commute Field	417	1,332	915	219.4	150	746	596	397.3
Bemidji	1,219	1,870	651	53.4	58	136	78	134.5
Beltrami County	5,975	9,256	3,281	54.9	146	394	248	169.9
Commute Field	6,923	10,839	3,916	56.6	199	583	384	193.0
Brainerd	272	549	277	101.8	64	113	49	76.6
Crow Wing County	612	1,298	686	112.1	174	381	207	119.0
Commute Field	3,325	5,507	2,182	65.6	303	693	390	128.7
Detroit Lakes	266	589	323	121.4	75	88	13	17.3
Becker County	2,032	3,194	1,162	57.2	120	230	110	91.7
Commute Field	3,243	5,122	1,879	57.9	147	276	129	87.8
Duluth-Superior	4,573	7,957	3,384	74.0	651	1,147	496	76.2
St Louis County	6,160	10,317	4,157	67.5	952	1,597	645	67.8
Douglas County, WI	1,304	2,014	710	54.4	201	315	114	56.7
Commute Field	10,282	16,900	6,618	64.4	1,334	2,332	998	74.8
Fairmont	129	480	351	272.1	93	324	231	248.4
Martin County	200	607	407	203.5	137	421	284	207.3
Commute Field	200	607	407	203.5	137	421	284	207.3
Fargo/Moorhead	3,652	7,827	4,175	114.3	1,434	2,606	1,172	81.7
Clay County	1,860	3,080	1,220	65.6	1,179	1,872	693	58.8
Cass County, ND	2,432	6,032	3,600	148.0	700	1,518	818	116.9
Commute Field	9,051	16,693	7,642	84.4	3,440	6,137	2,697	78.4
Fergus Falls	176	402	226	128.4	57	122	65	114.0
Ottertail County	523	1,654	1,131	216.3	224	957	733	327.2
Commute Field	644	1,921	1,277	198.3	274	1,100	826	301.5
Grand Forks/ East Grand Forks	2,722	3,958	1,236	45.4	1,199	1,486	287	23.9
Polk County	997	1,826	829	83.1	1,146	1,502	356	31.1
Grand Forks County, ND	3,917	4,630	713	18.2	1,053	1,359	306	29.1
Commute Field	5,717	8,154	2,437	42.6	2,985	4,294	1,309	43.9
Grand Rapids	175	347	172	98.3	33	66	33	100.0
Itasca County	1,505	2,360	855	56.8	143	263	120	83.9
Commute Field	1,505	2,360	855	56.8	143	263	120	83.9
Hibbing	244	455	211	86.5	80	116	36	45.0
St. Louis County	6,160	10,317	4,157	67.5	952	1,597	645	67.8
Commute Field	7,909	13,132	5,223	66.0	1,175	1,976	801	68.2
International Falls	442	315	-127	-28.7	144	50	-94	-65.3
Koochiching County	666	557	-109	-16.4	185	81	-104	-56.2
Commute Field	666	557	-109	16.4	185	81	-104	56.2

Table 2.3. Race and Ethnicity, Regional Centers and Commute Fields, 1990-2000

(continued)

Regional Center/ Central County/ Commute Field	Non-White Population		Change in Non-White Population		Hispanic Population		Change in Hispanic Population	
	1990	2000	No.	%	1990	2000	No.	%
Little Falls	104	215	111	106.7	37	81	44	118.9
Morrison County	196	482	286	145.9	98	203	105	107.1
Commute Field	326	1,082	756	231.9	156	666	510	326.9
Mankato	1,176	2,416	1,240	105.4	331	719	388	117.2
Blue Earth County	1,396	2,820	1,424	102.0	480	988	508	105.8
Commute Field	3,022	7,647	4,625	153.0	1,850	5,456	3,606	194.9
Marshall	280	1,101	821	293.2	162	755	593	366.0
Lyon County	365	1,633	1,268	347.4	214	1,009	795	371.5
Commute Field	995	3,140	2,145	215.6	434	1,586	1,152	265.4
Montevideo	32	155	123	384.4	18	107	89	494.4
Chippewa County	114	422	308	270.2	94	251	157	167.0
Commute Field	359	948	589	164.1	199	467	268	134.7
New Ulm	104	258	154	148.1	78	171	93	119.2
Brown County	193	586	393	203.6	151	545	394	260.9
Commute Field	633	1,666	1,033	163.2	354	1,080	726	205.1
Owatonna	342	1,326	984	287.7	308	967	659	214.0
Steele County	471	1,619	1,148	243.7	544	1,266	722	132.7
Commute Field	867	3,269	2,402	277.0	837	2,362	1,525	182.2
Park Rapids	85	132	47	55.3	3	35	32	1066.7
Hubbard County	302	678	376	124.5	37	124	87	235.1
Commute Field	2,334	3,872	1,538	65.9	157	354	197	125.5
Rochester	4,095	10,718	6,623	161.7	822	2,565	1,743	212.0
Olmsted County	4,590	12,022	7,432	161.9	970	2,959	1,989	205.1
Commute Field	7,814	20,267	12,453	159.4	3,060	8,707	5,647	184.5
Wadena	49	91	42	85.7	28	26	-2	-7.1
Wadena County	138	289	151	109.4	47	128	81	172.3
Commute Field	268	889	621	231.7	105	591	486	462.9
Waseca	108	489	381	352.8	57	433	376	659.6
Waseca County	195	1,044	849	435.4	129	566	437	338.8
Commute Field	195	1,044	849	435.4	129	566	437	338.8
Willmar	695	2,180	1,485	213.7	1,205	2,911	1,706	141.6
Kandiyohi County	924	2,627	1,703	184.3	1,363	3,295	1,932	141.7
Commute Field	1,390	4,900	3,510	252.5	1,752	4,742	2,990	170.7
Winona	611	1,496	885	144.8	218	365	147	67.4
Winona County	936	2,098	1,162	124.1	350	686	336	96.0
Commute Field	999	2,279	1,280	128.1	392	771	379	96.7
Worthington	630	2,616	1,986	315.2	242	2,175	1,933	798.8
Nobles County	691	2,813	2,122	307.1	262	2,325	2,063	787.4
Commute Field	1,023	3,432	2,409	235.5	412	2,795	2,383	578.4
Minnesota	244,704	517,355	212,651	111.4	53,884	141,786	87,902	163.1

Source: U.S. Department of Commerce, Bureau of the Census.

Table 2.4. Population Age Structure, Regional Centers and Commute Fields, 1990-2000

Regional Center/ Central County/ Commute Field	Population Under 16		Change in Population Under 16 1990-00		Population 65 and Older		Change in Population 65 and Older 1990-00	
	1990	2000	No.	%	1990	2000	No.	%
Albert Lea	3,739	3,695	-44	-1.2	3,817	3951	134	3.5
Freeborn County	7,639	6,825	-814	-10.7	6,146	6173	27	0.4
Commute Field	7,639	6,825	-814	-10.7	6,146	6173	27	0.4
Alexandria	1,473	1,573	100	6.8	1,904	2101	197	10.3
Douglas County	7,032	6,813	-219	-3.1	5,200	5887	687	13.2
Commute Field	17,534	16,199	-1335	-7.6	13,058	13,692	634	4.9
Bemidji	2,074	2,237	163	7.9	1,688	1,860	172	10.2
Beltrami County	9,225	9,994	769	8.3	3,996	4,608	612	15.3
Commute Field	15,006	15,802	796	5.3	8,273	9,353	1,080	13.1
Brainerd	2,813	2,945	132	4.7	2,495	2,425	-70	-2.8
Crow Wing County	10,717	11,950	1,233	11.5	7,643	9,445	1,802	23.6
Commute Field	18,664	20,572	1,908	10.2	14,754	17,855	3,101	21.0
Detroit Lakes	1,299	1,470	171	13.2	1,700	1,745	45	2.6
Becker County	7,239	6,925	-314	-4.3	4,586	4,902	316	6.9
Commute Field	8,630	8,226	-404	-4.7	5,507	5,777	270	4.9
Duluth-Superior	22,281	21,724	-557	-2.5	19,350	17,336	-2,014	-10.4
St Louis County	43,011	38,871	-4,140	-9.6	33,467	32,305	-1,162	-3.5
Douglas County, WI	9,524	8,965	-559	-5.9	6,807	35,432	28,625	420.5
Commute Field	65,439	60,171	-5,268	-8.1	49,069	107,009	57,940	118.1
Fairmont	2,469	2,259	-210	-8.5	2,330	2,296	-34	-1.5
Martin County	5,534	4,638	-896	-16.2	4,546	4,316	-230	-5.1
Commute Field	5,534	4,638	-896	-16.2	4,546	6,612	2,066	45.4
Fargo/Moorhead	20,206	23,560	3,354	14.3	11,044	13,269	2,225	20.1
Clay County	11,429	11,310	-119	-1.0	5,982	6,642	660	11.0
Cass County, ND	23,210	25,660	2,450	10.6	10,126	11,866	1,740	17.2
Commute Field	63,620	64,257	637	1.0	34,452	37,169	2,717	7.9
Fergus Falls	2,571	2,701	130	5.1	2,646	2,957	311	11.8
Ottertail County	12,093	12,271	178	1.5	9,845	10,818	973	9.9
Commute Field	15,446	15,270	-176	-1.1	12,632	16,373	3,741	29.6
Grand Forks/ East Grand Forks	12,042	11,187	-855	-20.9	5,639	5,690	51	0.9
Polk County	8,247	7,019	-1,228	-14.9	5,785	5,436	-349	-6.0
Grand Forks County, ND	16,825	13,926	-2,899	-17.2	6,185	6,389	204	3.3
Commute Field	37,882	31,427	-6,455	42.6	22,654	27,184	4,530	20.0
Grand Rapids	1,756	1,486	-270	-15.4	1,622	1,741	119	7.3
Itasca County	10,193	9,194	-999	-9.8	6,490	7,397	907	14.0
Commute Field	10,193	9,194	-999	-9.8	6,490	9,138	2,648	40.8
Hibbing	4,006	3,319	-687	-17.1	3,510	3,364	-146	-4.2
St. Louis County	43,011	38,871	-4,140	-9.6	33,467	32,305	-1,162	-3.5
Commute Field	57,210	51,384	-5,826	-10.2	43,467	43,066	-401	-0.9
International Falls	1,625	1,386	-239	-14.7	1,368	1,434	66	4.8
Koochiching County	3,612	2,978	-634	-17.6	2,437	2,575	138	5.7
Commute Field	3,612	2,978	-634	-17.6	2,437	2,575	138	5.7

Table 2.4. Population Age Structure, Regional Centers and Commute Fields, 1990-2000

(continued)

Regional Center/ Central County/ Commute Field	Population Under 16		Change in Population Under 16 1990-00		Population 65 and Older		Change in Population 65 and Older 1990-00	
	1990	2000	No.	%	1990	2000	No	.%
Little Falls	1,687	1,689	2	0.1	1,466	1,751	285	19.4
Morrison County	8,352	7,752	-600	-7.2	4,618	4,949	331	7.2
Commute Field	14,723	13,474	-1,249	-8.5	8,595	10,633	2,038	23.7
Mankato	4,828	4,803	-25	-0.5	3,432	3,626	194	5.7
Blue Earth County	11,253	10,414	-839	-7.5	6,586	6,753	167	2.5
Commute Field	35,829	33,450	-2,379	-6.6	21,815	23,572	1,757	8.1
Marshall	2,478	2,698	220	8.9	1,570	1,579	9	0.6
Lyon County	6,074	5,787	-287	-4.7	3,854	3,711	-143	-3.7
Commute Field	17,192	15,351	-1,841	-10.7	13,633	12,739	-894	-6.6
Montevideo	1,167	1,138	-29	-2.5	1,335	1,121	-214	-16.0
Chippewa County	3,244	2,864	-380	-11.7	2,762	2,617	-145	-5.2
Commute Field	8,198	6,994	-1,204	-14.7	7,314	6,762	-552	-7.5
New Ulm	2,944	2,671	-273	-9.3	2,160	2,248	88	4.1
Brown County	6,671	5,824	-847	-12.7	4,753	4,711	-42	-0.9
Commute Field	13,356	12,195	-1,161	-8.7	7,852	7,946	94	1.2
Owatonna	4,531	5,585	1,054	23.3	2,650	2,824	174	6.6
Steele County	7,923	8,251	328	4.1	4,294	4,427	133	3.1
Commute Field	17,102	17,346	244	1.4	9,207	9,344	137	1.5
Park Rapids	573	690	117	20.4	822	929	107	13.0
Hubbard County	3,639	3,917	278	7.6	2,664	6,173	3,509	131.7
Commute Field	10,878	10,842	-36	-0.3	7,250	11,075	3,825	52.8
Rochester	15,751	19,713	3,962	25.2	7,750	9,776	2,026	26.1
Olmsted County	26,906	29,661	2,755	10.2	10,604	13,364	2,760	26.0
Commute Field	73,619	74,785	1,166	1.6	42,526	43,533	1,007	2.4
Wadena	921	883	-38	-4.1	897	1,024	127	14.2
Wadena County	3,325	3,134	-191	-5.7	2,527	2,708	181	7.2
Commute Field	9,696	8,856	-840	-8.7	6,504	6,641	137	2.1
Waseca	1,947	2,029	82	4.2	1,358	1,343	-15	-1.1
Waseca County	4,688	4,408	-280	-6.0	2,831	2,775	-56	-2.0
Commute Field	4,688	4,408	-280	-6.0	2,831	2,775	-56	-2.0
Willmar	4,017	4,232	215	5.4	2,799	3,011	212	7.6
Kandiyohi County	9,936	9,508	-428	-4.3	5,811	6,171	360	6.2
Commute Field	20,220	18,706	-1,514	-7.5	14,540	14,418	-122	-0.8
Winona	4,019	4,262	243	6.0	4,122	3,902	-220	-5.3
Winona County	10,534	9,941	-593	-5.6	6,561	6,567	6	0.1
Commute Field	13,821	12,928	-893	-6.5	8,824	8,871	47	0.5
Worthington	2,088	2,544	456	21.8	1,941	1,972	31	1.6
Nobles County	4,780	4,826	46	1.0	3,719	3,609	-110	-3.0
Commute Field	11,740	10,758	-982	-8.4	9,444	9,202	-242	-2.6
Minnesota	962,923	1,137,723	174,800	18.2	546,934	594,266	55,599	8.7

Source: U.S. Department of Commerce, Bureau of the Census.

The number of households in Minnesota grew at a rate of 15 percent during the 1990s (Table 2.5). Among our 26 regional centers, only Owatonna (17.9)%, Park Rapids (16.6%), and Rochester (22.2%) exceeded that pace. New household expansion within cities depends upon redevelopment and an increase in the housing stock, so it makes sense that strong growth in new households will mean suburban expansion of housing opportunities, as well as growth throughout the commute fields. Of our 26 core counties, Douglas County (20.8%; Alexandria), Beltrami (20.8%; Bemidji), Crow Wing (29.3%; Bemidji), Cass (27.4%; Fargo/Moorhead), Itasca (15.1%; Grand Rapids), Hubbard (28.6%; Park Rapids), Olmsted (19.3%; Rochester), outpaced the rate of new household formation in the state as a whole. These rates reflect suburbanization and exurbanization around these regional centers; but, within these core counties, only in the centers of Park Rapids and Rochester did the number of households grow at comparable rates, outpacing the state as a whole.

Growth in the number of households within a region might reflect net population growth, and might also reflect a reduction in the average size of households, as children leave their parents' homes and find apartments or houses of their own, or as spouses separate, yielding two households instead of one. Also, in reasonably good economic times, roommates who share lodging for economic reasons might find it possible to establish solo households, thus adding to the total number. Since the drivers of this change vary, we also have to note the proportion that these households constitute of the total number of households. Table 2.6 documents the change in the number of single-person households in our study areas during the 1990s.

Within the state as a whole, the number of single-person households grew during the decade at a rate of 23.1 percent. The regional centers of Alexandria (25.6%), Bemidji (24.0%), Duluth/Superior (26.2%), Fargo/Moorhead (39.3%), Grand Rapids (28.3%), Mankato (30.6%), and Rochester (24.5%) outpaced this rate. Even the city of International Falls, which experienced severe population decline in the 1990s, saw an increase in single-person households of 21.6 percent during the decade. The core counties outpaced the growth rates of each of these centers except for Duluth and Mankato, and Rochester nearly matched the growth rate of Olmsted County (25.2%). This evidence suggests that new suburban housing opportunities are facilitating this expansion.

In-Migration

Part of the population change within study areas was due to natural change, but there was significant movement of population in and out of each area. This chapter examines the volume and proportion of population in each area in 2000 that lived elsewhere in 1995.

Special attention is devoted to the share of population in each regional center and each study area that lived outside the U.S. in 1990 (Table 2.7).

Newcomers from nearby, from elsewhere in the state, from other states, and from outside the U.S. all can be sources of population growth, in addition to net natural increase of the resident population. Table 2.7 reports the proportion of population in 2000 that was new to our study areas since 1995, and where these people came from.

Table 2.5. Number of Households, Regional Centers and Commute Fields, 1990-2000

Regional Center/ Central County/ Commute Field	Number of Households		Change in Number of Households 1990-2000	
	1990	2000	No.	%
Albert Lea	7,533	7,785	252	3.3
Freeborn County	13,029	13,356	327	2.5
Commute Field	13,029	13,356	327	2.5
Alexandria	3,527	4,047	520	14.7
Douglas County	10,988	13,276	2,288	20.8
Commute Field	26,166	29,665	3,499	13.4
Bemidji	4,079	4,669	590	14.5
Beltrami County	11,870	14,337	2,467	20.8
Commute Field	20,715	25,102	4,387	21.2
Brainerd	5,197	5,623	426	8.2
Crow Wing County	17,204	22,250	5,046	29.3
Commute Field	30,632	39,787	9,155	29.9
Detroit Lakes	2,976	3,319	343	11.5
Becker County	10,477	11,844	1,367	13.0
Commute Field	12,282	13,813	1,531	12.5
Duluth-Superior	45,564	47,109	1,545	3.4
St Louis County	78,901	82,619	3,718	4.7
Douglas County, WI	16,374	17,808	1,434	8.8
Commute Field	115,874	123,344	7,470	6.4
Fairmont	4,717	4,702	-15	-0.3
Martin County	9,129	9,067	-62	-0.7
Commute Field	9,129	9,067	-62	-0.7
Fargo/Moorhead	41,212	50,928	9,716	23.6
Clay County	17,490	18,670	1,180	6.7
Cass County	40,281	51,315	11,034	27.4
Commute Field	101,506	116,487	14,981	14.8
Fergus Falls	5,080	5,633	553	10.9
Ottertail County	19,510	22,671	3,161	16.2
Commute Field	24,769	27,957	3,188	12.9
Grand Forks/ East Grand Forks	21,690	22,606	916	4.2
Polk County	11,984	12,070	86	0.7
Grand Forks County, ND	25,340	25,435	95	0.4
Commute Field	57,744	57,264	-480	-0.8
Grand Rapids	3,246	3,446	200	6.2
Itasca County	15,461	17,789	2,328	15.1
Commute Field	15,461	17,789	2,328	15.1
Hibbing	7,439	7,439	0	0.0
St. Louis County	78,901	82,619	3,718	4.7
Commute Field	101,801	107,847	6,046	5.9
International Falls	3,126	2,959	-167	-5.3
Koochiching County	6,025	6,040	15	0.2
Commute Field	6,025	6,040	15	0.2

Table 2.5. Number of Households, Regional Centers and Commute Fields, 1990-2000

(continued)

Regional Center/ Central County/ Commute Field	Number of Households		Change in Number of Households 1990-2000	
	1990	2000	No.	%
Little Falls	2,901	3,197	296	10.2
Morrison County	10,399	11,816	1,417	13.6
Commute Field	18,988	21,158	2,170	11.4
Mankato	11,220	12,367	1,147	10.2
Blue Earth County	19,277	21,062	1,785	9.3
Commute Field	55,174	59,672	4,498	8.2
Marshall	4,443	4,914	471	10.6
Lyon County	9,073	9,715	642	7.1
Commute Field	26,696	27,203	507	1.9
Montevideo	2,340	2,353	13	0.6
Chippewa County	5,245	5,361	116	2.2
Commute Field	13,357	13,116	-241	-1.8
New Ulm	5,199	5,494	295	5.7
Brown County	10,321	10,598	277	2.7
Commute Field	19,799	21,240	1,441	7.3
Owatonna	7,382	8,704	1,322	17.9
Steele County	11,342	12,846	1,504	13.3
Commute Field	23,529	26,325	2,796	11.9
Park Rapids	1,266	1,476	210	16.6
Hubbard County	5,781	7,435	1,654	28.6
Commute Field	16,258	19,279	3,021	18.6
Rochester	27,913	34,116	6,203	22.2
Olmsted County	40,058	47,807	7,749	19.3
Commute Field	113,067	127,169	14,102	12.5
Wadena	1,789	1,871	82	4.6
Wadena County	4,978	5,426	448	9.0
Commute Field	13,567	14,768	1,201	8.9
Waseca	3,236	3,388	152	4.7
Waseca County	6,649	7,059	410	6.2
Commute Field	6,649	7,059	410	6.2
Willmar	6,678	7,302	624	9.3
Kandiyohi County	14,298	15,936	1,638	11.5
Commute Field	30,601	32,429	1,828	6.0
Winona	9,334	10,301	967	10.4
Winona County	16,930	18,744	1,814	10.7
Commute Field	22,053	24,255	2,202	10.0
Worthington	3,967	4,311	344	8.7
Nobles County	7,683	7,939	256	3.3
Commute Field	18,818	18,995	177	0.9
Minnesota	1,647,853	1,895,127	247,274	15.0

Source: U.S. Department of Commerce, Bureau of the Census.

Table 2.6. Single-Person Households, Regional Centers and Commute Fields, 1990-2000

Regional Center/ Central County/ Commute Field	Number of Single-Person Households 1990	Percentage of All Households in 1990	Number of Single-Person Households 2000	Percentage of All Households in 2000	Change in Number of Single-Person Households 1990-2000	
					No.	%
Albert Lea	2284	30.3	2,571	33.0	287	12.6
Freeborn County	3378	25.9	3,772	28.2	394	11.7
Commute Field	3378	25.9	3,772	28.2	394	11.7
Alexandria	1,325	37.6	1,664	41.1	339	25.6
Douglas County	2,696	24.5	3,521	26.5	825	30.6
Commute Field	6,574	25.1	7,980	26.9	1406	21.4
Bemidji	1,350	33.1	1,674	35.9	324	24.0
Beltrami County	2,721	22.9	3,558	24.8	837	30.8
Commute Field	4,848	23.4	6,284	25.0	1436	29.6
Brainerd	1,862	35.8	2,106	37.5	244	13.1
Crow Wing County	4,360	25.3	5,884	26.4	1524	35.0
Commute Field	7,694	25.1	10,514	26.4	2820	36.7
Detroit Lakes	1,186	39.9	1,333	40.2	147	12.4
Becker County	2,580	24.6	3,191	26.9	611	23.7
Commute Field	3,019	24.6	3,723	27.0	704	23.3
Duluth-Superior	14,417	31.6	16,215	34.4	1,798	26.2
St Louis County	22,747	28.8	25,804	31.2	3,057	13.4
Douglas County, WI	4,551	27.8	5,315	29.8	764	16.8
Commute Field	32,454	28.0	37,199	30.2	4,745	14.6
Fairmont	1,485	31.5	1,562	33.2	77	5.2
Martin County	2,536	27.8	2,716	30.0	180	7.1
Commute Field	2,536	27.8	2,716	30.0	180	7.1
Fargo/Moorhead	12,211	29.6	17,010	33.4	4,799	39.3
Clay County	4,097	23.4	4,870	26.1	773	18.9
Cass County, ND	11,347	28.2	16,026	31.2	4,679	41.2
Commute Field	26,407	26.0	33,612	28.9	7,205	27.3
Fergus Falls	1,786	35.2	2,000	35.5	214	12.0
Ottertail County	5,027	25.8	6,022	26.6	995	19.8
Commute Field	6,407	25.9	7,446	26.6	1,039	16.2
Grand Forks/ East Grand Forks	6,192	28.5	7,006	31.0	814	13.1
Polk County	3,114	26.0	3,488	28.9	374	12.0
Grand Forks County, ND	6,492	25.6	7,201	28.3	709	10.9
Commute Field	15,347	26.6	16,737	29.2	1,390	9.1
Grand Rapids	1,024	31.5	1,314	38.1	290	28.3
Itasca County	3,572	23.1	4,634	26.0	1,062	29.7
Commute Field	3,572	23.1	4,634	26.0	1,062	29.7
Hibbing	2,195	29.5	2,495	33.5	300	13.7
St. Louis County	22,747	28.8	25,804	31.2	3,057	13.4
Commute Field	28,514	28.0	32,933	30.5	4,419	15.5
International Falls	888	28.4	1,080	36.5	192	21.6
Koochiching County	1,493	24.8	1,836	30.4	343	23.0
Commute Field	1,493	24.8	1,836	30.4	343	23.0

Table 2.6. Single-Person Households, Regional Centers and Commute Fields, 1990-2000

(continued)

Regional Center/ Central County/ Commute Field	Number of Single-Person Households 1990	Percentage of All Households in 1990	Number of Single-Person Households 2000	Percentage of All Households in 2000	Change in Number of Single-Person Households 1990-2000	
					No.	%
Little Falls	961	33.1	1,152	36.0	191	19.9
Morrison County	2,412	23.2	2,945	24.9	533	22.1
Commute Field	4,533	23.9	5,401	25.5	868	19.1
Mankato	3,053	27.2	3,988	32.2	935	30.6
Blue Earth County	4,678	24.3	5,713	27.1	1,035	22.1
Commute Field	13,576	24.6	15,627	26.2	2,051	15.1
Marshall	1,276	28.7	1,496	30.4	220	17.2
Lyon County	2,370	26.1	2,707	27.9	337	14.2
Commute Field	7,202	27.0	7,749	28.5	547	7.6
Montevideo	788	33.7	820	34.8	32	4.1
Chippewa County	1,460	27.8	1,582	29.5	122	8.4
Commute Field	3,750	28.1	3,884	29.6	134	3.6
New Ulm	1,566	30.1	1,705	31.0	139	8.9
Brown County	2,892	28.0	3,070	29.0	178	6.2
Commute Field	4,988	25.2	5,626	26.5	638	12.8
Owatonna	1,922	26.0	2,317	26.6	395	20.6
Steele County	2,620	23.1	3,154	24.6	534	20.4
Commute Field	5,357	22.8	6,225	23.6	868	16.2
Park Rapids	514	40.6	617	41.8	103	20.0
Hubbard County	1,357	23.5	1,798	24.2	441	32.5
Commute Field	3,937	24.2	4,989	25.9	1,052	26.7
Rochester	8,134	29.1	10,126	29.7	1,992	24.5
Olmsted County	9,872	24.6	12,358	25.8	2,486	25.2
Commute Field	28,305	25.0	33,540	26.4	5,235	18.5
Wadena	612	34.2	708	37.8	96	15.7
Wadena County	1,358	27.3	1,584	29.2	226	16.6
Commute Field	3,479	25.6	4,040	27.4	561	16.1
Waseca	945	29.2	991	29.3	46	4.9
Waseca County	1,636	24.6	1,771	25.1	135	8.3
Commute Field	1,636	24.6	1,771	25.1	135	8.3
Willmar	1,948	29.2	2,276	31.2	328	16.8
Kandiyohi County	3,424	23.9	4,098	25.7	674	19.7
Commute Field	7,950	26.0	8,954	27.6	1,004	12.6
Winona	3,011	32.3	3,626	35.2	615	20.4
Winona County	4,316	25.5	5,286	28.2	970	22.5
Commute Field	5,541	25.1	6,777	27.9	1,236	22.3
Worthington	1,138	28.7	1,247	28.9	109	9.6
Nobles County	1,925	25.1	2,105	26.5	180	9.4
Commute Field	4,833	25.7	5,176	27.2	343	7.1
Minnesota	413,531	25.1	509,468	26.9	95,384	23.1

Source: U.S. Department of Commerce, Bureau of the Census.

Table 2.7. In-Migration, Regional Centers and Commute Fields, 1995-2000

Regional Center/ Central County/ Commute Field	Total Population 2000	Population in 2000 that Lived Outside the County in 1995					
		All	% of Total Pop.	Lived elsewhere in U.S.	% of Total Pop.	Lived outside of U.S.	% of Total Pop.
Albert Lea	18,356	2,702	14.7	2,502	13.6	200	1.1
Freeborn County	32,584	4,142	12.7	3,904	12.0	238	0.7
Commute Field	32,584	4,142	12.7	3,904	12.0	238	0.7
Alexandria	8,820	2,214	25.1	2,179	24.7	35	0.4
Douglas County	32,821	6,206	18.9	6,113	18.6	93	0.3
Commute Field	74,772	13,555	18.1	13,223	17.7	332	0.4
Bemidji	11,917	3,760	31.6	3,597	30.2	163	1.4
Beltrami County	39,650	8,194	20.7	7,794	19.7	400	1.0
Commute Field	66,449	13,868	20.9	13,399	20.2	469	0.7
Brainerd	13,178	2,816	21.4	2,708	20.5	108	0.8
Crow Wing County	55,099	11,245	20.4	10,975	19.9	270	0.5
Commute Field	97,550	20,907	21.4	20,472	21.0	435	0.4
Detroit Lakes	7,348	1,722	23.4	1,650	22.5	72	1.0
Becker County	30,000	5,533	18.4	5,408	18.0	125	0.4
Commute Field	35,190	6,282	17.9	6,123	17.4	159	0.5
Duluth-Superior	114,286	23,258	20.4	22,029	19.3	1,229	1.1
St Louis County	200,528	31,075	15.5	29,647	14.8	1,428	0.7
Douglas County, WI	43,287	6,535	15.1	6,221	14.4	314	0.7
Commute Field	286,544	47,167	15.6	45,166	15.0	2,001	0.7
Fairmont	10,889	1,811	16.6	1,774	16.3	37	0.3
Martin County	21,802	2,991	13.7	2,924	13.4	67	0.3
Commute Field	21,802	2,991	13.7	2,924	13.4	67	0.3
Fargo/Moorhead	122,776	36,733	29.9	34,340	28.0	2,393	1.9
Clay County	51,229	13,366	26.1	12,800	25.0	566	1.1
Cass County, ND	123,138	30,801	25.0	28,747	23.3	2,054	1.7
Commute Field	296,651	71,598	24.1	68,043	22.9	3,555	1.2
Fergus Falls	13,471	2,341	17.4	2,245	16.7	96	0.7
Ottertail County	57,159	9,765	17.1	9,282	16.2	483	0.8
Commute Field	70,586	12,183	17.3	11,672	16.5	511	0.7
Grand Forks/ East Grand Forks	56,822	15,394	27.1	14,430	25.4	964	1.7
Polk County	31,369	5,240	16.7	4,998	15.9	242	0.8
Grand Forks County, ND	66,109	18,465	27.9	16,829	25.5	1,636	2.5
Commute Field	146,213	31,057	21.2	28,927	19.8	2,130	1.5
Grand Rapids	7,764	1,487	19.2	1,377	17.7	110	1.4
Itasca County	43,992	6,817	15.5	6,542	14.9	275	0.6
Commute Field	146,213	6,817	15.5	6,542	14.9	275	0.6
Hibbing	17,071	1,588	9.3	1,544	9.0	44	0.3
St. Louis County	200,528	31,075	15.5	29,647	14.8	1,428	0.7
Commute Field	244,520	39,480	16.1	37,733	15.4	1,747	0.7
International Falls	6,703	828	12.4	715	10.7	113	1.7
Koochiching County	14,355	1,739	12.1	1,604	11.2	135	0.9
Commute Field	14,355	1,739	12.1	1,604	11.2	135	0.9

Table 2.7. In-Migration, Regional Centers and Commute Fields, 1995-2000

(continued)

Regional Center/ Central County/ Commute Field	Total Population 2000	Population in 2000 that Lived Outside the County in 1995					
		All	% of Total Pop.	Lived elsewhere in U.S.	% of Total Pop.	Lived outside of U.S.	% of Total Pop.
Little Falls	7,719	1,213	15.7	1,197	15.5	16	0.2
Morrison County	31,712	4,134	13.0	4,081	12.9	53	0.2
Commute Field	56,138	8,481	15.1	8,219	14.6	262	0.5
Mankato	32,427	12,233	37.7	11,542	35.6	691	2.1
Blue Earth County	55,941	15,164	27.1	14,365	25.7	799	1.4
Commute Field	158,721	36,168	22.8	34,616	21.8	1,552	1.0
Marshall	12,735	3,475	27.3	3,062	24.0	413	3.2
Lyon County	25,425	5,124	20.2	4,656	18.3	468	1.8
Commute Field	68,914	10,875	15.8	10,312	15.0	563	0.8
Montevideo	5,346	929	17.4	907	17.0	22	0.4
Chippewa County	13,088	2,121	16.2	2,086	15.9	35	0.3
Commute Field	32,235	5,011	15.5	4,914	15.2	97	0.3
New Ulm	13,594	2,726	20.1	2,650	19.5	76	0.6
Brown County	26,911	4,039	15.0	3,924	14.6	115	0.4
Commute Field	56,682	12,990	22.9	12,552	22.1	438	0.8
Owatonna	22,434	4,809	21.4	4,307	19.2	502	2.2
Steele County	33,680	6,314	18.7	5,765	17.1	549	1.6
Commute Field	70,937	13,200	18.6	12,460	17.6	740	1.0
Park Rapids	3,276	851	26.0	838	25.6	13	0.4
Hubbard County	18,376	4,530	24.7	4,473	24.3	57	0.3
Commute Field	48,376	10,063	20.8	9,881	20.4	182	0.4
Rochester	85,806	22,169	25.8	18,836	22.0	3,333	3.9
Olmsted County	124,277	26,941	21.7	23,335	18.8	3,606	2.9
Commute Field	328,917	63,228	19.2	57,608	17.5	5,620	1.7
Wadena	4,294	896	20.9	896	20.9	0	0.0
Wadena County	13,713	2,698	19.7	2,682	19.6	16	0.1
Commute Field	38,139	7,045	18.5	6,820	17.9	225	0.6
Waseca	8,493	1,791	21.1	1,748	20.6	43	0.5
Waseca County	19,526	3,506	18.0	3,445	17.6	61	0.3
Commute Field	19,526	3,506	18.0	3,445	17.6	61	0.3
Willmar	18,351	3,892	21.2	3,509	19.1	383	2.1
Kandiyohi County	41,203	6,831	16.6	6,369	15.5	462	1.1
Commute Field	83,401	14,013	16.8	13,296	15.9	717	0.9
Winona	27,069	8,006	29.6	7,534	27.8	472	1.7
Winona County	49,985	10,870	21.7	10,296	20.6	574	1.1
Commute Field	63,789	13,290	20.8	12,672	19.9	618	1.0
Worthington	11,283	2,413	21.4	2,091	18.5	322	2.9
Nobles County	20,832	3,262	15.7	2,916	14.0	346	1.7
Commute Field	48,268	6,996	14.5	6,570	13.6	426	0.9
Minnesota	4,919,479	955,406	19.4	355,250	7.2	84,505	1.7

Source: U.S. Department of Commerce, Bureau of the Census.

Minnesota has received a steady influx of international migrants and refugees since the early 1970s, and that number has grown and changed in its ethnic composition over the decades. During the 1990s, the proportion of residents who had arrived from abroad since 1995 was only 1.9 percent. In earlier years, many of these migrants were drawn to the Twin Cities metropolitan area, for jobs, social services, cultural networks, and the like. Increasingly, however, many of Minnesota's cities and towns beyond the Twin Cities have provided opportunities for economic advancement to newcomers from abroad. As with percentage change in non-white and Hispanic populations, however, many of the study areas experiencing percentage increases in newcomers from outside the U.S. are adding just a few, to what was in 1990 an almost nonexistent group. None of the study areas (regional center plus its commute field) registered proportions of newcomers arriving from outside the U.S. since 1995 of more than 1.7 percent of total population, which was the average statewide. More commonly, newcomers arrive seeking recreational or retirement opportunities, or move to these areas to enter the economy that supports these activities.

While all of the study areas gained some new international arrivals between 1995 and 2000, the highest proportion in 2000 was in the city of Rochester (3.9%), where a high-skilled service economy centered on the medical industry attracts professionals from around the globe. Beyond that, only the larger centers of Fargo/Moorhead (1.9%) and Mankato (2.1%) outpaced the state, no doubt helped by the universities there, along with the smaller centers of Marshall (3.2%), Owatonna (2.2%), Willmar (2.1%), and Worthington (2.9%). Canadian immigrants also are reflected in these numbers, and so no doubt constitute some part of the increase for Fargo and Grand Forks. In all cases the proportion in the regional center was higher than that of the surrounding commute field, except in the case of Grand Forks County, ND (2.5%).

Housing Trends

This chapter examines how housing supplies ebb and flow in the different study areas of non-metro Minnesota, the drivers that are at work, and how broad changes in the economy and ways of life have played out on the ground throughout the state.

Discussions center on the following topics and data sets:

- © Housing Units, Regional Centers and Commute Fields, 1970-2000 (Table 2.8);
- © Seasonal Housing Units, Regional Centers and Commute Fields, 1970-2000 (Table 2.9);
- © Owner-Occupied Housing Units, Regional Centers and Commute Fields, 1990-2000 (Table 2.10).

Coincident with increased demand for housing, or developer speculation in the face of forecast market growth, new housing units will appear on the landscape. Table 2.8 reports the change in numbers of housing units for our study areas from 1970-2000, in two phases. Between 1970 and 1990, Minnesota's housing stock grew by a rate of 44.8 percent. Several of our regional centers outpace that rate, as they received new rural-urban migrants from the countryside, and as transportation links developed. Alexandria (45.5%), Detroit Lakes (59.5%), Fargo/Moorhead (65.9%), Grand Forks/East Grand Forks (63%), Marshall (61.6%), Owatonna (49.5%), Rochester

Table 2.8. Housing Units, Regional Centers and Commute Fields, 1970-2000

Regional Center/ Central County/ Commute Field	Number of Housing Units				Change in Number of Housing Units 1970-1990		Change in Number of Housing Units 1990-2000	
	1970	1980	1990	2000	No.	%	No.	%
Albert Lea	6,500	7,707	7,930	8,133	1,430	22.0	203	2.6
Freeborn County	12,412	13,815	13,783	13,996	1,371	11.0	213	1.5
Commute Field	12,412	13,815	13,783	13,996	1,371	11.0	213	1.5
Alexandria	2,572	3,379	3,741	4,311	1,169	45.5	570	15.2
Douglas County	9,068	13,179	14,590	16,694	5,522	60.9	2,104	14.4
Commute Field	24,729	32,720	34,838	37,519	10,109	40.9	2,681	7.7
Bemidji	3,565	3,928	4,412	4,948	847	23.8	536	12.1
Beltrami County	9,590	13,099	14,670	16,989	5,080	53.0	2,319	15.8
Commute Field	18,819	26,026	28,720	33,332	9,901	52.6	4,612	16.1
Brainerd	4,317	4,963	5,483	5,847	1,166	27.0	364	6.6
Crow Wing County	19,799	25,,688	29,916	33,483	10,117	51.1	3,567	11.9
Commute Field	38,601	54,398	61,713	68,937	23,112	59.9	7,224	11.7
Detroit Lakes	2,116	3,417	3,375	3,782	1,259	59.5	407	12.1
Becker County	10,912	15,430	15,563	16,612	4,651	42.6	1,049	6.7
Commute Field	13,060	17,840	18,068	19,312	5,008	38.3	1,244	6.9
Duluth-Superior	45,707	49,078	47,706	49,190	1,999	4.4	1,484	3.1
St Louis County	80,859	95,324	95,403	95,800	14,544	18.0	397	0.4
Douglas County, WI	16,882	20,141	20,610	20,356	3,728	22.1	-254	-1.2
Commute Field	118,516	142,999	146,049	148,357	27,533	23.2	2,308	1.6
Fairmont	3,859	4,766	4,989	5,036	1,130	29.3	47	0.9
Martin County	8,451	9,784	9,847	9,800	1,396	16.5	-47	-0.5
Commute Field	8,451	9,784	9,847	9,800	1,396	16.5	-47	-0.5
Fargo/Moorhead	26,058	35,800	43,218	53,380	17,160	65.9	10,162	23.5
Clay County	13,942	17,811	18,546	19,746	4,604	33.0	1,200	6.5
Cass County, ND	24,278	35,215	42,407	53,790	18,129	74.7	11,383	26.8
Commute Field	65,173	86,867	94,468	107,991	29,295	44.9	13,523	14.3
	,							
Fergus Falls	4,134	4,927	5,385	5,909	1,251	30.3	524	9.7
Ottertail County	20,486	26,953	29,295	33,862	8,809	43.0	4,567	15.6
Commute Field	26,435	33,430	35,613	40,065	9,178	34.7	4,452	12.5
Grand Forks/ East Grand Forks	14,163	20,645	23,089	23,946	8,926	63.0	857	6.4
Polk County	12,343	14,766	14,275	14,008	1,932	15.7	-267	-1.9
Grand Forks County, ND	18,192	24,563	27,085	27,373	8,893	48.9	288	1.1
Commute Field	53,023	64,609	65,391	64,220	12,368	23.3	-1,171	-1.8
Grand Rapids	2,401	3,275	3,377	3,621	976	40.6	244	7.2
Itasca County	14,944	21,221	22,494	24,528	7,550	50.5	2,034	9.0
Commute Field	14,944	21,221	22,494	24,528	7,550	50.5	2,034	9.0
Hibbing	5,681	8,358	8,168	8,037	2,487	43.8	-131	-1.6
St. Louis County	80,859	95,324	95,403	95,800	14,544	18.0	397	0.4
Commute Field	93,402	116,545	117,897	120,328	24,495	26.2	2,431	2.1
International Falls	2,322	2,399	3,306	3,264	984	42.4	-42	-1.3
Koochiching County	6,277	7,241	7,825	7,719	1,548	24.7	-106	-1.4
Commute Field	6,277	7,241	7,825	7,719	1,548	24.7	-106	-1.4

Table 2.8. Housing Units, Regional Centers and Commute Fields, 1970-2000
(continued)

Regional Center/ Central County/ Commute Field	Number of Housing Units				Change in Number of Housing Units 1970-1990		Change in Number of Housing Units 1990-2000	
	1970	1980	1990	2000	No.	%	No.	%
Little Falls	2,338	2,858	3,048	3,358	710	30.4	310	10.2
Morrison County	9,055	11,619	12,434	13,870	3,379	37.3	1,436	11.5
Commute Field	17,308	22,310	23,668	25,770	6,360	36.7	2,102	8.9
Mankato	8,915	10,627	11,688	12,759	2,773	31.1	1,071	9.2
Blue Earth County	15,767	19,381	20,358	21,971	4,591	29.1	1,613	7.9
Commute Field	47,503	57,632	59,419	63,779	11,916	25.1	4,360	7.3
Marshall	2,904	3,974	4,692	5,182	1,788	61.6	490	10.4
Lyon County	7,526	9,196	9,675	10,298	2,149	28.6	623	6.4
Commute Field	26,365	29,947	29,463	29,801	3,098	11.8	338	1.1
Montevideo	2,093	2,522	2,538	2,551	445	21.3	13	0.5
Chippewa County	5,308	6,120	5,755	5,855	447	8.4	100	1.7
Commute Field	14,295	15,778	14,693	14,502	398	2.8	-191	-1.3
New Ulm	4,169	5,138	5,379	5,736	1210	29.0	357	6.6
Brown County	9,070	10,469	10,814	11,163	1,744	19.2	349	3.2
Commute Field	15,913	19,428	20,777	22,403	4,864	30.6	1,626	7.8
Owatonna	5,069	7,032	7,578	8,940	2,509	49.5	1,362	18.0
Steele County	8,758	11,255	11,840	13,306	3,082	35.2	1,466	12.4
Commute Field	18,292	23,670	24,622	27,375	6,330	34.6	2,753	11.2
Park Rapids	1,035	1,397	1,429	1,616	394	38.1	187	13.1
Hubbard County	6,062	9,103	10,042	12,229	3,980	65.7	2,187	21.8
Commute Field	16,974	24,533	25,605	28,841	8,631	50.8	3,236	12.6
Rochester	18,068	23,110	28,961	35,346	10,893	60.3	6,385	22.0
Olmsted County	26,639	34,345	41,603	49,422	14,964	56.2	7,819	18.8
Commute Field	83,317	102,475	113,332	127,719	30,015	36.0	14,387	12.7
Wadena	1,583	1,919	1,929	1,964	346	21.9	35	1.8
Wadena County	4,280	5,438	5,801	6,334	1,521	35.5	533	9.2
Commute Field	12,533	16,129	17,035	18,234	4,502	35.9	1,199	7.0
Waseca	2,320	3,199	3,356	3,563	1,036	44.7	207	6.2
Waseca County	5,406	6,884	7,011	7,427	1,605	29.7	416	5.9
Commute Field	5,406	6,884	7,011	7,427	1,605	29.7	416	5.9
Willmar	4,274	6,000	6,985	7,789	2,711	63.4	804	11.5
Kandiyohi County	11,109	15,100	16,669	18,415	5,560	50.0	1,746	10.5
Commute Field	28,324	34,307	34,661	36,504	6,337	22.4	1,843	5.3
Winona	8,312	9,202	9,682	10,666	1,370	16.5	984	10.2
Winona County	13,682	16,503	17,630	19,551	3,948	28.9	1,921	10.9
Commute Field	18,279	21,981	23,216	25,649	4,937	27.0	2,433	10.5
Worthington	3,253	4,092	4,141	4,573	888	27.3	432	10.4
Nobles County	7,386	8,212	8,094	8,465	708	9.6	371	4.6
Commute Field	19,498	21,682	20,824	20,926	1,326	6.8	102	0.5
Minnesota	1,276,19,8	1,612,960	1,848,445	2,065,946	572,247	44.8	217,501	11.8

Source: U.S. Department of Commerce, Bureau of the Census.

(60.3%), and Willmar (63.4%) all outpaced statewide housing unit net growth between 1970 and 1990.

More recently, as regional centers developed and filled in, the growth in housing units slowed. Statewide, the rate was 11.8 percent during the decade. Many of the same growth leaders of the earlier period maintained or exceeded the state in net additions of housing units: Alexandria (15.2%), Bemidji (12.1%), Detroit Lakes (12.1%), Fargo/Moorhead (23.5%), Owatonna (18%), Park Rapids (13.1%), and Rochester (22%). Waseca (11.5%) stayed roughly on par with the state.

Seasonal housing units (Table 2.9) are a significant feature of the Minnesota housing landscape beyond the Twin Cities metropolitan region. There was a boom in seasonal units between 1970 and 1990, as postwar Baby Boom families acquired enough assets to purchase seasonal homes, and transportation links made it easier to travel to the countryside. Statewide, seasonal units increased 82.8 percent between 1970 and 1990. The data indicate that they then leveled off with no new growth in the 1990s, with only a 9-percent increase during the decade. These statistics must be interpreted with some care. The definition of a seasonal housing unit used by the Census Bureau changed significantly in 1990. Furthermore, the tabular data published by the Census Bureau and the definitions provided with those data exhibit inconsistencies such that it is very difficult to know exactly how the data for seasonal housing in the 1980 census should be compared to the data in the 1990 and 2000 censuses. Besides definitional problems, we have no data that would permit us to report the extent of conversion of seasonal units to year-round units during the 1980s and the 1990s. Because of the incongruities between the definitions in 1980 and 2000, the magnitude of the changes shown in the data likely exaggerates the actual change. Nonetheless, we can examine relative rates of change.

Among our regional centers, many that had experienced comparable growth in the previous period also had flat rates or even declines during the 1990s. Areas of recreational amenity are scattered all across the state, but the combination of natural amenities, with urban services nearby plus easy transportation links, all seem to have favored extreme growth throughout the four decades. The most dramatic increase was in Rochester, with an increase from 1 unit to 190 units over the course of 40 years.

Table 2.10 tracks the change in median value of owner-occupied housing units across our study areas from 1990-2000. Statewide, the median value increased 65.4 percent during the decade, from $74,000 to $122,400. Areas in the northern part of the state saw the most dramatic percentage increases during this period, but some of them were starting from a low baseline in 1990. As might be expected, housing values in the surrounding core counties outpaced increases within the regional centers themselves, as newer housing construction accompanied suburbanization.

Table 2.9. Seasonal Housing Units, Regional Centers and Commute Fields, 1970-2000

Regional Center/Central County/ Commute Field	Seasonal Housing Units				Change in Number of Seasonal Housing Units 1970-1990		Change in Number of Seasonal Housing Units 1990-2000	
	1970	1980	1990	2000	No.	%	No.	%
Albert Lea	3	2	17	14	14	466.7	-3	-17.6
Freeborn County	186	33	72	61	-114	-61.3	-11	-15.3
Commute Field	186	33	72	61	-114	-61.3	-11	-15.3
Alexandria	25	23	27	23	2	8.0	-4	-14.8
Douglas County	1,246	2,456	2,795	2,825	1,549	124.3	30	1.1
Commute Field	2,574	5,008	6,356	6,173	3,782	146.9	-183	-2.9
Bemidji	14	22	55	43	41	292.9	-12	-21.8
Beltrami County	876	2,124	1,718	2,046	842	96.1	328	19.1
Commute Field	2,842	5,873	5,744	6,580	2,902	102.1	836	14.6
Brainerd	20	2	16	28	-4	-20.0	12	75.0
Crow Wing County	7,252	8,136	10,996	10,333	3,744	51.6	-663	-6.0
Commute Field	13,860	20,237	27,288	26,932	13,428	96.9	-356	-1.3
Detroit Lakes	10	135	189	268	179	1790.0	79	41.8
Becker County	2,653	3,765	4,152	4,133	1,499	56.5	-19	-0.5
Commute Field	2,936	4,237	4,624	4,674	1,688	57.5	50	1.1
Duluth-Superior	45	32	104	391	59	131.1	287	276.0
St Louis County	6,112	8,705	11,046	9,239	4,934	80.7	-1,807	-16.4
Douglas County, WI	1,422	2,287	3,068	1,797	1,646	115.8	-1,271	-41.4
Commute Field	10,163	16,644	21,398	18,884	11,235	110.5	-115,874	-11.7
Fairmont	17	8	23	41	6	35.3	18	78.3
Martin County	56	33	96	152	40	71.4	56	58.3
Commute Field	56	33	96	152	40	71.4	56	58.3
Fargo/Moorhead	13	7	111	238	98	753.8	127	114.4
Clay County	256	207	71	135	-185	-72.3	64	90.1
Cass County, ND	158	86	141	276	-17	-10.8	135	95.7
Commute Field	414	293	212	411	-202	-48.8	199	93.9
Fergus Falls	0	6	12	39	12		27	225.0
Ottertail County	4,270	6,357	8,013	9,882	3,743	87.7	1,869	23.3
Commute Field	4,411	6,660	8,417	10,228	4,006	90.8	1,811	21.5
Grand Forks/ East Grand Forks	0	11	56	110	56	n.d.	54	96.4
Polk County	887	1,107	886	1,009	-1	-0.1	123	13.9
Grand Forks County, ND	118	128	112	167	-6	-5.1	55	49.1
Commute Field	1,492	1,939	1,571	1,956	79	5.3	385	24.5
Grand Rapids	5	2	9	37	4	80.0	28	311.1
Itasca County	2,662	4,625	5,302	5,807	2,640	99.2	505	9.5
Commute Field	2,662	4,625	5,302	5,807	2,640	99.2	505	9.5
Hibbing	17	37	45	101	28	164.7	56	124.4
St. Louis County	6,112	8,705	11,046	9,239	4,934	80.7	-1,807	-16.4
Commute Field	8,774	13,330	16,348	15,046	7,574	86.3	-1,302	-8.0
International Falls	0	2	35	87	35	n.d.	52	148.6
Koochiching County	337	554	1,335	1,200	998	296.1	-135	-10.1
Commute Field	337	554	1,335	1,200	998	296.1	-135	-10.1

Table 2.9. Seasonal Housing Units, Regional Centers and Commute Fields, 1970-2000
(continued)

Regional Center/Central County/ Commute Field	Seasonal Housing Units				Change in Number of Seasonal Housing Units 1970-1990		Change in Number of Seasonal Housing Units 1990-2000	
	1970	1980	1990	2000	No.	%	No.	%
Little Falls	4	4	6	38	2	50.0	32	533.3
Morrison County	787	1,422	1,521	1,692	734	93.3	171	11.2
Commute Field	1,515	2,695	3,453	3,677	1,938	127.9	224	6.5
Mankato	1	5	24	45	23	2,300.0	21	87.5
Blue Earth County	193	246	258	279	65	33.7	21	8.1
Commute Field	1,261	1,397	1,442	1,534	181	14.4	92	6.4
Marshall	0	0	8	11	8	n.d.	3	37.5
Lyon County	5	5	14	77	9	180.0	63	450.0
Commute Field	139	282	646	712	507	364.7	66	10.2
Montevideo	1	0	18	0	17	1,700.0	-18	-100.0
Chippewa County	87	89	48	50	-39	-44.8	2	4.2
Commute Field	134	101	108	234	-26	-19.4	126	116.7
New Ulm	0	5	15	22	15	n.d.	7	46.7
Brown County	0	14	29	30	29	n.d.	1	3.4
Commute Field	14	26	179	81	165	1,178.6	-98	-54.7
Owatonna	2	11	6	0	4	200.0	-6	-100.0
Steele County	156	163	101	77	-55	-35.3	-24	-23.8
Commute Field	199	374	196	199	-3	-1.5	3	1.5
Park Rapids	17	21	41	7	24	141.2	-34	-82.9
Hubbard County	1,715	3,354	3,498	3,982	1,783	104.0	484	13.8
Commute Field	4,368	7,119	7,650	8,115	3,282	75.1	465	6.1
Rochester	1	5	75	190	74	7,400.0	115	153.3
Olmsted County	61	67	137	249	76	124.6	112	81.8
Commute Field	371	937	1,184	1,426	813	219.1	242	20.4
Wadena	1	0	6	0	5	500.0	-6	-100.0
Wadena County	127	166	392	547	265	208.7	155	39.5
Commute Field	855	1,439	2,324	2,532	1,469	171.8	208	9.0
Waseca	1	0	7	7	6	600.0	0	0.0
Waseca County	37	78	80	87	43	116.2	7	8.7
Commute Field	37	78	80	87	43	116.2	7	8.7
Willmar	1	0	23	25	22	2,200.0	2	8.7
Kandiyohi County	1,318	1,405	1,697	1,683	379	28.8	-14	-0.8
Commute Field	1,626	1,627	1,881	1,887	255	15.7	6	0.3
Winona	1	7	14	15	13	1,300.0	1	7.1
Winona County	64	86	89	146	25	39.1	57	64.0
Commute Field	99	291	295	422	196	198.0	127	43.1
Worthington	7	7	10	15	3	42.9	5	50.0
Nobles County	11	17	25	28	14	127.3	3	12.0
Commute Field	117	375	647	512	530	453.0	-135	-20.9
Minnesota	57,498	83,597	105,122	105,609	47,624	82.8	487	9.0

Source: U.S. Department of Commerce, Bureau of the Census.

Table 2.10. Median Value of Owner-Occupied Housing Units, Regional Centers and Commute Fields, 1990-2000

Regional Center/ Central County/ Commute Field	Median Value of Owner-Occupied Housing Units		Change in Median Value of Owner-Occupied Housing Units 1990-2000	
	1990	2000	Dollars	Percent
Albert Lea	43,800	69,700	25,900	59.1
Freeborn County	42,800	76,000	33,200	77.6
Commute Field	42,800	76,000	33,200	77.6
Alexandria	50,800	85,100	34,300	67.5
Douglas County	56,400	101,500	45,100	80.0
Commute Field	44,097	84,824	40,727	92.4
Bemidji	43,200	69,800	26,600	61.6
Beltrami County	49,200	74,300	25,100	51.0
Commute Field	46,132	77,707	31,575	68.4
Brainerd	41,400	70,800	29,400	71.0
Crow Wing County	54,200	104,800	50,600	93.4
Commute Field	52,260	99,339	47,079	90.1
Detroit Lakes	45,500	83,400	37,900	83.3
Becker County	49,000	84,100	35,100	71.6
Commute Field	46,781	80,935	34,155	73.0
Duluth-Superior				
St Louis County	42,200	74,600	32,400	76.8
Douglas County, WI	38,700	70,800	32,100	82.9
Commute Field	42,003	75,873	33,870	80.6
Fairmont	47,600	69,800	22,200	46.6
Martin County	40,500	64,200	23,700	58.5
Commute Field	40,500	64,200	23,700	58.5
Fargo/Moorhead				
Clay County	58,600	84,300	25,700	43.9
Cass County, ND	67,900	93,900	26,000	38.3
Commute Field	58,256	85,510	27,253	46.8
Fergus Falls	45,100	76,000	30,900	68.5
Ottertail County	46,600	84,400	37,800	81.1
Commute Field	43,938	80,195	36,257	82.5
Grand Forks/ East Grand Forks				
Polk County	47,200	72,700	25,500	54.0
Grand Forks County, ND	62,700	87,100	24,400	38.9
Commute Field	49,593	71,475	21,882	44.1
Grand Rapids	48,700	78,000	29,300	60.2
Itasca County	44,300	79,100	34,800	78.6
Commute Field	44,300	79,100	34,800	78.6
Hibbing	38,000	61,600	23,600	62.1
St. Louis County	42,200	74,600	32,400	76.8
Commute Field	42,578	75,972	33,393	78.4
International Falls	39,500	57,200	17,700	44.8
Koochiching County	41,800	63,700	21,900	52.4
Commute Field	41,800	63,700	21,900	52.4

Table 2.10. Median Value of Owner-Occupied Housing Units, Regional Centers and Commute Fields, 1990-2000

(continued)

Regional Center/ Central County/ Commute Field	Median Value of Owner-Occupied Housing Units		Change in Median Value of Owner-Occupied Housing Units 1990-2000	
	1990	2000	Number	Percent
Little Falls	43,600	72,100	28,500	65.4
Morrison County	47,100	86,600	39,500	83.9
Commute Field	41,627	79,447	37,820	90.9
Mankato	62,100	97,400	35,300	56.8
Blue Earth County	59,500	95,400	35,900	60.3
Commute Field	33,385	92,567	59,181	177.3
Marshall	60,000	92,700	32,700	54.5
Lyon County	48,200	82,400	34,200	71.0
Commute Field	20,018	67,701	47,682	238.2
Montevideo	37,100	62,500	25,400	68.5
Chippewa County	34,200	67,500	33,300	97.4
Commute Field	30,979	61,626	30,647	98.9
New Ulm	53,200	89,600	36,400	68.4
Brown County	48,900	85,200	36,300	74.2
Commute Field	56,703	97,976	41,273	72.8
Owatonna	63,800	104,000	40,200	63.0
Steele County	61,200	103,400	42,200	69.0
Commute Field	57,094	98,675	41,581	72.8
Park Rapids	36,400	66,700	30,300	83.2
Hubbard County	48,700	91,400	42,700	87.7
Commute Field	48,893	86,915	38,022	77.8
Rochester	71,900	114,400	42,500	59.1
Olmsted County	72,300	114,700	42,400	58.6
Commute Field	59,228	103,332	44,104	74.5
Wadena	36,800	51,200	14,400	39.1
Wadena County	36,200	64,600	28,400	78.5
Commute Field	35,440	68,269	32,829	92.6
Waseca	55,200	84,200	29,000	52.5
Waseca County	53,500	89,600	36,100	67.5
Commute Field	53,500	89,600	36,100	67.5
Willmar	57,800	83,700	25,900	44.8
Kandiyohi County	56,800	91,700	34,900	61.4
Commute Field	43,248	77,597	34,348	79.4
Winona	50,400	89,300	38,900	77.2
Winona County	54,400	96,400	42,000	77.2
Commute Field	51,752	93,764	42,013	81.2
Worthington	49,900	69,900	20,000	40.1
Nobles County	39,600	64,500	24,900	62.9
Commute Field	34,209	61,607	27,399	80.1
Minnesota	74,000	122,400	48,400	65.4

Source: U.S. Department of Commerce, Bureau of the Census.

Summary

This chapter provides a basic portrait of population and housing dynamics across our 26 study areas during the 1990s. These data will inform further analysis within the later tasks of this project. We present data from Census 2000 on trends in population and housing in and around 26 of the 49 regional centers that form the principal nodes on Greater Minnesota's trunk highway system. We describe how population age structure and household composition within 26 sample study areas changed between 1970 and 2000, and suggest what some of the trends imply about labor force participation and housing needs and wants in the years ahead. Nationwide, 21 percent of the population lives in non-metro areas; in Minnesota the share is 29 percent. Greater Minnesota is diverse in demographic and economic terms. Of the 274 non-metro counties in the 9th Federal Reserve District, five in Minnesota were among the *top* 30 percent in both population growth and per capita income (Beltrami, Carlton, Douglas, Goodhue, and Le Sueur), but four were among the bottom 30 percent (Kittson, Lincoln, Norman, Traverse).

When population change in sample regional centers in the 1990s is compared with change in the nearby counties that comprise the centers' commuting fields, four situations appear: Group A includes 15 centers and their commuting fields where both had population increases; Group B includes 4 centers with declining populations, but increases in the commuting fields; Group C includes 4 centers with growing populations, but with declines in their commuting fields; and Group D includes 3 situations where both the center and the commute field lost population. A good portion of the 1990s net population growth in the 26 study areas reflected growth in non-white and Hispanic populations. In-migration of workers and retirees accounted for some of the increases, but none of the study areas registered proportions of newcomers from *outside* the U.S. since 1995 of more than 1.7 percent of total population, which was the statewide average. Centers outpacing the state average included Rochester (3.9%), Fargo-Moorhead (1.9%), Mankato (2.1%), Marshall (3.2%), Owatonna (2.2%), (Willmar 2.1%), and Worthington (2.9%).

Population increases impose pressures on the housing stocks within some study areas. Between 1970 and 1990, Minnesota's housing stock grew by 44.8 percent. Several sample regional centers exceeded that rate: Alexandria (45.5%), Detroit Lakes (59.5%), Fargo-Moorhead (65.9%), Grand Forks-EGF 63%), Marshall (61.6%), Owatonna (49.5%) Rochester (60.3%), and Willmar (63.4%). In the 1990s, the statewide housing inventory increased by 11.8 percent, with many of the same growth leaders of the pervious period maintaining or exceeding the state in net additions of new housing units: Alexandria (15.2%), Bemidji (12.1%), Detroit Lakes (12.1%), Fargo/Moorhead (23.5%), Owatonna (18%), Park Rapids (13.1%), Rochester (22%), and Waseca (roughly similar to the state at 11.5%). Steady expansion of the housing stock in a study area usually accompanies house price inflation, which yields positive *wealth effects* for residents, which stimulate additional rounds of local consumption and investment. Areas in northern study areas saw dramatic percentage increases in average housing values in the 1990s. Of the 26 study areas, 20 saw increases in the median value of owner-occupied housing of 50 percent or more in the 1990s.

Chapter 3, which follows, examines occupation and industry structures and change during the 1990s in our study areas.

Chapter 3

Industrial and Occupational Structure of Greater Minnesota's Labor Force, 1970-2000

Introduction

There are two main approaches to measuring and analyzing the structure of a region's economy and its change over time. One focuses on *industries*, and the other on worker *occupations*. Both of them rely on employment data, partly because these data are readily available from state and federal agencies, and partly because employment is one important facet of a market-based economy.

In the three decades between 1970 and 2000, Minnesota's employed civilian population over 16 years of age (i.e., excluding military personnel) almost doubled, rising 81 percent, from 1.46 million to 2.65 million. Part of the increase can be traced to increases in the state's population and part to a steady increase in the rate of female participation in the paid labor force, which in Minnesota has been among the highest in the nation. But statewide averages tend to hide regional variations across the state. Outside the Twin Cities metropolitan area during the same period regional employment increases ranged from 10 percent (Montevideo area) to an increase of 130 percent (Brainerd area), with a median of 15 percent increase over the three decades among 26 sample regions discussed below. Moreover, the 30-year average fails to reflect changes in the recent decade. In the 1990s, while the state as a whole added civilian employment at a rate of 21 percent, change outside the Twin Cities area ranged from a *decline* of 9 percent (International Falls area) to an increase of 44 percent (Brainerd area).

This chapter examines the recent economic structure and changes after 1970 in 26 regions of Minnesota located outside the greater Twin Cities commuting field. [1] The goal of the chapter is to shed additional light on changes in the state's economy that may have implications for long-range transportation planning to support the state's production and consumption requirements.

Changing Employment Profiles: National, Regional, and Local

Post-WWII Transformation of the American Labor Force

It is well known that by the time of the 1920 U.S. Census of Population, the American settlement fabric had become predominantly *urban* for the first time in history, with an *urban place* defined as persons living in incorporated nucleated settlements of 2,500 or more (i.e., towns, cities, etc.) or unincorporated places of 2,500 or more that met certain population density criteria. Part of the steady and disproportionate increase in urban population was due to immigrants settling in cities where new jobs were concentrated. Another part was due to migration from farms and small towns, and the rest was due to natural increase, much of it traceable to young migrant couples bearing children at their urban destinations rather than at their places of origin.

The immigrant exclusion acts of the 1920s curtailed immigrant flows to cities from foreign lands, and the Depression years of the 1930s trimmed flows from the countryside. But World War II drew millions into cities to support the war effort, and following the war the growth of urban centers continued in earnest, across the U.S., the Upper Midwest, and in Minnesota.

The 1950s were a decade of tumultuous change in Minnesota's population. In balance sheet terms, the following population changes occurred: [2]

1950 population	**2,982,483**
Add:	
Births	821,710
In-migration	994,059
Subtract:	
Deaths	293,623
Out-migration	1,090,765
Net Change:	**431,381**
1960 Population	**3,413,864**

Source: Henderson and Krueger, p. 13.

Births during the Baby Boom years of the 1950s added an exceptional number of new persons to the state, numbers that were supplemented by substantial in-migration, principally from the Dakotas, Montana, and some from Northwest Wisconsin. But at the same time, the number of people leaving Minnesota in the 1950s equaled about a third of the state's 1950 population.

Although some young persons relocate out of state for schooling and some retirees leave the state permanently, most people migrate for economic reasons, and Minnesota migrations during the 1950s were no exception. Some left farms and small towns across the Upper Midwest for the Twin Cities, Duluth-Superior, the Iron Range, and other Minnesota locales offering economic opportunity. But even larger numbers left the state entirely for jobs elsewhere.

The peak of the post-war Baby Boom occurred in the years 1959-61, then births trailed off as those born in the late 1940s reached adulthood and a new phase in the economic and demographic life in Greater Minnesota got underway. The 1960s appear to have been a transition decade in many ways. The following sections examine the three-decade period beginning in 1970, and describe what happened to selected sub-state regional economies within Greater Minnesota.

Economic Base of Small City-Centered Regions Compared With Large Regions

The smaller the study area and its economy, the more it depends on its business links with the outside world for markets and earnings. *Economic Base Theory* has been the principal approach to conceptualizing how small regions support themselves. Sales to the outside world are seen as bringing in money, which is then available to circulate locally. Money from the outside is called

"basic" or "export" revenue or income; money circulating internally is called "non-basic" or "local service" income.

Money entering from outside is understood to produce a "multiplier effect" in the sense that once the money enters from the outside world it can be spent and re-spent within the local area during the year to support a chain of buyer-seller transactions. By the same token, the argument goes, if export earnings fail to enter from the outside world, they are not available to be spent again and again within the local economy. A dollar entering the local economy might be spent 2 or 3 times during the following year, yielding an outcome of 2 or 3 times the impact of the original export dollar sale.

The reverse of this argument is that the larger the economy of a region, the more self-sufficient it can be and usually is. Places like the New York, Los Angeles, Chicago, or Minneapolis-St. Paul regions are far more self-sufficient economically than are places a tenth or a hundredth their size. The literature on this subject traditionally comments that the larger a place becomes, the more it supports itself "by taking in its own laundry." Put another way, the larger that a region becomes, the more it is able to produce much of what it consumes and to consume much of what it produces. In multiplier terms, it relies proportionately less on sales to the rest of the world but those sales yield a much higher multiplier effect than sales originating in a small regional economy.

Large regional economies, despite the congestion costs and other frictions of daily life that they impose, can be efficient places for production and consumption. Incomes tend to be higher, and average costs of production of goods and services are usually lower due to large volumes of sales, lower average unit costs of production, and competition among producers.

In Economic Base Theory terms, our 26 study areas can be thought of as small regional economies with regional centers at their cores. As small economies, they depend relatively more heavily on revenues flowing in from the outside world than do large places like the Minneapolis-St. Paul area. Some of them rely on manufacturing, shipping product to markets elsewhere in the U.S. or beyond. Some concentrate on processing raw materials from farms, forests, and mining operations. Some obtain much of their export income from tourism, or from retirees' pensions. Some collect tuition and government monies to support higher education institutions in exchange for exporting education. Still others are in the hospital and medical care business among other things, with the Rochester economy as one outstanding example. The more revenue that enters a local economy, the stronger will be that local economy. Depending on the kind of work performed to earn that export income, the more that the occupational profile of the local economy is shaped.

Classifying Workers by Industry

There is a reciprocal, reinforcing relationship between regional population change and regional economic change. Places with comparatively vibrant economies attract workers away from regions with stagnant economies. The relocation of workers yields several results. The vibrant region receives additional productive human capital that they did not pay for, plus new

consumers, while the region undergoing out-migration loses on both fronts. Growing economies stimulate reinvestment of locally produced profits, while attracting inflows of capital from outside the region. For these reasons, growing regions develop substantial advantages for further growth, while declining regions face major challenges of hanging onto what they have.

Regional economic change can be monitored by tracking employment change. There are two standard ways to classify workers: by the *industries* in which they work, or by the specific *jobs* that they perform within that industry. An industry is a collection of establishments (i.e., workplaces) that are similar in the goods or services that they produce, or in the processes that they employ during the productive activity. For 60 years the Standard Industrial Classification (SIC) was the official way of monitoring workers by industry in the United States. The SIC had its origins in the late 1930s when the federal government undertook an initiative to identify points of economic vitality within the Depression-era economy so that federal policy could be geared more effectively toward fostering economic expansion. Prior to the 1930s, the government had few useful measures of overall economic activity, so the SIC proved to be an important innovation.

The SIC was "developed for use in the classification of establishments by type of activity in which they are engaged; for purposes of facilitating the collection, tabulation, presentation, and analysis of data relating to establishments; and for promoting uniformity and comparability in the presentation of statistical data collected by various agencies of the United States Government, State agencies, trade associations, and private research organizations. The Standard Industrial Classification for *establishments* differs from a classification for enterprises (companies) or products. … Other classifications have been developed for use in the classification of commodities or products and also for occupations." [3] By 1987 the 703-page SIC comprised ten familiar "1-digit" industrial classes:

A. Agriculture, Forestry and Fisheries
B. Mining
C. Contract Construction
D. Manufacturing
E. Transportation, Communication, Electric, Gas, and Sanitary Services
F. Wholesale and Retail Trade
G. Finance, Insurance, and Real Estate
H. Services
I. Government
J. Non-classifiable Establishments

The sequence of these industrial classes from A to J corresponded roughly with stages in American economic history and the relative importance of each class through time. In the early years of the republic, most workers engaged in the extractive pursuits of agriculture, forestry and fisheries. As the economy grew and productivity improved, new industries flourished in turn– mining, construction, manufacturing, and so on. In the 20th century, newer industries grew

faster than the older ones, while the older industries were increasingly automated, with agriculture as an outstanding example.

Within each of the broad "1-digit" industry classes were more detailed groupings of establishments. For example, within the 1-digit Mining industry was Major Group 12: Coal Mining, one component of which was Group 122: Bituminous Coal and Lignite Surface Mining; which in turn contained Group 1221: Surface Mining, and Group 1222: Underground Mining, and so on.

In 1997, the SIC was superseded by the North American Industry Classification System (NAICS), which was designed to coordinate statistical practice among the partners in the North American Free Trade Agreement (NAFTA)–Canada, the U.S., and Mexico. "The North American Industry Classification System (NAICS) is unique among industry classifications in that it is constructed within a single conceptual framework. Economic units that have similar production processes are classified in the same industry, and the lines drawn between industries demarcate, to the extent practicable, differences in production processes. This supply-based or production-oriented, economic concept was adopted for NAICS because an industry classification system is a framework for collecting and publishing information on both inputs and outputs, for statistical uses that require that inputs and outputs be used together and be classified consistently." [4]

The NAICS United States structure for industries comprises the following major industrial classes: [5]

Sector:

- 11 Agriculture, Forestry, Fishing, and Hunting
- 21 Mining
- 22 Utilities
- 23 Construction
- 31-33 Manufacturing
- 42 Wholesale Trade
- 44-45 Retail Trade
- 48-49 Transportation and Warehousing
- 51 Information
- 52 Finance and Insurance
- 53 Real Estate and Rental and Leasing
- 54 Professional, Scientific, and Technical Services
- 55 Management of Companies and Enterprises
- 56 Administrative and Support and Waste Management and Remediation Services
- 61 Educational Services
- 62 Health Care and Social Assistance
- 71 Arts, Entertainment, and Recreation
- 72 Accommodation and Food Services
- 81 Other Services (except Public Administration)
- 92 Public Administration

Classifying Workers by Occupation

Classifying establishments by *industry* usually conveys little information about the specific *jobs* performed by individual workers within establishments (Table 3.1). For example, a bank is easily classified within the SIC (before 1997) or the NAICS (1997 and later), but employees in the bank may be managers, tellers, receptionists, guards, janitors, and others.

Table 3.1. Occupational Classification Schemes

U.S. Dept of Labor Bureau of Labor Statistics Dictionary of Occupational Titles (Skill based)	U.S. Dept of Commerce Bureau of the Census Job Classification System (Social Status based)	U.S. Dept of Commerce Bureau of the Census Job Classification System (New in Census 2000*)
Professional. Technical and Managerial Occupations Clerical and Sales Occupations Service Occupations Farming, Fishery, Forestry, and Related Occupations Processing Occupations Machine Trades Occupations Bench Work Occupations Structural Work Occupations Miscellaneous Occupations	White Collar Professional, Technical and Kindred Workers Managers, Officials, and Proprietors, Including Farm Clerical and Kindred Workers Sales Workers Blue Collar Craftsmen, Foremen, and Kindred Workers Operatives and Kindred Workers Private Household Workers Service Workers Except Private Household Laborers Occupation not Reported	Management, professional, and related occ Management, business, and financial operations occ Professional and related occ Service occupations Health support occ Protective service occ Food preparation and serving related occ Building and grounds cleaning and maintenance occ Personal care and service occ Sales and office occ Sales and related occ Office and administrative support occ Farming, fishing, and forestry occ Construction, extraction, and maintenance occ Construction and extraction occ Installation, maintenance, and repair occ Production, transportation, and material moving occ Production occ Transportation and material moving occ

* Based on the Standard Occupational Classification (SOC) Manual: 2000, which includes a hierarchical structure showing 23 major occupational groups divided into 96 minor groups, 449 broad groups, and 821 detailed occupations. For Census 2000, tabulations with occupation as the primary characteristic use several levels of occupational detail. See Appendix A.

The Census Bureau and other statistical agencies wrestled for years with the challenge of adopting an appropriate basis or set of criteria for classifying jobs in the American economy. [6] The dominant view that emerged at the Census Bureau around 1900 was that the job

classification should be based on a theory of socioeconomic status so that census data could then be used to document how sons were moving up the socioeconomic ladder compared with the status enjoyed by their fathers.

By the 1930s, however, labor economists in the federal government were arguing successfully that the interchangeability of skills between jobs would be a more useful criterion for job classification, job training, and labor market studies. For the next half century, the federal government used both systems side by side: a Bureau of the Census (Department of Commerce) classification based on social class, and a Bureau of Labor Statistics (BLS, Department of Labor) methodology based on job training and job skills. The Bureau of the Census system was used to classify decennial census data, and the BLS system yielded the Dictionary of Occupational Titles (DOT). [7] In the 2000 Census of Population and Housing, the Census Bureau used a new occupation classification system for "Employed Civilian Population age 16 and over."

The Census 2000 occupation classes are used in data tables and analysis below.

Interactions between Industrial Change, Occupation Change, and Population Movements

Change in the industrial structure of a region's economy generates corresponding changes in the region's occupational mix, and its population size and composition. Every industry–that is, every aggregation of similar establishments–contains a different mix of jobs. This fact means that if one industry expands (e.g., manufacturing in the 1920s) compared with another (e.g., farming in the 1920s), the proportion of available job opportunities of different types will change as well.

Migration flows are heavily influenced by perceptions of differential economic opportunity at the origins compared with various available destinations. At the same time, the flows themselves influence the future vitality of economies at both the origins and the destinations. Fast-growing regional economies gain ambitious workers accompanied by members of their households, while regions with less energetic economies lose valuable human resources and consumers to places offering greater economic promise.

A further outcome of economic change and its accompanying migration flows is the effect that they wield on settlement forms. These cycles of change are well known, and have taken different forms across the United States during the past half-century. As farming became increasingly mechanized and automated, farm populations dropped sharply. As mining and manufacturing expanded, mining towns and manufacturing cities attracted capital investment and population. But just as people follow the jobs, jobs also follow people and their purchasing power. For example, as central cities spilled outward following World War II, jobs and shopping opportunities followed soon afterward.

Changes in Minnesota

The U.S. was an essentially closed economy up into the 1960s, with foreign trade accounting for only a small fraction of gross national product. Most of what we produced as a nation we

consumed, and most of what we consumed was produced domestically. The economy grew steadily after World War II, and although economic expansion was punctuated by periodic business recessions, the labor force expanded steadily. Between 1970 and 2000, the employed civilian labor force grew by 74 percent in the United States, and 81 percent in Minnesota. In the decade of the 1990s, the Minnesota employed civilian labor force grew by 21 percent, outpacing the national rate of 15 percent (Table 3.2). [8]

Table 3.2. Employed Civilian Labor Force (1,000s)

Year	United States	Minnesota
1970	78,678	1,464
1980	99,303	1,886
1990	118,793	2,192
2000	136,891	2,649

Sources: U.S. Census Bureau. For Minnesota data: 1970: County and City Data Book: 1972, Tab. 1; for 1980: County and City Data Book: 1983, Tab. A; for 1990: County and City Data Book: 1994, Tab. A; and for 2000: Statistical Abstract of the United States 2001, Table 572. For U.S. data: Statistical Abstract of the United States 2003, Table 587.

The Twin Cities metropolitan region was in many ways the economic growth engine for the State of Minnesota during the post-war period. By the end of the 20th century it had emerged as the economic capital of the Upper Midwest region, roughly corresponding with the 9th Federal Reserve District (Montana, the Dakotas, Minnesota, Northwest Wisconsin, and Michigan's Upper Peninsula), with a population of 3 million sprawled over the 25 counties included in the Twin Cities commuting field.

Although the greater Twin Cities region acts as the Upper Midwest's primary economic engine, its major demographic concentration, and its most significant business headquarters and managerial control center, it is complemented by a hierarchy of lower-order centers arrayed across the region. In Minnesota, there are 49 such regional centers outside the greater Twin Cities region–cities and towns that serve as focal points of business and government for tributary commuting fields, and that serve as the primary nodes or transportation intersections on Minnesota's trunk highway system.

As Minnesota's employed civilian labor force grew from 1.5 million in 1970 to 2.6 million in 2000, a significant portion of that growth occurred in and near the state's regional centers. In the sections that follow, we examine the changing industrial and occupational structure of the labor force in and around a sample of 26 of those regional centers. In cases where the center is a pair of twin cities (e.g., Duluth-Superior), the dominant twin is designated as the "key city." The key city is understood as the major city in the commuting field, the functional center of the study area, and its largest single job center.

Regional Economies in Greater Minnesota

Adjacent to each sample regional center we define a study area around the center. Adjacent to each sample center is a *commuting field* (sometimes referred to metaphorically as a *commute shed*, alluding to flows like those within a watershed) composed of one or more counties, each of which sent at least five percent of its daily commuters to jobs in the county containing the regional center in 1990. Most such jobs are within or close to the regional center itself. The area of each county is composed of incorporated cities and towns, and unincorporated townships, all of which we refer to as minor civil divisions (MCDs).

The 26 study areas with their employment change during the 1990s are as follows (Table 3.3):

Table 3.3. Employment Change in Study Areas, 1990-2000

Study Area	Employment Change, 1990-2000 (%)	Study Area	Employment Change, 1990-2000 (%)
Albert Lea	**8**	Little Falls	**22**
Alexandria	**23**	Mankato-No.M.	**14**
Bemidji	**31**	Marshall	**9**
Brainerd	**44**	Montevideo	**6**
Detroit Lakes	**23**	New Ulm	**12**
Duluth-Superior	**15**	Owatonna	**16**
Fairmont	**4**	Park Rapids	**24**
Fargo-Moorhead	**20**	Rochester	**16**
Fergus Falls	**18**	Wadena	**17**
Grand Forks-EGF	**5**	Waseca	**13**
Grand Rapids	**26**	Willmar	**15**
Hibbing	**15**	Winona	**12**
International Falls	**- 9**	Worthington	**9**

Data source: U.S. Census Bureau.

The census is taken in April and asks respondents if they worked for pay during the past week regardless of part-time or full-time status. This measure of employment undercounts seasonal employment if April is a time when certain workers are not on the job. Employment change in the sample study areas during the 1990s ranged from declines of 9 percent in the International Falls area (a large paper mill construction project, which had inflated the 1990 employment count, ended prior to the 2000 census) and 5 percent in the Grand Forks-East Grand Forks area, to an increase of 44 percent in the Brainerd area. The Grand Forks-East Grand Forks area never fully recovered from the disastrous 1997 flood of the Red River of the North, which imposed

enormous damage and capital losses. Meanwhile the Fargo-Moorhead economy continued a strong growth trajectory, capturing business that formerly went to its competitor 80 miles to the north, and drawing customers from Canada for shopping and entertainment.

If the employment statistics are sorted by percentage change, some geographical patterns emerge (Table 3.4). The areas that added employment faster than average for the group (median increase was 15 percent) are mainly in the state's northern lake and recreational areas. In the middle group are areas that have had relatively diversified economies in the postwar years. The ten study areas in the slow-growth group have three strikes against them. All have been hampered by excessive reliance on agriculture and forestry, a shortage of other options to replace jobs lost in those slow-growth sectors, and remoteness from major metropolitan centers.

Table 3.4. Three Settings for Employment Change in Study Areas, 1990-2000 (change in percent)

Areas Mainly in Northern Lake Districts (Fast Growth)		**Areas with Diversified Economies (Moderate Growth)**		**Stagnant Natural Resource-Based Economies (Slow Growth)**	
Brainerd	**44**	Rochester	**16**	Waseca	**13**
Bemidji	**31**	Owatonna	**16**	New Ulm	**12**
Grand Rapids	**26**	Willmar	**15**	Winona	**12**
Park Rapids	**24**	Hibbing	**15**	Worthington	**9**
Detroit Lakes	**23**	Duluth-Superior	**15**	Marshall	**9**
Alexandria	**23**	Mankato-No.M.	**14**	Albert Lea	**8**
Little Falls	**22**			Montevideo	**6**
Fargo-Moorhead	**20**			Grand Forks-EGF	**5**
Fergus Falls	**18**			Fairmont	**4**
Wadena	**17**			International Falls	**- 9**

Data source: U.S. Census Bureau.

In the sections that follow, we first examine the details of how the *industrial structures* within study areas changed between 1970 and 2000. We summarize where the jobs were added–by industry and by place, as well as where the jobs were lost by industry and by place.

In the final section, we explore how the *occupational structures* within sample study areas changed during the same three decades, 1970 to 2000. Where were jobs added–by occupation and by place? Where were jobs lost–by occupation and by place?

The chapter concludes with a summary analysis of the different economic transitions underway in Minnesota's regions, and suggests their implications for long-range transportation planning for the state.

Changing Industrial Structures: Jobs by Industry: 1970-2000

The appendices for this chapter provide complete details of employment change by industry for the census years 1970, 1980, 1990 and 2000. To illustrate the variety of industrial and occupational shifts underway across Minnesota, we take a closer look at the Brainerd, Willmar, and Montevideo study areas (Table 3.5). The fast-growing Brainerd area represents areas in the northern lakes district, most of which have been doing well in recent years in economic and demographic terms. The Willmar area represents places with diversified economies that have been holding their own with slow but steady employment growth during the 1990s. The Montevideo area and others in its slow-growth or decline class have had to contend with stagnant regional economies tied to natural resources, mainly farming.

The three selected study areas represent three rates of growth in regional economies outside the Twin Cities area in the 1990s: faster growth, moderate growth, and slow growth. The Brainerd area represents the ten study areas that grew fastest. The Willmar area represents the six areas that added jobs more slowly. The Montevideo area represents the ten areas that added few jobs, and one area (International Falls) actually lost jobs as explained above.

The most dramatic shifts were in *Agriculture, Forestry, Fishing and Hunting, and Mining* (NAICS classes 11 and 21), which saw sharp losses in the 1970s and 1980s in all three sample study areas, with continued declines at more modest rates in the 1990s. Aside from these losses, the Brainerd area in the northern Lake District added jobs in every category in all three decades. In the diversified economy of the Willmar area, except for the extraction industries, there were across-the-board job gains in the 1970s and 1980s, but losses showed up in some industry groups in the 1990s. The Montevideo area, representing the struggling natural resource-based areas, job gains were extremely modest, with big job losses in the 1970s and 1980s in the extractive industries that were barely offset by gains in *Finance and Related Industries* (52,53) and in *Education* and in *Health* (61-62).

Areas of Above-Average Employment Expansion–by Industry: Mainly in Northern Lake Districts, 1990-2000

Next we identify industries where the most jobs were added in the 1990s in the faster-growing study areas of which Brainerd was presented as representative (Table 3.6). In these ten areas, jobs were added at rates between 17 percent (Wadena) and 44 percent (Brainerd). We noted earlier that for the most part they are all in the northern Lake District, where weekend and seasonal recreation and an influx of retired persons added energy to regional economies. In each of the ten areas, *Construction* (NAICS 23) is the first- or second-ranking industry in terms of percentage job growth, which would be expected in regions that are expanding their economies. *Arts, Entertainment, Recreation, Accommodation, and Food Services* (NAICS 71-72), along with

Other Services (NAICS 81) also were big gainers in employment in the 1990s. *Manufacturing* (NAICS 31-33) pops up in a few cases adding jobs at significant rates. Its share of jobs in 2000 ranged from 10 percent in the Bemidji and Fargo-Moorhead areas, to 21 percent in the Wadena and Little Falls areas. When that industry's share is small, it takes only a small increase in jobs for the rate of increase to emerge as significant compared with other larger industry clusters. On the other hand, Manufacturing is usually an export activity, bringing revenue into the area from the rest of the world. So even when its share of the total is small, it helps in a big way to fuel the local economy as tourism and other export industries do.

Table 3.5. Employment Change by Industry (Jobs Gained, Lost): Three Representative Study Areas, 1970-2000

NAICS Class(es)	Brainerd Study Area (In the Northern Lake District)		Willmar Study Area (A Diversified Economy)		Montevideo Study Area (A Natural Resource-Based Economy)	
	1970-1990	1990-2000	1970-1990	1990-2000	1970-1990	1990-2000
Agric, Forest, Fish & Hunt, Mining (11,21)	**- 392**	**- 65**	**- 1,277**	**- 273**	**- 1,067**	**- 374**
Constr (23)	929	1,568	292	736	29	282
Mfg (31-33)	1,199	1,572	1,866	1,984	91	604
Wholesale Trade (42)	337	271	214	**- 163**	**- 65**	**- 31**
Retail Trade (44-45)	1,705	1,635	583	741	**- 149**	62
Transport, Warehousing, Utilities (22,48-49)	256	266	185	614	**- 27**	220
Information (51)	200	263	114	**- 6**	**- 52**	**- 16**
Finance, Ins, Real Estate, Rental, Leasing (52,53)	900	769	638	206	210	**- 18**
Professional, Scientific, etc. (54-56)	813	63	660	**- 1,548**	**- 96**	**- 953**
Educ, Health (61-62)	3,007	2,763	3,431	1,572	926	515
Arts, Ent, Recrea, Food, etc. (71-72)	1,075	2,775	403	59	**- 88**	**- 2**
Other Services (81)	594	844	391	781	16	418
Public Admin (92)	726	575	190	510	38	111
Total	**11,348**	**13,300**	**7,688**	**5,214**	**585**	**819**

Data source: U.S. Census Bureau. Data for 1970-1990 are presented for comparison or contrast with the decade of the 1990s. The emphasis in our analysis is on trends in the 1990s. Some of the unusually large declines in the 1990s (e.g., Willmar area) resulted from the reassignment of sub-industries due to shifts from the SIC to the NAICS. Detailed data by census year appear in the appendices.

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Table 3.6. Four Fastest Growing Industries (by percentage increase in employment) in "Fast-Growth" Study Areas, 1990-2000

"Fast-Growth" Study Areas (Average Expansion Rate, %)	NAICS classes			
Brainerd (44)	Arts/Ent/Rec…107	Const…68	Other Serv…59	Finance…51
Bemidji (31)	Const…77	Arts/Ent/Rec…58	Pub Ad…56	Other Serv…48
Grand Rapids (26)	Transp…69	Const…64	Other Serv…58	Arts/Ent/Rec…53
Park Rapids (24)	Const…62	Other Serv…45	Mfg…44	Educ…34
Detroit Lakes (23)	Arts/Ent/Rec…73	Const…53	Other Serv…42	Educ…39
Alexandria (23)	Mfg…68	Const…66	Other Serv…42	Transp…33
Little Falls (22)	Const…71	Other Serv…67	Mfg…44	Educ…32
Fargo-Moorhead (20)	Const…48	Mfg…41	Finance…34	Other Serv…28
Fergus Falls (18)	Other Serv…55	Const…52	Mfg…45	Transp…36
Wadena (17)	Const…78	Other Serv…71	Mfg…54	Finance…32

Data source: U.S. Census Bureau. Note: Industry abbreviations refer to NAICS classes identified in an earlier table. Detailed data tables appear in the appendices.

Areas with Diversified Economies and with Slower-Growth Employment Expansion—by Industry, 1990-2000

The six modestly growing study areas added jobs at rates of 14 to 16 percent in the 1990s, but these places are scattered around Minnesota and feature diversified economies (Table 3.7). Thus is it unsurprising that there is no apparent consistency in how they added their jobs, although the Construction industry (NAICS 23) was significant in every case. The leading industry in job growth in the Owatonna area was *Public Administration* (NAICS 92), while *Other Services* (NAICS 81) dominated in the Willmar and Mankato-N. Mankato areas, and the tourist-oriented *Arts, Entertainment, Recreation, Accommodation, and Food Services* (NAICS 71-72) industry led in growth in the Hibbing and Duluth-Superior areas.

Table 3.7. Four Fastest-Growing Industries (by percentage increase in employment) in "Moderate-Growth" Study Areas, 1990-2000

"Moderate-Growth" Study Areas (Average Expansion Rate, %)	NAICS classes			
Rochester (16)	Const…60	Mfg…45	Other Serv…31	Educ…30
Owatonna (16)	Pub Adm…70	Const…68	Other Serv…61	Finance…45
Willmar (15)	Other Serv…62	Pub Adm…52	Mfg…42	Const & Trans…39
Hibbing (15)	Arts/Ent/Rec …41	Other Serv…38	Transp…35	Const…33
Duluth-Superior (15)	Arts/Ent/Rec …47	Other Serv…37	Const…32	Transp…27
Mankato-No. M (14)	Other Serv…59	Const…47	Educ…23	Transp…19

Data source: U.S. Census Bureau. Note: Industry abbreviations refer to NAICS classes identified in an earlier table. Detailed data tables appear in the appendices.

Areas with Stagnant Natural Resource-Based Economies and Slow Growth or Declining Employment—by Industry, 1990-2000

The ten study areas classified as "slow-growth or declining" are saddled with relatively stagnant, natural-resource-based industrial bases and in the 1990s added jobs at a rate of only 13 percent or less, with the International Falls area actually losing 9 percent of its 1990 job base (Table 3.8). The industries themselves may be making money, but with automation and intense competition they have often trimmed employment and payrolls, which in turn led to cuts in local spending, which further undermines local economies.

The *Other Services* industry (NAICS 81) added jobs at a brisk rate in all areas, but these gains were mostly offset by widespread declines elsewhere. Without more detailed information, we cannot know whether the added jobs are equal in earnings and benefits to those that were lost, but our sense is that although employment may be relatively stable in terms of employee head counts, average overall compensation and wealth positions of individuals and households in these ten study areas are diverging steadily from averages in the Greater Twin Cities area. On the other hand, costs of living, ways of life, and residential satisfaction differ in important ways from place to place across Minnesota. Job counts are only one measure of how a study area is performing compared with other areas.

Table 3.8. Four Fastest-Growing Industries (by percentage increase in employment) in "Slow-Growth" Study Areas, 1990-2000

"Slow-Growth" Study Areas (Average Expansion Rate, %)	NAICS classes			
Waseca	Finance…91	Pub Adm…88	Other Serv…80	Constr…71
New Ulm	Other Serv…69	Constr…34	Transp…30	Educ…26
Winona	Other Serv…55	Finance…32	AE&Rec …28	Constr…27
Worthington	Other Serv…85	Constr…43	Mfg…43	Transp…40
Marshall	Other Serv…62	Mfg…58	Transp…37	Constr…30
Albert Lea	Other Serv…46	Mfg…32	Const…32	Pub Adm…29
Montevideo	Other Serv…93	Constr…38	Transp…36	Mfg…30
Grand Forks/EGF	Constr…47	Other Serv…45	Transp…27	Mfg…25
Fairmont	Other Serv…48	Educ…32	Finance…24	Transp…20
International Falls	Finance…90	Agric…71	Other Serv…20	Educ…13

Data source: U.S. Census Bureau. Note: Industry abbreviations refer to NAICS classes identified in an earlier table. Detailed data tables appear in the appendices.

Changing Occupational Structures: Jobs by Occupational Class, 1970-2000

Along with *industrial* realignments within our sample study areas come *job* or *occupational* realignments. If we examine our three representative study areas in terms of job gains and losses by occupation, some trends are clear (Table 3.9).

The *Management & Professional* class added jobs at a brisk pace throughout both time periods and in each study area. *Service* jobs almost held their own in fast-growing Brainerd area, but lost ground sharply in the 1990s in the other areas after modest growth in the previous two decades. It is likely that automation and self-service options have seen technology replace many jobs.

Farming, Fishing, and Related jobs lost jobs across the board as the industries to which they are attached either declined in levels of activity or invested in automation that replaced workers with machines. In the last two job categories—*Construction, Extraction, & Maintenance*, and *Production, Transportation, and Material Moving*—jobs were added at all locations and in each time period.

Table 3.9. Employment Change by Occupation (Jobs Gained, Lost): Three Representative Study Areas, 1970-2000

Occupation Class(es)	Brainerd Study Area (Fast Growth)		Willmar Study Area (Moderate Growth)		Montevideo Study Area (Slow Growth)	
	1970-90	**1990-2000**	**1970-90**	**1990-2000**	**1970-90**	**1990-2000**
Management, Professional, & Related Occ.	3,505	4,596	2,663	3,215	329	1,146
Service Occ.	2,205	2,072	1,325	- 877	52	- 490
Sales & Office Occ.	3,682	3,448	2,530	1,507	236	300
Farming, Fishing, and Forestry Occ.	**- 12**	**- 329**	**- 996**	**- 1,156**	**- 742**	**- 803**
Construction, Extraction, and Maintenance Occ.	817	1,962	778	726	309	182
Production, Transportation, and Material Moving Occ.	1,159	1,550	1,446	1,799	412	483
Total	**11,356**	**13,300**	**7,746**	**5,214**	**595**	**819**

Data source: U.S. Census Bureau. Occupation classes are the Census Bureau's current job classification system. Large gains in "Management, Professional and Related Occupations" shown here are in contrast to job losses noted in the "Professional, Scientific, etc. Industries" (NAICS 54-56) noted in an earlier table. The titles of the classes are somewhat misleading. NAICS 54: Professional, Scientific, and Technical Services (includes legal, accounting, architectural and engineering, research and consulting, advertising and other establishments), NAICS 55: Management of Companies and Enterprises (includes establishments that manage other enterprises); and NAICS 56: Administrative and Support and Waste Management and Remediation Services (includes establishments that perform services for other companies–office administration, hiring and placing personnel, document preparation, security and surveillance services, cleaning, and waste disposal services).

Areas of Above-Average Employment Expansion—by Occupation: Mainly in Northern Lakes Districts, 1990-2000

In the ten fast-growth study areas, job counts expanded by an average of 17 to 44 percent during the 1990s (Table 3.10). If we identify the specific job classes that expanded faster than the average in each of the ten study areas and list them in the table below, we see that in 20 of 27 cases, the fast job growth occurred in two occupation classes: *Construction,* and *Management & Professional*.

In the three study areas where *Production, Transportation, and Material Moving Occupations* edged out one or the other of those job classes–i.e., Alexandria, Little Falls, and Wadena—it

Table 3.10. Fastest-Growing Occupations in "Fast-Growth" Study Areas, 1990-2000

"Fast-Growth" Study Areas (Average Expansion Rate-%)	Occupational Classes Expanding at Above Average Rates (by percentage increase in employment)			
Brainerd (44)	Constr…64	Mgmt/Prof…59	Sales/Off…45	
Bemidji (31)	Constr…76	Mgmt/Prof…43		
Grand Rapids (26)	Constr…46	Mgmt/Prof…33		
Park Rapids (24)	Constr…52	Mgmt/Prof…44		
Detroit Lakes (23)	Mgmt/Prof…46	Constr…43		
Alexandria (23)	Mgmt/Prof…47	Prod/Tran...46	Constr…29	
Little Falls (22)	Mgmt/Prof…48	Prod/Tran...39	Constr…28	Sales/Off…26
Fargo-Moorhead (20)	Constr…40	Mgmt/Prof…34		
Fergus Falls (18)	Mgmt/Prof…41	Constr…34	Prod/Tran...24	Sales/Off…23
Wadena (17)	Prod/Tran...45	Mgmt/Prof…31	Constr…23	

Data source: U.S. Census Bureau. Occupation classes are the Census Bureau's current job classification system.

seems pretty clear that unusually strong expansions in the Manufacturing and in Construction *industries* were largely responsible for fast growth in selected occupations in those industries.

Areas with Diversified Economies and with Moderate-Growth Employment Expansion–by Occupation, 1990-2000

As the United States continues its steady shift to a service-oriented economy, that shift shows up in and around the state's regional centers in the form of jobs added at above-average rates in certain occupations, while slow declines occur in other lines of work (Table 3.11). Meanwhile, jobs are continuously needed to build and maintain the physical infrastructure needed for production and consumption of all kinds.

In the six moderate-growth study areas, these occupational trends stand out in sharp relief. While overall job growth in the six study areas ranged from 14 to 16 percent, jobs in *Management & Professional* occupations grew at rates well above average in all six study areas—from 23 percent in the Hibbing area, to 37 percent in and around Owatonna.

Table 3.11. Fastest-Growing Occupations in "Moderate-Growth" Study Areas, 1990-2000

"Moderate-Growth" Study Areas (Average Expansion Rate-%)	Occupational Classes Expanding at Above Average Rates, 1990-2000 (by percentage increase in employment)			
Rochester (16)	Mgmt/Prof…33	Constr…23	Prod/Tran…19	
Owatonna (16)	Mgmt/Prof…37	Sales/Off…20	Prod/Tran…18	
Willmar (15)	Mgmt/Prof…34	Prod/Tran…29	Constr…23	Sales/Off…19
Hibbing (15)	Constr…33	Mgmt/Prof…23	Service…16	
Duluth-Superior (15)	Constr…31	Mgmt/Prof…24		
Mankato-No.M. (14)	Mgmt/Prof…33	Prod/Tran…20		

Data source: U.S. Census Bureau. Occupation classes are the Census Bureau's current job classification system.

Areas with Stagnant Natural Resource-Based Economies and Slow Growth or Declining Employment—by Occupation, 1990-2000

In our ten slow-growth study areas, the same trends discussed above are visible, but with less intensity (Table 3.12). Rates of overall job growth in the 1990s ranged from a high of 13 percent (Willmar area) to a loss of 9 percent (International Falls area). In each of the ten study areas, the first or second ranked occupational area in terms of job growth was *Management, Professional, and Related Occupations*—with growth rates reaching a high of 33 percent (Marshall area). In eight of the study areas, *Production. Transportation, and Material Moving Occupations* ranked first or second in job growth rates–hitting a high of 37 percent in the Albert Lea area.

Implications of Industrial and Occupational Change for Transportation Planning

Changes in the industrial composition of Minnesota's economy have introduced major changes in transportation activity and the use of the state's trunk highways, but the precise nature of those impacts has not been examined here. We can speculate, though, that traditional mixed farming made relatively modest demands on highways, except at harvest and marketing times. As segments of the manufacturing industry reduced their dependence on railroads and increased their reliance on trucks and highways, they have made intense use of roads as they acquire inputs and ship output during the year. And now that three-quarters of the country's gross domestic product is composed of consumption, day-to-day travel for shopping and recreation imposes yet another set of expanding demands on the state's highways.

Table 3.12. Fastest-Growing Occupations in Slow-Growth Study Areas, 1990-2000

"Slow-Growth" Study Areas (Average Expansion Rate-%)	Occupational Classes Expanding at Above Average Rates (by percentage increase in employment)			
Waseca (13)	Mgmt/Prof…26	Prod/Trans…23	Sales/Off…23	
New Ulm (12)	Mgmt/Prof…32	Prod/Trans…17		
Winona (12)	Mgmt/Prof…30	Prod/Trans…18	Sales/Off…17	
Worthington (9)	Prod/Trans…32	Mgmt/Prof…29	Sales/Off…16	Constr…12
Marshall (9)	Mgmt/Prof…33	Prod/Trans…27	Constr…19	Sales/Off…15
Albert Lea (8)	Prod/Trans…37	Mgmt/Prof…16		
Montevideo (6)	Mgmt/Prof…30	Prod/Trans…20	Constr…13	Sales/Off…10
Grand Forks-EGF (5)	Constr…39	Mgmt/Prof…14		
Fairmont (4)	Mgmt/Prof…24	Prod/Trans…8		
International Falls (- 9)	Farm/Fish…4	Mgmt/Prof…- 3	Service…- 7	

Data source: U.S. Census Bureau. Occupation classes are the Census Bureau's current job classification system.

What are the implications of rapidly changing job scenes since 1970 within our 26 study areas, whether viewed through the lens of industrial change or of occupational change? On the demand side of the picture—*where personal trips originate*—we generally see more people, more households, more journeys to work, more disposable income, and more journeys to shop and recreate. Of the state's 5 million population, 40 percent live outside the greater Twin Cities. Their number will probably continue increasing although as a share of the state's total it will probably drop because growth rates are unlikely to match those of the Twin Cities area.

Like the Twin Cities area, the number of households and number of cars may rise faster than the population. Like the Twin Cities, we can expect to see household members' lives of production and consumption activity increasing in complexity in the following ways compared with 1950s and 1960s:

- © A greater need for and desire for movement on the part of individuals
- © More jobs per household as workers augment full-time work with part-time jobs, or patch together several part-time jobs when satisfactory and secure full-time employment is unavailable or unwanted
- © More discretionary income

- © Greater flexibility in work schedules
- © Components of a business enterprise, formerly done under one roof, increasingly disaggregated, outsourced, and dispersed
- © Child-care issues add extra segments to journeys to and from work
- © Recreation absorbs a larger fraction of life—both daily and on weekends
- © Older Americans comprise a greater share of the population, with many active and prosperous, but also many with special needs
- © More trips and more complicated trips
- © Forecasting models for metro areas may need modification for smaller areas across the countryside

On the other side of the planning equation are the *trip destinations*. The map of housing and job locations is constantly changing. Households often select them independently with the expectation that highway capacity will be available to link the two. In the Twin Cities in the 1950s, about 80 percent of metro activity occurred inside the compact cities of Minneapolis and St. Paul, with most jobs and major shopping opportunities concentrated in the downtowns. Things were simpler, more predicable; dad at work, mom at home. That hasn't been the case since at least the 1960s.

The same is true across the Minnesota countryside. It's not your grandfather's rural countryside any more. Like the Twin Cities metro area, we see dispersal of practically everything over the last 50 years. The retail goods and service distribution functions of small cities and towns have given way to the ubiquitous shopping mall and superstores. Retailing is farther away from the customers, but disposable incomes are higher, shopping baskets are fuller, and vehicle miles traveled rise steadily.

Recreation expands to account for a bigger share of household lives, and these too involve more daily and weekend recreational travel. As jobs, shopping and recreation opportunities disperse, trips of all kinds increase in number and length—trips to school, shop, exercise, play, visit friends, visit the doctor, drop kids at day care, and so forth. They generate complex trip chains that are hard to measure, to model, and to plan for across the Minnesota countryside for the same reasons as they pose challenges for Twin Cities planners.

Summary and Conclusions

Regional economic change can be monitored by tracking employment change. There are two standard ways to classify workers in order to assess changes in their numbers over time: by the *industry* in which they work, or by the specific *job* that they perform within that industry.

Changes in the *industrial structure* of a region's economy generate a corresponding set of changes in the region's *occupational or job mix*, as well as its population size and composition.

Every industry contains a different job mix. This fact means that if one industry expands compared with another the available job opportunities of different types will change as well.

Job opportunities influence population movements. Migration flows are heavily directed by perceptions of differential economic opportunity at the origins compared with various available destinations. At the same time, the flows themselves influence the economies at both the origins and the destinations. Fast-growing regional economies gain ambitious workers accompanied by members of their households, while regions with less-energetic economies lose valuable human resources and consumers to places offering greater economic promise. An outcome of economic change and its accompanying migration flows is the effect that they wield on settlement forms. As people follow the jobs, jobs also follow people and their purchasing power. For example, as central cities spilled outward following World War II, jobs and shopping opportunities followed soon afterward.

This chapter has examined changes in employment levels within the 26 study areas between 1970 and 2000. Employment changes are examined in terms of *industries* of employment as well as by the changing mix of *occupations* pursued. The 26 study areas are grouped into (1) fast-growing recreation and retirement areas, located mainly in northern lake districts; (2) areas with mixed economies and moderate job growth; and (3) slow-growth areas in the west and southwest parts of Minnesota that depend on a weak farm economy, plus northern areas supported largely by mining and forest products industries. Structural changes in regional economies bring about changes in household activity within those sub-regions, and vice-versa. Along with changes in economic activity and household behavior come changes in daily travel behavior, which yield corresponding impacts on the state's trunk highways.

Taking a closer look at employment changes in the 1990s, the three settings displayed the following trends: (1) areas of *fast growth*, mainly in the northern lake districts, saw employment expansion ranging from 44 percent (Brainerd area) to 17 percent (Wadena area); (2) areas of *modest growth* and diversified economies had employment growth from 16 percent (Rochester and Owatonna areas) to Mankato-No. Mankato (14 percent); while (3) slow-growth natural-resource-based economies lagged with employment change from 13 percent (Waseca area) to Fairmont (4 percent) and International Falls (minus 9 percent as a major construction project ended).

The typical leading industries (1st or 2nd place) in the fast-growth study areas as measured by employment gains in the 1990s were Construction, Other Services, and Arts, Entertainment, Recreation & Food, etc. although Manufacturing was prominent in the Alexandria (1st place) and Fargo-Moorhead (2nd place) areas. In modest-growth areas, the same industries ranked among the top two, except for Public Administration ranking first in the Owatonna area, and second in the Willmar area. Among the ten slow-growth areas, the leading industry in seven areas was Other Services, with no other distinctive patterns appearing.

The fastest-growing occupations (ranked 1st or 2nd) in the fast-growth areas were Construction, Extraction & Maintenance and Management, Professional & Related." In the six moderate-growth areas, the same occupational classes led in job growth (i.e., 1st or 2nd place) in nine of twelve cases. In the ten slow-growth areas, job expansion in Management & Professional

occupations ranked first or second in every case, with Production, Transportation & Material Moving jobs ranking first or second in job growth in eight of ten areas. Construction jobs were prominent only in Grand Forks-EGF.

On the demand side of the picture–where trips originate–the number of people and number of households will continue increasing as an outcome of a relatively robust state economy. Of the state's 5 million population, 40 percent live outside the greater Twin Cities, and that number is likely to continue increasing even though growth rates are unlikely to match those of the Twin Cities area. Like the Twin Cities area, the number of households and number of cars in Greater Minnesota may rise faster than the population.

On the other side of the planning equation are *trip destinations*. Locations of homes and jobs continue to change. Like the Twin Cities metro area, we see dispersal of practically everything over the last 50 years. The retailing functions of villages and hamlets have given way to ubiquitous shopping mall and superstores. Retailing is farther away from the customers, but with disposable incomes higher, shopping baskets are fuller, and vehicle miles traveled keep rising. Recreation continues to form a bigger share of household lives, and will generate more daily and weekend recreational travel. As jobs, shopping and recreation opportunities disperse, trips of all kinds increase in number and length, generating complex *trip chains* that are hard to measure, to model, and to plan for in the countryside for the same reasons they pose challenges for Twin Cities planners.

The next chapter focuses on commuting and other transportation patterns within our 26 study areas and how they have changed since 1970.

Chapter 4

Travel Behavior in the Minnesota Countryside, 1980-2000

Demand and Supply for Highway Capacity

The urbanization of the Minnesota countryside beyond the greater Minneapolis-St. Paul region in recent decades involves a transformation of local populations and economies. It is bringing a dispersal of jobs and housing, more vehicular traffic, and longer commutes. In our second chapter we described demographic trends in Greater Minnesota in recent decades. Chapter 3 examined industrial and occupational adjustments. The goal of this chapter is to summarize what the U.S. Census of Population and Housing tells us about daily commuting activity in and near 26 regional centers across Minnesota, and how patterns have changed over time.

Why are we interested in this set of relationships throughout Greater Minnesota? Simply put, we wish to learn the degree to which development trends and mounting traffic problems faced in the Twin Cities area are duplicated elsewhere in the state, and so we review those processes here. These questions arose out of the Transportation and Regional Growth (TRG) Study.

By the early 1990s the capacity of the Twin Cities-area regional highway network was failing to keep up with incremental demands being made upon it, and that the gap between growing demands on the road system and the available capacity to handle it was likely to continue widening. Meanwhile, economic activity and real estate development in and around Minnesota's 49 regional centers outside the Twin Cities area, and located at the principal nodes on the state's trunk highway system, seemed to be sprawling outward in the same ways that low-density growth at and beyond the built-up edges of the Twin Cities area was occurring. [57]

Even though the overall Minnesota population has continued to grow, with most of the growth in recent years concentrated in the Twin Cities area, there continues to be population growth in greater Minnesota (Table 4.1).

Table 4.1. Population Change in Minnesota, Twin Cities Area, and Greater Minnesota, 1990-2000

	1990	Percent of State	2000	Percent of State	Change	Percent of State	Percent Change 1990-2000
Minnesota	4,375,099	100	4,919,479	100	544,380	100	12
Twin Cities Area*	2,688,908	61	3,131,819	64	442,911	81	16
Greater Minnesota **	1,686,191	39	1,787,660	36	101,469	19	6

Data Source: U.S. Bureau of the Census. * 20 Minnesota counties included in earlier TRG reports.
** 67 Minnesota counties outside Twin Cities area.

In 1990, two out of five Minnesotans lived outside the Twin Cities area. In the 1990s more than four out of five persons who were added to the state total were added in the Twin Cities area. These changes shifted the proportions of state totals towards the Twin Cities, continuing a long-term trend. Greater Minnesota had a net increase of over 100,000 persons in the 1990s, with some counties adding population while others lost. Growth concentrated in certain regional centers, in certain commuting areas surrounding selected regional centers, and sometimes in both (Table 4.2).

Growth and Congestion in the Twin Cities Metropolitan Region

Some observers, noting that (a) rapid growth of the Twin Cities area, which was accompanied by (b) low-density development on the edge *and* (c) increasing highway congestion, speculated that (b) was contributing significantly to (c); that is, that the steady dispersal of population, jobs, homes, and businesses to lower-density settings was adding to the traffic loads on highways at rates that were exceeding overall economic and demographic growth measures.

To the extent that this supposed relationship (i.e., low-density development aggravates congestion) might be true, it argued for constraining sprawl and encouraging infill development along with redevelopment inside built-up areas, plus higher development densities on the edges of the built-up area. The other option—major expansion in metro-area trunk-highway capacities—seemed unlikely because of intractable political and financial obstacles.

Others challenged this reasoning and its conclusion with a statistical analysis of the relationship between population density and traffic congestion in the 31 largest metro areas, showing that congestion was greatest in the high-density areas. [58] Unfortunately, this is a weak and misleading argument. The correlation sheds little light on issues facing the Twin Cities. Traffic congestion on trunk highways reflects a relationship between the supply of and the demand for road capacity. When demand at certain times exceeds the capacity on the roads within a region at those times, there will be congestion. The fact that America's largest metro areas experience the greatest congestion merely reflects the fact that the degree to which demand exceeds supply generally rises along with metro area size. In general, the largest metro areas have the most vibrant economies, so they attract more people, investment and business activity, but because of physical and political constraints they have few ways to enhance road capacity in already built-up areas. Hence, congestion intensifies. This is especially true in the oldest, largest, and most densely built up urban areas in the Northeast, which achieved great size and density long before the modern automobile era.

The patterns observed in other large metro areas in no way vitiate the claim that *if* the Twin Cities area continues on its recent course of steady growth, and *if* population and economic activity continue to disperse at lower and lower density, and *if* vehicle miles traveled each day continue to rise while incremental highway capacity fails to keep up, *then* there will be increasing rates of highway congestion. On the other hand, to the extent that higher development densities on new land and infill development in already built-up areas mute the rate of increase in vehicle miles traveled, then the gap between demand and supply for highway capacity would be narrowed from what otherwise would occur.

Table 4.2. Population Change in Selected Regional Centers and Their Commute Fields, 1990-2000

Regional Center/ Commute Field**	Regional Center Population Change, 1900-2000 (%)	Commute Field* Population Change, 1900-2000 (%)
A+ Commute Field Grows Faster		
Brainerd	6.7	24.3
Bemidji	6.0	15.3
Fergus Falls	9.0	9.5
Waseca	1.3	8.0
Wadena	3.9	4.4
Mankato	3.0	4.4
Duluth-Superior	1.5	2.7
A- Regional Center Grows Faster		
Rochester	21.3	9.3
Owatonna	15.7	9.9
Fargo-Moorhead	15.4	8.3
Park Rapids	14.4	13.0
Alexandria	12.5	8.3
Detroit Lakes	10.7	6.9
Little Falls	6.7	6.0
Winona	6.6	3.9
Willmar	4.7	3.8
New Ulm	3.5	2.9
B Commute Field Grows; Center Declines		
Grand Rapids	- 2.7	7.7
Hibbing	- 5.4	2.3
C Center Grows; Commute Field Declines		
Worthington	13.1	- 0.9
Marshall	5.9	- 1.9
Albert Lea	0.3	- 1.4
D Center and Field Both Decline		
Grand Forks-EGF	- 2.2	- 6.3
Montevideo	- 2.8	- 4.7
Fairmont	- 3.3	- 4.9
International Falls	- 19.5	- 11.9

* Includes the regional center.

** Regional centers and commuting fields are grouped by comparing change in the center with change in the entire commuting field, which consists of one or more counties.

Data source: U.S. Bureau of the Census

Census Coverage and Limitations.

The travel-behavior data that have been collected in the decennial census and published at the county level are derived from the long-form questionnaires received and returned by an average of one in six households. Each household member is asked to report whether he or she worked during the previous week, the job and industry of their work, whether they worked at home or commuted to a job away from home, the location of the job, how they got there, travel time to work, time leaving home to go to work, and number of vehicles available for use by household members (Table 4.3).

Our next task was matching available data sets concerning commuting with topics of interest regarding "urbanization of the Minnesota countryside." Unfortunately, no published data on commuting or vehicle availability are available for counties in the 1970 census. (Only special tabulations can be purchased from the Census Bureau.) From the 1980 census, the categories "*Means of Transportation to Work*," "*Carpooling*," and "*Travel Time to Work*," contain the fewest categories, and "Ferryboat" was unavailable as an option (although that would have been of little use in Minnesota).

For carpooling, data categories repeat over the three censuses, 1980-2000, except that the 1980 category "*In 5-or-more person carpool*" was split into two categories for the 1990 and 2000 censuses.

Data for "*Time Leaving Home to Go to Work*" are unavailable in the 1980 census. Census 2000 has four fewer categories of data for this question than does the 1990 census. The principal difference is that Census 2000 focuses on the time period between 6:00 and 8:59 am.

Data for "*Vehicles Available*" are available in all years, but broken down by housing tenure only for 1990 and 2000, and the categories were the same in both of those censuses. One of the most helpful data sets from 1980, 1990 and 2000 describes the share of commuters who traveled outside their home county to work in another county.

Issues Addressed with Available Data

As noted earlier, the goal of this chapter is to summarize what the census tells us about daily commuting activity in and near 26 regional centers across Minnesota, and how commuting patterns changed over time in the 58 counties that are included in the 26 study areas. The expectation was that to the degree that sprawl-like dispersal of housing, population, and jobs has been occurring, the commuting statistics ought to reflect various facets of that dispersal.

The principal data sets that are useful for documenting the consequences of low-density development include those describing the *share of workers who commute to jobs outside their county of residence* and *how that share has increased*, along with *commute times* and *how they have been changing* as low-density development continues in the vicinity of regional centers in Greater Minnesota.

Table 4.3. Travel-Related Census Data Available at County Level, 1970-2000*

1970	1980	1990	2000
Not available at county level	**Table 174: Means of Transportation to Work** Private Vehicle Drive alone: Car, truck, or van Car pool Car, truck, or van Public transportation Bus or streetcar Subway, elevated train Railroad Taxicab Bicycle Motorcycle Walked only Other means Worked at home	**PO49: Means of Transportation to Work** Car, truck, or van: Drove alone Carpooled Public transportation Bus or trolley bus Streetcar or trolley car Subway or elevated Railroad Ferryboat Taxicab Motorcycle Bicycle Walked Other means Worked at home	**QT-P23: Means of Transportation and Carpooling** Car, truck, or van Drove alone Carpooled In 2-person carpool In 3-person carpool In 4-person carpool In 5/6-person carpool In 7 or more persons Public transportation Bus or trolley bus Streetcar or trolley car Subway or elevated Railroad Ferryboat Taxicab Motorcycle Bicycle Walked Other means Worked at home
No data (unpublished)	**Private Vehicle Occupancy** Drive alone In 2-person carpool In 3-person carpool In 4-person carpool In 5-or-more person pool Persons per private vehicle	**P053: Private Vehicle Occupancy** Car, truck, or van: Drove alone In 2-person carpool In 3-person carpool In 4-person carpool In 5-person carpool In 6-person carpool In 7-or-more-persons Other means	**Included in QT-P23 (above) in 2000**
Table 62: Automobiles Available (All occupied housing units) 1 2 3 or more none	**Table H-7: Vehicles Available** (All occupied housing units) 1 2 3 or more None	**H037: Tenure by Vehicles Available** Owner occupied None 1 2 3 4 5 or more Renter occupied None 1 2 3 4 5 or more	**QT-H11: Tenure by Vehicles Available** Owner occupied No vehicle available 1 vehicle available 2 vehicle available 3 vehicle available 4 vehicle available 5 or more vehicles Renter occupied No vehicle available 1 vehicle available 2 vehicle available 3 vehicle available 4 vehicle available 5 or more vehicles

Table 4.3. Travel-Related Census Data Available at County Level, 1970-2000 (continued)

1970	1980	1990	2000
No data (unpublished)	**Travel Time to Work** Less than 10 minutes 10-19 minutes 20-29 minutes 30-39 minutes 30 to 44 minutes 45 or more minutes Mean minutes	**P050: Travel Time to Work** Did not work at home: Less than 5 minutes 5 to 9 minutes 10 to 14 minutes 15 to 19 minutes 20 to 24 minutes 25 to 29 minutes 30 to 34 minutes 35 to 39 minutes 40 to 44 minutes 45 to 59 minutes 60 to 89 minutes 90 or more minutes Worked at home	**QT-P23: Travel Time to Work** Less than 10 minutes 10 to 14 minutes 15 to 19 minutes 20 to 24 minutes 25 to 29 minutes 30 to 34 minutes 35 to 44 minutes 45 to 59 minutes 60 to 89 minutes 90 or more minutes Mean travel time to work
No data (unpublished)	**No data**	**P052: Time Leaving Home to Go to Work** Did not work at home 12:00M to 4:59 am 5:00 am to 5:29 am 5:30 am to 5:59 am 6:00 am to 6:29 am 6:30 am to 6:59 am 7:00 am to 7:29 am 7:30 am to 7:59 am 8:00 am to 8:59 am 9:00 am to 9:59 am 10:00 am to 10:59 am 11:00 am to 11:59 am 12:00 N to 3:59 pm 4:00 pm to 11:59 pm Worked at home	**QT-P23: Time Leaving Home to Go to Work** 5:00 to 5:59 am 6:00 to 6:29 am 6:30 to 6:59 am 7:00 to 7:29 am 7:30 to 7:59 am 8:00 to 8:29 am 8:30 to 8:59 am 9:00 to 11:59 am 12:00 N to 3:59 pm All other times
Table 119: Place of Work *(Workers 14 years and over)* Worked in county of residence Percent of all workers Worked outside county of residence Place of work not reported	**Table 36: Place of Work** *(Workers 16 years and over)* Worked in state of residence Worked in county of residence Worked outside county of residence Worked outside State of residence Not reported	**P045. Place of Work** *(Workers 16 years and over)* Worked in state of residence Worked in county of residence Worked outside county of residence Worked outside state of residence	**QT-P25. Place of Work** *(Workers 16 years and over)* Worked in state of residence Worked in county of residence Worked outside county of residence Worked outside state of residence

* Census 2000 was the final occasion for the Census Bureau to collect detailed household and housing information using long-form questionnaires as part of the decennial census. See Appendix A for notes on plans for future data collection by the U.S. Bureau of the Census.

Data source: U.S. Bureau of the Census, and census long-form questionnaires for each decennial census, 1970-2000.

Share of All Workers Who Commute to Jobs Away from Home

For every study area, the decennial census uses the long-form questionnaire to estimate the number of persons 16 years of age and older who worked during the previous week. That estimated total is split between those who worked at home for compensation, and those who commuted to jobs outside the home (Table 4.4). The commuters are further described by whether they traveled alone to work, or traveled with one or more persons. Commuters are also described by their means of transportation to work.

Between 1980 and 2000, the proportion of workers who commuted to jobs away from home seems to have increased steadily. The share who commuted to jobs away from home in 1980 ranged from 74.3 percent (Lincoln County–Marshall area) to 98.2 percent (St. Louis County–Duluth-Superior Area) in the 56 counties, with a median county share of 87.1 to 87.6 percent, or about *seven of eight* workers.

The shares increased on average somewhat after 1980, so that by census time in 1990 they ranged from 79.4 percent (Murray County–Marshall and Worthington areas), to 96.7 percent (St. Louis County–Duluth-Superior Area), with a median county share of 89.8 percent.

By 2000, the shares had increased once again on average, revealing a median value of 92.9 to 93.2 percent, and a range from 87.3 percent (Lyon County–Marshall area) to 96.5 percent (again in the St. Louis County–Duluth-Superior Area).

The general trend over the 20-year period seems to be one of workers moving from work at home to work outside the home, such that by census 2000 the median county share was *more than nine out of ten workers* commuting.

Workers Commuting to Jobs Outside Their County of Residence

We have 26 study areas, defined as commute sheds or commuting fields linked with the central counties containing one of Mn/DOT's 49 regional centers outside the Twin Cities area (Table 4.5). Each study area consists of one or more counties (Figure 1.3). A county is included in the commute shed of a regional center if it sends at least 5 percent of its workforce as daily commuters to the central county. On the basis of this criterion, the Twin Cities commuting field contained 24 counties in 1990, including four in Wisconsin—the set of counties included in the TRG study. In the present investigation, we used the same 5-percent criterion, which defined some study areas to include only one county, while others encompassed as many as six (Mankato-NM), seven (Rochester, Fargo-Moorhead), or more (Grand Forks-EGF: nine).

In every county of every study area, the percentage of all workers who commuted to jobs outside their county of residence increased between 1980 and 2000 (Table 4.5). This overall trend included the counties with the *lowest* percentages in 1980, which rose in the following two decades (i.e., Koochiching County/International Falls: 4.3 to 7.4 percent; Olmsted County/ Rochester: 3.5 to 5.5 percent; Nobles County/Worthington: 4.2 to 13.8 percent; Lyon County/Marshall: 4.3 to 5.8 percent), as well as those with the *highest* share of commuters to

Table 4.4. Share of Workers Commuting to Their Jobs, 1980-2000

Study Area; Central County; other MN Counties in Commuting Field	Workers										
	1980			1990			Chng in # of comm 1980-1990	2000			Chng in # of comm 1990-2000
	Total	Workers who commute		Total	Workers who commute			Total	Workers who commute		
		No	%		No.	%			No.	%	
Albert Lea											
Freeborn	15,270	14,050	92.0	14,589	13,556	92.9	-494	15,801	14,962	94.7	1,406
Alexandria											
Douglas	11,347	10,008	88.2	12,671	11,641	91.9	1,633	16,283	15,052	92.4	3,411
Grant	2,576	2,080	80.7	2,602	2,076	79.8	-4	2,959	2,645	89.4	569
Pope	4,334	3,480	80.3	4,440	3,574	80.5	94	5,285	4,683	88.6	1,109
Todd	9,459	7,492	79.2	9,323	7,638	81.9	146	11,019	9,884	89.7	2,246
Bemidji											
Beltrami	11,627	10,582	91.0	13,704	12,748	93.0	2,166	17,713	16,809	94.9	4,061
Clearwater	2,621	2,164	82.6	2,848	2,456	86.2	292	3,491	3,271	93.7	815
Hubbard	4,515	4,142	91.7	5,746	5,149	89.6	1,007	7,862	7,386	93.9	2,237
Brainerd											
Crow Wing	14,108	13,252	93.9	17,910	17,027	95.1	3,775	25,420	24,281	95.5	7,254
Aitkin	3,995	3,602	90.2	4,346	3,874	89.1	272	6,098	5,610	92.0	1,736
Cass	6,197	5,543	89.4	7,570	6,902	91.2	1,359	11,436	10,653	93.2	3,751
Detroit Lakes											
Becker	10,422	9,129	87.6	11,194	10,113	90.3	984	13,630	12,658	92.9	2,545
Mahnomen	1,830	1,616	88.3	1,653	1,392	84.2	-224	2,200	1,966	89.4	574
Duluth-Superior											
St. Louis	86,760	85,188	98.2	82,007	79,279	96.7	-5,909	92,771	89,560	96.5	10,281
Carlton	10,546	9,855	93.4	11,685	11,157	95.5	1,302	14,100	13,577	96.3	2,420
Lake	4,804	4,644	96.7	4,217	4,020	95.3	-624	5,114	4,852	94.9	832
Fairmont											
Martin	10,887	9,637	88.5	10,263	9,212	89.8	-425	10,620	9,932	93.5	720
Fargo-Moorhead											
Clay	22,255	21,155	95.1	24,008	22,658	94.4	1,503	25,430	24,467	96.2	1,809
Becker	10,422	9,129	87.6	11,194	10,113	90.3	984	13,630	12,658	92.9	2,545
Norman	3,319	2,642	79.6	3,166	2,668	84.3	26	3,328	3,041	91.4	373
Wilkin	3,330	2,784	83.6	3,200	2,872	89.8	88	3,414	3,133	91.8	261
Fergus Falls											
Ottertail	19,214	16,245	84.5	21,779	18,877	86.7	2,632	26,150	24,247	92.7	5,370
Grant	2,576	2,080	80.7	2,602	2,076	79.8	-4	2,959	2,645	89.4	569
Wilkin	3,253	2,784	85.6	3,200	2,872	89.8	88	3,414	3,133	91.8	261
Grand Forks-EGF											
Polk	13,803	12,582	91.2	13,745	12,267	89.2	-315	14,186	13,421	94.6	1,154
Norman	3,283	2,642	80.5	3,166	2,668	84.3	26	3,328	3,041	91.4	373
Marshall	4,820	3,792	78.7	4,305	3,736	86.8	-56	4,460	4,109	92.1	373
Red Lake	1,672	1,528	91.4	1,730	1,451	83.9	-77	1,903	1,744	91.6	293
Grand Rapids											
Itasca	13,819	13,257	95.9	14,944	14,155	94.7	898	18,909	18,137	95.9	3,982
Hibbing											
St. Louis	86,760	85,188	98.2	82,007	79,279	96.7	-5,909	92,771	89,560	96.5	10,281
Itasca	13,819	13,257	95.9	14,944	14,155	94.7	898	18,909	18,137	95.9	3,982

Table 4.4. Share of Workers Commuting to Their Jobs, 1980-2000 (continued)

Study Area; Central County; other MN Counties in Commuting Field	Workers										
	1980			1990			Chng in # of comm 1980-1990	2000			Chng in # of comm 1990-2000
	Total	Workers who commute		Total	Workers who commute			Total	Workers who commute		
		No	%		No	%			No	%	
International Falls											
Koochiching	6,400	6,151	96.1	7,117	6,844	96.2	693	6,358	6,080	95.6	-764
Little Falls											
Morrison	10,202	8,378	82.1	12,042	10,299	85.5	1,921	14,849	13,547	91.2	3,248
Todd	9,459	7,492	79.2	9,323	7,638	81.9	146	11,019	9,884	89.7	2,246
Mankato-NM											
Blue Earth	23,509	21,802	92.7	27,299	25,811	94.5	4,009	30,876	29,516	95.6	3,705
Faribault	7,393	6,411	86.7	7,157	6,303	88.1	-108	7,621	6,993	91.8	690
Le Sueur	9,626	8,598	89.3	10,759	9,904	92.1	1,306	13,204	12,486	94.6	2,582
Nicollet	12,072	11,196	92.7	14,370	13,401	93.3	2,205	16,542	15,717	95.0	2,316
Waseca	7,841	6,985	89.1	8,513	7,772	91.3	787	9,652	9,100	94.3	1,328
Watonwan	4,905	4,167	85.0	5,283	4,733	89.6	566	5,495	5,149	93.7	416
Marshall											
Lyon	11,241	10,000	89.0	11,792	10,716	90.9	716	13,216	12,523	94.8	1,807
Lincoln	3,302	2,455	74.3	2,897	2,289	79.0	-166	3,066	2,676	87.3	387
Murray	4,344	3,270	75.3	4,064	3,225	79.4	-45	4,489	3,997	89.0	772
Redwood	7,561	6,226	82.3	7,514	6,326	84.2	100	8,061	7,317	90.8	991
Yellow Medicine	5,233	4,317	82.5	4,848	4,104	84.7	-213	5,165	4,705	91.1	601
Montevideo											
Chippewa	5,959	5,102	85.6	5,848	5,220	89.3	118	6,256	5,747	91.9	527
Lac qui Parle	4,267	3,388	79.4	3,688	3,032	82.2	-356	3,800	3,375	88.8	343
Yellow Medicine	5,233	4,317	82.5	4,848	4,104	84.7	-213	5,165	4,705	91.1	601
New Ulm											
Brown	12,647	11,018	87.1	12,684	11,499	90.7	481	13,585	12,610	92.8	1,111
Nicollet	12,072	11,196	92.7	14,370	13,401	93.3	2,205	16,542	15,717	95.0	2,316
Owatonna											
Steele	13,801	12,889	93.4	15,330	14,385	93.8	1,496	17,848	16,911	94.8	2,526
Dodge	6,312	5,428	86.0	7,621	6,921	90.8	1,493	9,205	8,621	93.7	1,700
Waseca	7,841	6,985	89.1	8,513	7,772	91.3	787	9,652	9,100	94.3	1,328
Park Rapids											
Hubbard	4,606	4,142	89.9	5,746	5,149	89.6	1,007	7,862	7,386	93.9	2,237
Becker	10,422	9,129	87.6	11,194	10,113	90.3	984	13,630	12,658	92.9	2,545
Rochester											
Olmsted	46,247	44,160	95.5	56,518	54,341	96.1	10,181	65,891	63,452	96.3	9,111
Dodge	6,312	5,428	86.0	7,621	6,921	90.8	1,493	9,205	8,621	93.7	1,700
Fillmore	8,950	7,120	79.6	9,369	7,895	84.3	775	10,649	9,442	88.7	1,547
Goodhue	16,963	15,242	89.9	19,308	17,806	92.2	2,564	23,092	21,827	94.5	4,021
Mower	16,479	15,188	92.2	16,150	15,027	93.0	-161	18,336	17,503	95.5	2,476
Wabasha	8,197	6,831	83.3	9,080	8,053	88.7	1,222	11,174	10,223	91.5	2,170
Winona	20,043	18,574	92.7	23,579	21,949	93.1	3,375	26,103	24,646	94.4	2,697
Wadena											
Wadena	4,631	4,049	87.4	5,176	4,551	87.9	502	5,831	5,357	91.9	806
Todd	9,459	7,492	79.2	9,323	7,638	81.9	146	11,019	9,884	89.7	2,246

Table 4.4. Share of Workers Commuting to Their Jobs, 1980-2000 (continued)

Study Area; Central County; other MN Counties in Commuting Field	Workers										
	1980			1990			Chng in # of comm 1980-1990	2000			Chng in # of comm 1990-2000
	Total	Workers who commute		Total	Workers who commute			Total	Workers who commute		
		No	%		No	%			No	%	
Waseca											
Waseca	7,841	6,985	89.1	8,513	7,772	91.3	787	9,652	9,100	94.3	1,328
Willmar											
Kandiyohi	15,663	14,329	91.5	17,733	16,396	92.5	2,067	20,815	19,755	94.9	3,359
Chippewa	5,959	5,102	85.6	5,848	5,220	89.3	118	6,256	5,747	91.9	527
Renville	8,094	6,814	84.2	7,367	6,239	84.7	-575	8,176	7,439	91.0	1,200
Swift	5,221	4,497	86.1	4,409	3,716	84.3	-781	5,160	4,733	91.7	1,017
Winona											
Winona	20,043	18,574	92.7	23,579	21,949	93.1	3,375	26,103	24,646	94.4	2,697
Worthington											
Nobles	9,293	7,940	85.4	9,110	7,879	86.5	-61	10,012	9,258	92.5	1,379
Jackson	5,815	4,672	80.3	5,105	4,360	85.4	-312	5,596	5,046	90.2	686
Murray	4,344	3,270	75.3	4,064	3,225	79.4	-45	4,489	3,997	89.0	772

Data source: U.S. Bureau of the Census

Table 4.5. Share of Workers Commuting to Jobs Outside Their County of Residence, 1980-2000

Study Area; Central County; other MN Counties in Commuting Field	1980 Percent of All Workers	1990 Percent of All Workers	2000 Percent of All Workers
Albert Lea			
Freeborn	7.3	15.6	22.3
Alexandria			
Douglas	6.7	10.2	11.4
Grant	13.7	23.0	30.3
Pope	13.8	30.3	32.1
Todd	16.5	33.0	40.7
Bemidji			
Beltrami	8.0	10.4	12.2
Clearwater	15.2	25.0	32.0
Hubbard	27.6	34.7	38.0
Brainerd			
Crow Wing	8.1	8.9	13.0
Aitkin	18.8	25.5	34.9
Cass	23.5	37.4	39.9
Detroit Lakes			
Becker	13.7	19.8	24.8
Mahnomen	16.6	27.0	20.5
Duluth-Superior			
St. Louis	6.1	7.5	9.2
Carlton	26.5	29.5	31.9
Lake	23.0	20.0	27.8
Fairmont			
Martin	6.3	9.6	15.3
Fargo-Moorhead			
Clay	39.5	48.4	53.1
Becker	13.7	19.8	24.8
Norman	10.9	23.6	30.4
Wilkin	35.4	48.4	54.1
Fergus Falls			
Ottertail	9.4	14.5	18.8
Grant	13.7	23.0	30.3
Wilkin	35.4	48.4	54.1
Grand Forks-EGF			
Polk	21.9	28.2	30.4
Norman	10.9	23.6	30.4
Marshall	17.5	35.0	43.8
Red Lake	21.6	32.5	43.6
Grand Rapids			
Itasca	11.8	11.8	60.4
Hibbing			
St. Louis	6.1	3.8	9.2
Itasca	11.8	13.2	15.6

Table 4.5. Share of Workers Commuting to Jobs Outside Their County of Residence, 1980-2000 (continued)

Study Area; Central County; other MN Counties in Commuting Field	1980 Percent of All Workers	1990 Percent of All Workers *	2000 Percent of All Workers
International Falls			
Koochiching	4.2	4.5	7.4
Little Falls			
Morrison	14.0	23.7	32.5
Todd	16.5	33.0	40.7
Mankato-NM			
Blue Earth	14.7	22.7	23.2
Faribault	9.3	17.2	22.8
Le Sueur	37.5	50.0	53.1
Nicollet	45.0	48.1	48.8
Waseca	12.6	21.3	30.3
Watonwan	11.3	16.4	25.3
Marshall			
Lyon	4.3	6.4	5.8
Lincoln	13.3	25.9	36.7
Murray	15.5	25.1	32.6
Redwood	9.8	17.1	18.4
Yellow Medicine	14.6	26.1	34.7
Montevideo			
Chippewa	14.1	21.6	25.7
Lac qui Parle	9.5	21.9	26.6
Yellow Medicine	14.6	26.1	34.7
New Ulm			
Brown	6.2	9.1	10.4
Owatonna			
Steele	8.4	13.0	16.9
Dodge	41.0	55.3	55.8
Waseca	12.6	21.3	30.3
Park Rapids			
Hubbard	27.6	34.7	38.0
Becker	13.7	19.8	24.8
Rochester			
Olmsted	3.5	5.3	5.5
Dodge	41.0	55.3	55.8
Fillmore	16.9	32.2	37.0
Goodhue	18.9	27.6	32.6
Mower	13.6	20.8	22.7
Wabasha	23.9	44.3	43.5
Winona	9.8	13.9	16.7
Wadena			
Wadena	15.6	21.7	25.0
Todd	16.5	33.0	40.7
Waseca			
Waseca	12.6	21.3	30.3

Table 4.5. Share of Workers Commuting to Jobs Outside Their County of Residence, 1980-2000 (continued)

Study Area; Central County; other MN Counties in Commuting Field	1980 Percent of All Workers	1990 Percent of All Workers *	2000 Percent of All Workers
Willmar			
Kandiyohi	6.0	8.7	11.6
Chippewa	14.1	21.6	25.7
Renville	17.8	23.2	30.0
Swift	9.1	22.6	23.7
Winona			
Winona	9.8	13.9	16.7
Worthington			
Nobles	4.2	10.0	13.8
Jackson	15.9	24.9	29.1
Murray	15.5	25.1	32.6

Data source: U.S. Bureau of the Census.

outside destinations in 1980 (i.e., Nicollet County/Mankato area: 45.0 to 48.8 percent; Dodge County/Owatonna Area: 41.0 to 55.8 percent; Clay County/Fargo-Moorhead area: 39.5 to 53.1 percent; Wilkin County/Fargo Moorhead area: 35.4 to 54.1 percent).

Share of Commuters Driving Alone to Their Jobs

Some commuters drive alone during their commute, others drive with one or more people and still others commute by other means such as walking, bicycle, or transit (Table 4.6). We have data for three censuses, and the numbers present a profile that is difficult to interpret. In 1980, the 56 counties ranged from 52.7 percent of commuters driving alone to work (Mahnomen County–Detroit Lakes area) to a high of 74.1 percent (Freeborn County–Albert Lea area). The median percentage for the 566 counties was 61.2 to 61.3 percent.

By census time 1990, however, every county showed an increase in *number* of commuters driving to work alone, and in all cases the *percentage* of workers commuting alone also rose, sometimes by a substantial fraction. Even in cases where the total number of commuters *declined* between 1980 and 1990, the number of commuters driving alone *increased* (e.g., St. Louis County).

On the other hand, by census time in 2000, another pattern had emerged whereby the percentage of commuters driving alone had risen in only 17 counties. In every one of the 56 counties, the number of commuters driving alone rose, often by many thousands of workers. Even in Koochiching County, where the total number of commuters dropped between 1990 and 2000, the number of workers driving alone to work rose slightly. These statistics appear to show that, indeed, daily commuting traffic is rising steadily, partially due to a greater number of commuters in most cases, but increasingly due to workers commuting alone. As the following data indicate, those solo commuters, on average, are also spending more time on average in their commutes.

Commuting Times in Areas Where Commute Field Populations Grew Faster Than Regional Center Populations

A second indication of the dispersal of housing, population, jobs and the trend toward longer commutes in recent decades is average commute times, and how they increased between 1980 and 2000. For ease of interpretation, we classified study areas (i.e., commuting fields) into several groups depending on population change in regional centers and in commute fields in the 1990s. A *first* group consists of seven study areas where commute field populations grew faster than regional center populations during the 1990s (Table 4.7). In 1980, in all counties in this group, mean commuting times were less than 20 minutes. By 2000, all mean commute times had increased, from 8 percent (St. Louis County/Duluth) to 67 percent (Wilkin County/Fergus Falls area), with a median increase in commuting time among the 21 counties of 41 percent. More than half the counties saw an increase of over 40 percent in worker commute times between 1980 and 2000.

Table 4.6. Share of Commuters Driving Alone to Their Jobs, 1980-2000

Study Area; Central County; other MN Counties in Commuting Field	Commuters										
	1980			1990			Chng in # alone 80-90	2000			Chng in # alone 90-00
	Total	Drove Alone		Total	Drove Alone			Total	Drove Alone		
		No.	%		No.	%			No.	%	
Albert Lea											
Freeborn	14,050	10,407	74.1	13,556	11,297	83.3	890	14,962	12,731	80.6	1,434
Alexandria											
Douglas	10,008	7,034	70.3	11,641	9,704	83.4	2,670	15,052	12,858	79.0	3,154
Grant	2,080	1,219	58.6	2,076	1,623	78.2	404	2,645	2,168	73.3	545
Pope	3,480	2,233	64.2	3,574	2,842	79.5	609	4,683	3,978	75.3	1,136
Todd	7,492	4,310	57.5	7,638	6,039	79.1	1,729	9,884	7,911	71.8	1,872
Bemidji											
Beltrami	10,582	6,581	62.2	12,748	9,769	76.6	3,188	16,809	12,809	72.3	3,040
Clearwater	2,164	1,454	67.2	2,456	1,836	74.8	382	3,271	2,572	73.7	736
Hubbard	4,142	2,681	64.7	5,149	4,052	78.7	1,371	7,386	6,123	77.9	2,071
Brainerd											
Crow Wing	13,252	9,460	71.4	17,027	14,092	82.8	4,632	24,281	20,606	81.1	6,514
Aitkin	3,602	2,236	62.1	3,874	2,993	77.3	757	5,610	4,517	74.1	1,524
Cass	5,543	3,403	61.4	6,902	5,432	78.7	2,029	10,653	8,497	74.3	3,065
Detroit Lakes											
Becker	9,129	5,978	65.5	10,113	7,888	78.0	1,910	12,658	10,381	76.2	2,493
Mahnomen	1,616	851	52.7	1,392	1,055	75.8	204	1,966	1,460	66.4	405
Duluth-Superior											
St. Louis	85,188	50,338	59.1	79,279	59,581	75.2	9,243	89,560	72,671	78.3	13,090
Carlton	9,855	6,820	69.2	11,157	9,170	82.2	2,350	13,577	11,583	82.1	2,413
Lake	4,644	2,643	56.9	4,020	3,193	79.4	550	4,852	3,856	75.4	663
Fairmont											
Martin	9,637	6,650	69.0	9,212	7,384	80.2	734	9,932	8,400	79.1	1,016
Fargo-Moorhead											
Clay	21,155	13,340	63.1	22,658	16,874	74.5	3,534	24,467	19,679	77.4	2,805
Becker	9,129	5,978	65.5	10,113	7,888	78.0	1,910	12,658	10,381	76.2	2,493
Norman	2,642	1,707	64.6	2,668	2,130	79.8	423	3,041	2,353	70.7	223
Wilkin	2,784	1,681	60.4	2,872	2,286	79.6	605	3,133	2,631	77.1	345
Fergus Falls											
Ottertail	16,245	10,646	65.5	18,877	15,058	79.8	4,412	24,247	19,848	75.9	4,790
Grant	2,080	1,219	58.6	2,076	1,623	78.2	404	2,645	2,168	73.3	545
Wilkin	2,784	1,681	60.4	2,872	2,286	79.6	605	3,133	2,631	77.1	345
Grand Forks-EGF											
Polk	12,582	8,213	65.3	12,267	9,812	80.0	1,599	13,421	10,954	77.2	1,142
Norman	2,642	1,707	64.6	2,668	2,130	79.8	423	3,041	2,353	70.7	223
Marshall	3,792	2,299	60.6	3,736	2,668	71.4	369	4,109	3,266	73.2	598
Red Lake	1,528	998	65.3	1,451	1,102	75.9	104	1,744	1,383	72.7	281
Grand Rapids											
Itasca	13,257	9,027	68.1	14,155	11,373	80.3	2,346	18,137	15,129	80	3,756
Hibbing											
St. Louis	85,188	50,338	59.1	79,279	59,581	75.2	9,243	89,560	72,671	78.3	13,090
Itasca	13,257	9,027	68.1	14,155	11,373	80.3	2,346	18,137	15,129	80	3,756

Table 4.6. Share of Commuters Driving Alone to Their Jobs, 1980-2000 (continued)

Study Area; Central County; other MN Counties in Commuting Field	Commuters										
	1980			1990			Chng in # alone 80-90	2000			Chng in # alone 90-00
	Total	Drove Alone		Total	Drove Alone			Total	Drove Alone		
		No.	%		No.	%			No.	%	
International Falls											
Koochiching	6,151	3,939	64.0	6,844	4,911	71.8	972	6,080	4,978	78.3	67
Little Falls											
Morrison	8,378	5,111	61.0	10,299	7,884	76.6	2,773	13,547	10,925	73.6	3,041
Todd	7,492	4,310	57.5	7,638	6,039	79.1	1,729	9,884	7,911	71.8	1,872
Mankato-NM											
Blue Earth	21,802	14,674	67.3	25,811	19,653	76.1	4,979	29,516	23,752	76.9	4,099
Faribault	6,411	4,214	65.7	6,303	4,800	76.2	586	6,993	5,683	74.6	883
Le Sueur	8,598	5,789	67.3	9,904	7,533	76.1	1,744	12,486	10,332	78.2	2,799
Nicollet	11,196	7,241	64.7	13,401	10,140	75.7	2,899	15,717	12,664	76.6	2,524
Waseca	6,985	4,432	63.5	7,772	5,866	75.5	1,434	9,100	7,523	77.9	1,657
Watonwan	4,167	2,701	64.8	4,733	3,379	71.4	678	5,149	3,978	72.4	599
Marshall											
Lyon	10,000	6,487	64.9	10,716	8,130	75.9	1,643	12,523	10,017	75.8	1,887
Lincoln	2,455	1,456	59.3	2,289	1,615	70.6	159	2,676	2,210	72.1	595
Murray	3,270	2,029	62.0	3,225	2,406	74.6	377	3,997	3,127	69.7	721
Redwood	6,226	3,762	60.4	6,326	4,692	74.2	930	7,317	5,822	72.2	1,130
Yellow Medicine	4,317	2,688	62.3	4,104	3,009	73.3	321	4,705	3,875	75	866
Montevideo											
Chippewa	5,102	3,392	66.5	5,220	3,977	76.2	585	5,747	4,811	76.9	834
Lac qui Parle	3,388	2,077	61.3	3,032	2,304	76.0	227	3,375	2,735	72	431
Yellow Medicine	4,317	2,688	62.3	4,104	3,009	73.3	321	4,705	3,875	75	866
New Ulm											
Brown	11,018	7,060	64.1	11,499	8,724	75.9	1,664	12,610	10,309	75.9	1,585
Nicollet	11,196	7,241	64.7	13,401	10,140	75.7	2,899	15,717	12,664	76.6	2,524
Owatonna											
Steele	12,889	8,452	65.6	14,385	11,546	80.3	3,094	16,911	14,221	79.7	2,675
Dodge	5,428	3,296	60.7	6,921	5,194	75.0	1,898	8,621	7,164	77.8	1,970
Waseca	6,985	4,432	63.5	7,772	5,866	75.5	1,434	9,100	7,523	77.9	1,657
Park Rapids											
Hubbard	4,142	2,681	64.7	5,149	4,052	78.7	1,371	7,386	6,123	77.9	2,071
Becker	9,129	5,978	65.5	10,113	7,888	78.0	1,910	12,658	10,381	76.2	2,493
Rochester											
Olmsted	44,160	28,673	64.9	54,341	42,428	78.1	13,755	63,452	50,897	77.2	8,469
Dodge	5,428	3,296	60.7	6,921	5,194	75.0	1,898	8,621	7,164	77.8	1,970
Fillmore	7,120	4,195	58.9	7,895	5,680	71.9	1,485	9,442	7,268	68.3	1,588
Goodhue	15,242	9,805	64.3	17,806	13,816	77.6	4,011	21,827	18,341	79.4	4,525
Mower	15,188	10,677	70.3	15,027	11,934	79.4	1,257	17,503	14,502	79.1	2,568
Wabasha	6,831	4,075	59.7	8,053	5,985	74.3	1,910	10,223	8,166	73.1	2,181
Winona	18,574	11,407	61.4	21,949	16,063	73.2	4,656	24,646	19,686	75.4	3,623

Table 4.6. Share of Commuters Driving Alone to Their Jobs, 1980-2000 (continued)

Study Area; Central County; other MN Counties in Commuting Field	Workers										
	1980			1990			Chng in # of comm 1980-1990	2000			Chng in # of comm 1990-2000
	Total	Workers who commute		Total	Workers who commute			Total	Workers who commute		
		No	%		No	%			No	%	
Wadena											
Wadena	4,049	2,728	67.4	4,551	3,644	80.1	916	5,357	4,310	73.9	666
Todd	7,492	4,310	57.5	7,638	6,039	79.1	1,729	9,884	7,911	71.8	1,872
Waseca											
Waseca	7,841	6,985	89.1	8,513	7,772	91.3	787	9,652	9,100	94.3	1,328
Willmar											
Kandiyohi	15,663	14,329	91.5	17,733	16,396	92.5	2,067	20,815	19,755	94.9	3,359
Chippewa	5,959	5,102	85.6	5,848	5,220	89.3	118	6,256	5,747	91.9	527
Renville	8,094	6,814	84.2	7,367	6,239	84.7	-575	8,176	7,439	91.0	1,200
Swift	5,221	4,497	86.1	4,409	3,716	84.3	-781	5,160	4,733	91.7	1,017
Winona											
Winona	20,043	18,574	92.7	23,579	21,949	93.1	3,375	26,103	24,646	94.4	2,697
Worthington											
Nobles	9,293	7,940	85.4	9,110	7,879	86.5	-61	10,012	9,258	92.5	1,379
Jackson	5,815	4,672	80.3	5,105	4,360	85.4	-312	5,596	5,046	90.2	686
Murray	4,344	3,270	75.3	4,064	3,225	79.4	-45	4,489	3,997	89.0	772

Data source: U.S. Bureau of the Census

Table 4.7. Commute Times 1980, 1990 and 2000 in Areas Where Commute Field Populations Grew Faster Than Regional Center, 1990-2000

Study Area; Central County; other Counties in Commuting Field	Mean Minutes Commuting—All Commutes			Mean Minutes Commuting—Commutes Exceeding 45 minutes				
							Change '80-'00	
	1980	1990	2000	1980	1990	2000	Minutes	Percent
Brainerd Area								
Crow Wing	15.9	17.6	20.5	67.0	73.0	76.3	9.3	13.9
Aitkin	18.3	20.9	25.2	65.8	74.7	74.5	8.7	13.2
Cass	18.0	21.3	21.9	64.8	68.4	71.9	7.1	11.0
Fergus Falls Area								
Otter Tail	14.1	17.0	19.4	62.0	71.6	73.4	11.4	18.4
Grant	11.4	14.8	19.0	68.4	72.6	74.4	6.0	8.8
Wilkin	12.0	15.2	18.3	57.7	63.0	67.9	10.2	17.7
Wadena Area								
Wadena	12.9	15.6	19.3	67.9	73.3	74.0	6.1	8.9
Todd	14.1	17.4	23.2	67.8	69.1	74.8	7.0	10.3
Mankato-NM Area								
Blue Earth	13.6	16.8	17.0	65.0	76.7	78.0	13.0	20.0
Faribault	11.8	15.8	19.4	62.8	70.3	72.6	9.8	15.6
Le Sueur	15.5	22.1	22.5	60.6	69.2	68.4	7.8	12.9
Nicollet	12.2	14.8	15.1	82.2	74.4	79.2	-3.0	-3.6
Waseca	12.5	16.8	17.6	70.2	70.5	74.0	3.8	5.4
Watonwan	10.8	14.5	17.7	65.1	66.4	70.4	5.3	9.2
Duluth-Sup Area								
St. Louis	17.9	19.4	19.4	60.3	70.2	74.9	14.6	24.2
Carlton	17.1	19.0	21.2	59.3	66.4	71.9	12.6	21.2
Lake	13.4	18.2	21.4	56.4	66.7	68.3	11.9	21.1
Bemidji Area								
Beltrami	14.9	18.2	19.4	61.4	75.6	76.1	14.7	23.9
Clearwater	16.7	20.0	23.9	67.4	73.0	72.2	4.8	7.1
Hubbard	16.4	19.3	20.7	64.0	76.4	76.8	12.8	20.0
Waseca Area								
Waseca	12.5	16.8	17.6	70.2	70.5	74.0	3.8	5.4

Source: U.S. Bureau of the Census

An important subset of all commuters are those with daily one-way commutes exceeding 45 minutes. In all of the 21 counties in the first group, the mean minutes commuting to work by those spending 45 minutes or more going to work increased markedly between 1980 and 2000. In three counties (Aitkin—Brainerd area; Le Sueur—Mankato area; and Clearwater—Bemidji area) the mean declined somewhat after 1990. [59]

Without detailed information about the changing locations of job opportunities and populations in each of these seven study areas, we cannot infer or interpret the causes of the steady increases in commute times. It seems likely that the increases are due to longer commutes on average because the previous table disclosed the increases in workers traveling outside their county of

residence to work. It seems unlikely that the longer times spent commuting are due to heavy traffic at rush hour because most of the counties in the seven study areas are well supplied with uncongested roads. It is possible, and perhaps likely, that some of these statistics reflect the dispersal of populations to low-density residential settings with commuters trading the costs of longer commutes for the opportunity to live near a lake or on large lots at dispersed locations, a common phenomenon underway for years in the suburbs and exurban areas of the Twin Cities.

Commuting Times in Areas Where Regional Center Population Grew Faster Than Commute Field Population Grew

There were ten study areas where populations in both the regional center and the entire commute field grew in the 1990s, but the regional center population grew faster than the overall commute field population (center included) (Table 4.8). This second group contained ten study areas within 26 counties. Five of the 26 counties are part of two (e.g., Dodge) or three (e.g., Becker) different study areas. The difference between this set of ten study areas and the first group of seven discussed in the previous section is that in these ten cases, the regional centers displayed faster growth in the 1990s than the commute field as a whole.

It is hard to detect much difference in the commute times between the two groups of counties, based on the differences in regional center population growth and commute field growth during the 1990s.

In *all* counties in both groups, mean commute times in 1980 were *under* 20 minutes. By Census 2000, 19 of the 47 counties had mean commute times *exceeding* 20 minutes.

In *all* counties in both tables, the mean commute time in 2000 was greater than in 1980, sometimes by as much as 67 percent (Grant County—Fergus Falls area, Table 4.7) and 77 percent, (Norman—Fargo-Moorhead area, Table 4.8).

The mean minutes commuting by workers whose commutes exceeded 45 minutes ranged from 67.1 minutes to 80.4 minutes in 2000, and had increased between 1980 and 2000 in all counties except Nicollet County north of Mankato in the New Ulm Area (Table 4.8). The Nicollet County decline in mean commuting time for long-distance commuters may be due in part to more jobs closer to home during those two decades, or to improved highway access and higher average speeds to jobs via US169 to the Twin Cities suburbs.

Table 4.8. Commute Times 1980, 1990 and 2000 in Areas Where Regional Center Population Grew Faster Than Commute Field Population, 1990-2000

Study Area; Central County; Other MN Counties in Commute Field	Mean Minutes Commuting—All Commutes			Mean Minutes Commuting—Commutes Exceeding 45 Minutes				
							Change '80-'00	
	1980	1990	2000	1980	1990	2000	Minutes	Percent
Fargo-Moorhead Area								
Clay	15.0	17.3	17.4	63.0	73.4	70.5	7.5	11.9
Becker	16.9	20.0	23.1	66.1	71.6	72.2	6.1	9.2
Norman	11.8	17.5	20.9	55.9	65.2	68.0	12.1	21.6
Wilkin	12.4	15.2	18.3	57.7	63.0	67.9	10.2	17.7
Alexandria Area								
Douglas	13.7	16.2	17.2	75.9	76.8	77.7	1.8	2.4
Grant	11.4	14.8	19.0	68.4	72.6	74.4	6.0	8.8
Pope	13.1	16.3	18.0	66.6	69.1	73.1	6.5	9.8
Todd	14.1	17.4	23.2	67.8	69.1	74.8	7.0	10.3
Rochester Area								
Olmsted	14.0	16.7	16.3	67.0	74.1	78.6	11.6	17.3
Dodge	18.3	21.8	22.6	57.4	65.0	72.5	15.1	26.3
Fillmore	16.1	21.3	25.0	57.8	63.5	67.4	9.6	16.6
Goodhue	15.5	20.5	21.3	58.6	67.8	66.8	8.2	14.0
Mower	14.6	18.6	18.7	60.9	65.5	67.1	6.2	10.2
Wabasha	16.4	22.7	23.7	55.1	66.1	69.5	14.4	26.1
Winona	13.1	16.2	17.0	59.3	67.4	71.5	12.2	20.6
Detroit Lakes Area								
Becker	16.9	20.0	23.1	66.1	71.6	72.2	6.1	9.2
Mahnomen	13.5	18.8	21.5	64.3	77.6	80.4	16.1	25.0
Owatonna Area								
Steele	12.3	15.9	16.3	65.8	68.3	69.8	4.0	6.1
Dodge	18.3	21.8	22.6	57.4	65.0	72.5	15.1	26.3
Waseca	12.5	16.8	17.6	70.2	70.5	74.0	3.8	5.4
Park Rapids Area								
Hubbard	16.4	19.3	20.7	64.0	76.4	76.8	12.8	20.0
Becker	16.9	20.0	23.1	66.1	71.6	72.2	6.1	9.2
Little Falls Area								
Morrison	16.9	21.3	24.6	61.9	68.1	71.0	9.1	14.7
Todd	14.1	17.4	23.2	67.8	69.1	74.8	7.0	10.3
Winona Area								
Winona	13.1	16.2	17.0	59.3	67.4	71.5	12.2	20.6
Willmar Area								
Kandiyohi	13.2	16.7	17.9	66.9	75.7	75.9	9.0	13.5
Chippewa	10.6	14.7	15.3	61.7	72.9	73.8	12.1	19.6
Renville	10.9	16.2	18.8	65.4	71.2	78.3	12.9	19.7
Swift	11.2	16.0	17.2	49.5	61.5	74.3	24.8	50.1
New Ulm Area								
Brown	10.4	12.9	14.5	60.6	70.7	80.1	19.5	32.2
Nicollet	12.2	14.8	15.1	82.2	74.7	79.2	-3.0	-3.6

Data Source: U. S. Bureau of the Census

Commute Times in Areas with Population Loss in Regional Center, or in Commute Fields, or in Both

Each of the remaining nine study areas composed of a regional center and adjacent commute shed was classified into one of three groups based on population changes in the regional center compared with population in the overall commuting field during the 1990s (Table 4.9). The three groups of study areas each experienced a different pattern of demographic challenge. In the first group (Grand Rapids and Hibbing areas) the regional center lost population in the 1990s, while the overall study areas gained. In the second group (Worthington, Marshall, and Albert Lea areas) the regional centers gained population while each of their overall study areas lost population. The third set (Montevideo, Fairmont, Grand Forks-EGF, and International Falls areas) includes study areas where both the regional center and the overall study area lost population.

Study areas were grouped this way to see if any patterns could be detected in commute-time trends within or among the groups between 1980 and 2000. We speculated that population declines would be associated with diminished economic opportunities, and that those still working and commuting might have to travel farther on average to find work. It turned out that the trends were not generally different from those in the other study areas where population growth was more vigorous (Tables 4.7 and 4.8). In 1980, all 18 counties listed in Table 4.9 showed a mean commuting time of less than 20 minutes. During the following 20 years, all counties showed increases in average commuting time of from 8 percent (St. Louis County) to over 70 percent (Murray County—Worthington area; Koochiching County—International Falls area).

For commuters who spent more than 45 minutes in the journey to work, the patterns here resemble those in the previous two tables. With only two exceptions (Nobles and Red Lake) the time spent traveling one-way on the journey to work by those with commutes exceeding 45 minutes rose. Sometimes the increase was only three or four minutes (Jackson—Worthington area; Marshall—EGF area), but in more than half the counties the *increase* exceeded 10 minutes, bringing the average to over 70 minutes in almost all of these demographically challenged counties.

Using the census data reported in Tables 4.7, 4.8, and 4.9, we calculated a weighted average of the commute times for each study area using the number of commuters in each county and the mean commute time in each county for each of the three census years, 1980, 1990, and 2000 (Table 4.10). The study areas are grouped according to their various growth experiences in the 1990s.

Table 4.9. Commute Times 1980, 1990 and 2000 in Areas with Population Loss in Regional Center, or Commute Field, or Both, 1990-2000

Study Area; Central County; Other MN Counties in Commute Field	Mean Minutes Commuting — All Commutes			Mean Minutes Commuting—Commutes Exceeding 45 Minutes				
	1980	1990	2000	1980	1990	2000	Change '80-'00 Minutes	Change '80-'00 Percent
Center Loses, Commute Field Gains Population								
Grand Rapids Area								
Itasca	17.6	20.3	22.0	65.6	67.7	75.5	9.9	15.1
Hibbing Area								
St. Louis	17.9	19.4	19.4	60.3	70.2	74.9	14.6	24.2
Itasca	17.6	20.3	22.0	65.6	67.7	75.5	9.9	15.1
Center Gains; Commute Field Loses Population								
Worthington Area								
Nobles	10.8	14.8	15.8	72.0	82.4	71.4	0.6	-0.8
Jackson	12.9	15.6	15.7	73.2	77.0	76.1	2.9	4.0
Murray	11.9	16.1	20.7	62.1	72.9	72.7	10.6	17.1
Marshall Area								
Lyon	11.1	13.4	13.5	70.9	72.8	79.6	8.7	12.3
Lincoln	12.4	16.6	18.3	55.8	67.1	70.3	14.5	26.0
Murray	11.9	16.1	20.1	62.1	72.9	72.7	10.6	17.1
Redwood	11.2	14.0	16.4	68.7	68.4	75.9	7.2	10.5
Yellow Medicine	11.3	15.4	16.8	62.8	69.1	71	8.2	13.1
Albert Lea Area								
Freeborn	12.1	16.1	18.1	60.5	72.8	76.3	15.8	26.1
Center Loses; Commute Field Loses Population								
Montevideo Area								
Chippewa	10.6	14.7	15.3	61.7	72.9	73.8	12.1	19.6
Lac qui Parle	10.5	16.0	17.5	55.1	74.8	78.1	16.4	41.7
Yellow Medicine	11.3	15.4	16.8	62.8	69.1	71	8.2	13.1
Fairmont Area								
Martin	11.7	14.1	15.8	67.2	74.2	78	10.8	16.1
Grand Forks-EGF Area								
Polk	12.6	16.3	16.5	64.4	69.1	71.2	6.8	10.6
Marshall	15.6	19.3	23.2	64.1	66.6	68.1	4.0	6.2
Norman	11.8	17.5	20.9	55.9	65.2	68.7	12.8	22.9
Red Lake	14.0	17.8	21.2	69.4	64.9	68.7	0.7	-1.0
International Falls Area								
Koochiching	12.0	14.8	15.5	71.0	64.4	76.6	5.6	7.9

Data Source: U.S. Bureau of the Census

Table 4.10. Mean Commute Times, 1980, 1990, and 2000, by Study Area (minutes)

Study Area	1980	1990	2000	Change in Average Commute Time, 1980 to 2000	
				Minutes	Percent
Commute Field Populations Grew Faster Than Regional Center Population, 1990-2000					
Brainerd Area	16.8	19.0	21.5	4.7	28.0
Fergus Falls Area	13.6	16.6	19.2	5.6	41.2
Wadena Area	13.7	16.7	21.8	8.1	59.1
Mankato-No. Mankato Area	13.1	16.9	17.8	4.7	35.9
Duluth-Superior Area	17.6	19.3	19.7	2.1	11.9
Bemidji Area	15.5	18.7	20.3	4.8	31.0
Waseca Area	12.5	16.8	17.6	5.1	40.8
Regional Center Populations Grew Faster Than Commute Field Population, 1990-2000					
Fargo-Moorhead Area	15.0	17.9	19.4	4.4	29.3
Alexandria Area	13.5	16.5	19.3	5.8	43.0
Rochester Area	14.6	18.3	18.7	4.1	28.1
Detroit Lakes Area	16.4	19.9	22.9	6.5	39.6
Owatonna Area	13.6	17.5	18.2	4.6	33.8
Park Rapids Area	16.7	19.8	22.2	5.5	32.9
Little Falls Area	15.6	19.6	24.0	8.4	53.8
Winona Area	13.1	16.2	17.0	3.9	29.8
Willmar Area	12.0	16.2	17.6	5.6	46.7
New Ulm Area	11.3	13.9	14.8	3.5	31.0
Regional Center Lost Population; Commute Field Gained Population, 1990-2000					
Grand Rapids Area	17.6	20.3	22.0	4.4	25.0
Hibbing Area	17.9	19.5	19.8	1.9	10.6
Regional Center Gained Population; Commute Field Lost Population, 1990-2000					
Worthington Area	11.6	15.3	16.8	5.2	44.8
Marshall Area	11.4	14.5	15.9	4.5	39.5
Albert Lea Area	12.1	16.1	18.1	6.0	49.6
Regional Center Lost Population; Commute Field Lost Population, 1990-2000					
Montevideo Area	11.5	15.3	16.3	4.8	41.7
Fairmont Area	11.7	14.1	15.8	4.1	35.0
Grand Forks-East GF	12.9	17.0	18.6	5.7	44.2
International Falls Area	12.0	14.8	15.5	3.5	29.2

Data Source: U.S. Bureau of the Census. Weighted averages calculated by the authors using average commuting time by county and number of commuters per county in each census year.

The data reveal the following:

- Mean commute times in 1980 were under 20 minutes in every study area;
- Every study area reported an increase in average commuting time in each of the two decades, 1980s and 1990s;
- Eleven of the 26 study areas reported an increase of over 40 percent between 1980 and 2000;
- There seems to be little difference among the groups of study areas in their experiences regarding steady overall increases in commuting times; and
- The data do not reveal whether the longer times spent commuting are due to longer commutes, slower commutes, more complex commutes (e.g., due to stops along the way), or some combination of factors.

There are a few other variables that we did not tabulate and analyze because they seemed less directly relevant to the ways that commuting patterns impose loads on trunk highways compared with those variables considered in the foregoing discussions. The excluded variables include (1) means of travel to work by persons who worked, and patterns of carpooling; (2) patterns of private vehicle occupancy, such as persons per vehicle, and type of vehicle; (3) time leaving home to go to work; and (4) tenure (i.e., owners vs. renters) by vehicles available for use by members of the household.

Summary and Conclusions

This chapter has examined changes between 1980 and 2000 in commuting trends, including the share of all workers who commuted to jobs away from home, workers commuting to jobs outside their county of residence, and the share of commuters driving alone to work. There seems to be little doubt that regardless of population change or change in the number of workers by county (whether increasing or decreasing), the number of commuters, the average times spent commuting, and the proportion of commuting by solo drivers all have continued to increase throughout the state, in some cases at unusually rapid rates.

The proportion of workers who commuted to jobs away from home increased from a range of 74.3 percent (Lincoln County-Marshall area) to 98.2 percent (St. Louis County (Duluth-Superior area) in 1980, to a range of 87.3 percent (Lyon County-Marshall area) to 96.5 percent in St. Louis County in 1990. The median proportions rose from about 7 of 8 workers in 1980, to 9 of 10 workers in 2000. In every one of the Minnesota counties included in the 26 study areas, the percentage of workers who commuted to jobs outside their county of residence increased between 1980 and 2000. The number and the percentage of workers driving along to work rose sharply in the 1980s. In the 1990s, although the *number* of commuters driving alone rose in all 56 Minnesota counties, the *proportion* of workers driving alone rose in only 17 of those counties.

Daily commuting traffic has been rising steadily, partly due to a greater number of workers, but increasingly due to workers commuting alone. Moreover, those solo commuters, on average, are

spending more time in their commutes. Mean commute times in 1980 were under 20 minutes in every study area. Every study area reported an increase in average commuting time in the 1980s, and again in the 1990s. Eleven of the 26 study areas reported an increase of over 40 percent in average commute times between 1980 and 2000. There seems to be little difference among the study areas grouped by growth rates in their experiences regarding average commuting times. The census data do not reveal whether the longer commute times are due to longer commutes, slower commutes, more complex commutes (e.g., due to stops along the way), or some combination of factors.

Chapter 5

Demographic and Economic Attributes of Workers in the Minnesota Countryside, 1990-2000: Illustrations Drawn from Public Use Microdata Samples

Introduction

This chapter, and the two that follow, demonstrate the usefulness of what are called public use microdata samples (PUMS) drawn from Census Bureau-defined microdata areas (PUMAs). A review of the nature of PUMAs is followed by a detailed description of corresponding PUMS files, how they are created, and how they can be used as a supplemental source of census data in regional analysis and transportation planning. The chapter explains the difference between the two types of PUMS files, one based on a 5-percent sample of household responses to decennial long-form census questionnaires, and the other based on a 1-percent sample. The 5-percent samples refer to PUMAs, each of which is composed of a county or a multi-county area with a minimum population of 100,000. The 1-percent samples refer to Super-PUMAs (introduced for the first time in 2000), which have a minimum population of 400,000. PUMS files contain data on individuals, households, housing, and details on each individual worker's journey to work. The chapter describes how the American Community Survey is replacing the decennial long-form questionnaire, and what this means for the availability and usefulness of future PUMS data.

Following the overview on data sources, the chapter demonstrates how to investigate various relationships using cross-tabs that array demographic characteristics against employment characteristics of workers within PUMAs in different parts of Greater Minnesota. One set of PUMS data portrays how the mix of occupations pursued by workers varies by workers' ages in three different sample PUMAs–one in a fast-growing region of Minnesota (around Brainerd), one in a moderate-growth area (around Willmar), and a third in a slow-growth PUMA (around Montevideo). A second PUMS data set compares concentrations of Hispanic-origin workers and non-Hispanic workers by the industries in which they are employed using the same three sample PUMAs. On the bases of this data analysis, the chapter concludes that (1) the profiles of workers by occupations arrayed by age groups, and (2) the by industry arrayed by ethnic origins appear more similar than markedly different. Interpretation of these findings concludes the chapter.

Chapter 2 presented and discussed data from Census 2000 on trends in population and housing in and around 26 of 49 regional centers throughout Greater Minnesota. We described how population age structure and household composition within 26 sample study areas changed between 1970 and 2000, and suggested what some of the trends imply about labor force participation and housing needs and wants in the years ahead.

Chapter 3 discussed changes in employment levels within the 26 study areas between 1970 and 2000. Employment changes were examined in terms of *industry* of employment as well as by the changing mix of *occupations* pursued. The 26 study areas were grouped into (1) fast-growing recreation and retirement areas, located mainly in northern lake districts; (2) areas with mixed economies and moderate job growth; and (3) slow-growth areas in the west and southwest

parts of Minnesota that depend on a weak farm economy, and in northern areas supported largely by mining and forest products industries. Some causes and consequences of those changes are summarized. Structural changes in the regional economies bring about changes in household activity within those sub-regions, and vice-versa. Along with changes in economic activity and household behavior come changes in daily travel behavior, which yield corresponding impacts on the state's trunk highways.

Chapter 4 focused on changes between 1980 and 2000 in commuting behavior, including the share of all workers who commuted to jobs away from home, workers commuting to jobs outside their county of residence, and the share of commuters driving alone to work. In addition, the chapter presented average commute times within each of the 26 study areas and how those times grew between 1980 and 2000.

In this chapter and the two that follow, we move away from summarizing and analyzing the *aggregate data* sources used to describe regional centers, counties and study areas in previous chapters. The emphasis instead is on demonstrating the usefulness of what are called public use *microdata samples* (PUMS) drawn from *microdata areas* (PUMAs). First we review the nature of PUMAs. A description of the PUMS data files follows.

Public Use Microdata Areas (PUMAs) and Super-PUMAs

PUMS data files can be useful for a certain scale of regional analysis in transportation planning. PUMS data are provided for public use microdata areas (PUMAs). A PUMA is a decennial census area for which the Census Bureau provides specially selected extracts of raw PUMS data from a small sample of long-form decennial census records that have been screened to protect confidentiality. The long-form questionnaires used in recent decennial censuses were received by a sample of about one-in-six households, and contained detailed questions on household composition, characteristics of household members, and features of the housing unit that the household occupied. These extracts are referred to as "public use microdata sample (PUMS) files. Each file contains the data from the long-form questionnaire as submitted from a sample housing unit by the member or members of the household who lived in it at census time. All personal identifying information about the household and its members is removed from the PUMS files.

There are two different types of PUMS files. One is based on a 5-percent sample of the long-form census returns, and the other is based on a 1-percent sample of long-form returns. The 5-percent samples come from PUMAs that comprise an aggregation of counties that contain a total of at least 100,000 people. The 1-percent PUMAs, called Super-PUMAs and newly introduced for the 2000 census, comprise an aggregation of counties that contain a total of at least 400,000 persons.

For census 2000, rules for defining PUMAs dictate that a PUMA cannot be in more than one state. The larger 1-percent Super-PUMAs are aggregations of the smaller 5-percent PUMAs (Figure 5.1). [60]

Recall that each Super-PUMA contains a minimum of 400,000 persons. The five covering the state of Minnesota outside the 7-county Twin Cities core contain 17 PUMAs (each with a minimum of 100,000 population), 14 of which contain one or more of the 26 sample regional centers examined in this report (Figure 5.2).

Our study areas focus on 26 sample regional centers, and are based on the commuting fields adjacent to each regional center, but commuting fields (i.e., study areas) do not correspond with PUMAs. PUMAs are aggregates of counties and are defined to be large enough to contain a minimum of 100,000 persons so as to avoid disclosing information about identifiable individuals or households.

There is no convenient way to use public use microdata samples on the basis of study areas composed of only one or a few counties in Greater Minnesota as their populations are too small. Instead, we are forced to analyze the PUMS data provided for the PUMAs as the only option for exploiting the data at a sub-state scale outside the greater Twin Cities area. (For certain scholarly investigations, the Census Bureau allows access to the raw census returns through licensed data centers for purposes of compiling data profiles for areas different from PUMAs. This option is not available for local transportation planning purposes.)

Public Use Microdata Samples from the Decennial Censuses of Population and Housing

Public Use Microdata Sample (PUMS) Files

Public Use Microdata Sample (PUMS) files contain records representing 5-percent (for PUMAs) or 1-percent (for Super-PUMAs) samples of the occupied and vacant housing units in the U.S. and the people living in the occupied units. Persons living in group-quarters are also included. The file contains individual weights for each person and housing unit, which when applied to the individual records, expand the sample to the relevant total for the PUMA or Super-PUMA. [61]

Housing and Household Records

Some of the items included in the *housing record* are: acreage; agricultural sales; bedrooms; condominium fee; contract rent; cost of utilities; family income in 1999; farm residence; fire, hazard, and flood insurance; fuels used; gross rent; heating fuel; household income in 1999; household type; kitchen facilities; mobile home costs; mortgage payment; mortgage status; plumbing facilities; presence and age of own children; presence of subfamilies in household; real estate taxes; rooms; selected monthly owner costs; size of building (units in structure); telephone service; tenure; vacancy status; value (of housing unit); vehicles available; year household moved into unit; and year structure built. [62]

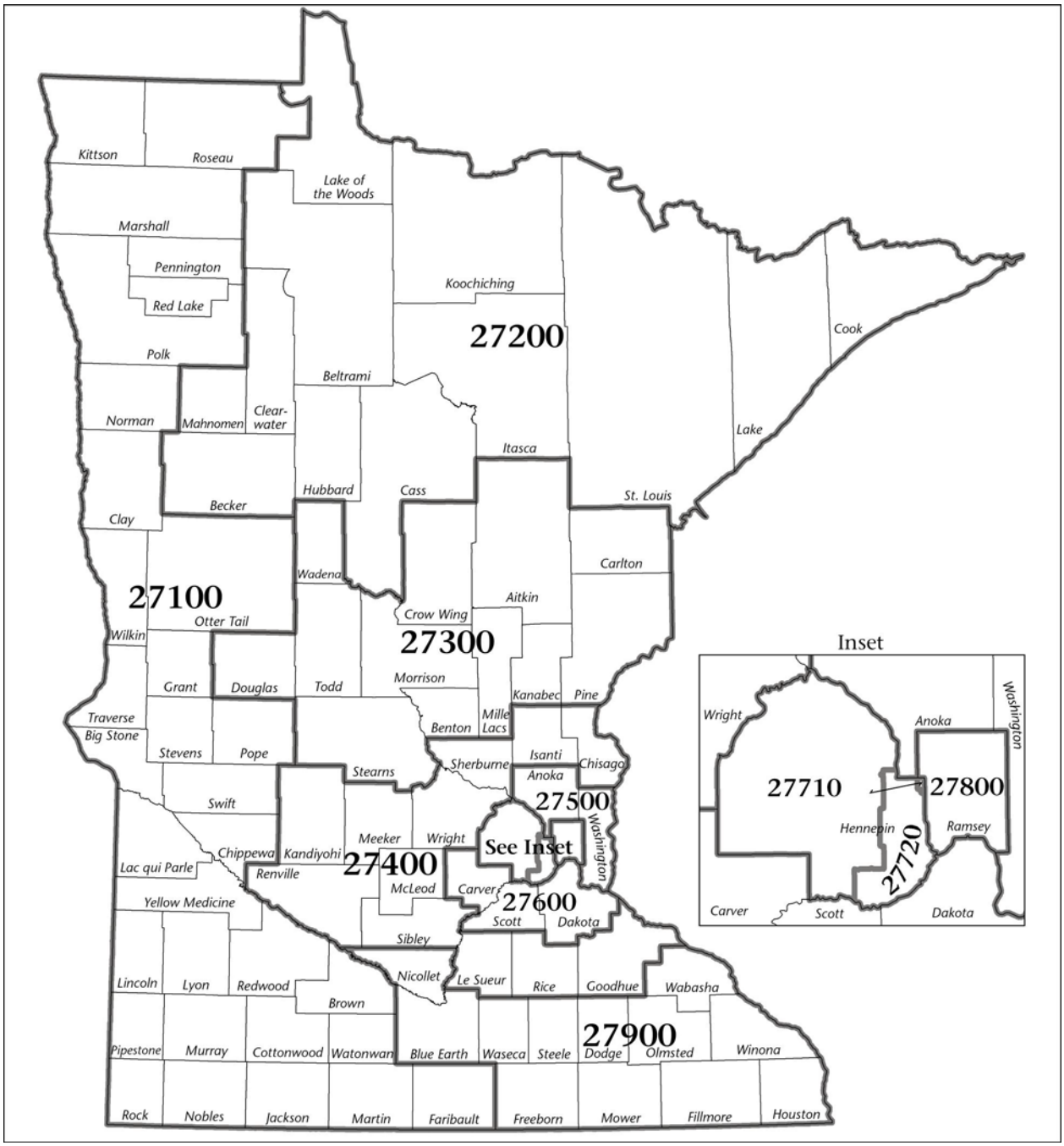

Figure 5.1. Minnesota's Super Public Use Microdata Areas (Super-PUMAs), 2000
Source: Cartography Laboratory, University of Minnesota

Figure 5.2. Public Use Microdata Areas (PUMAs) in Greater Minnesota, 2000
Source: Cartography Laboratory, University of Minnesota.

Person Records

Some of the items included on each *person record* are: ability to speak English; age; ancestry; citizenship; class of worker; disability status; earnings in 1999; educational attainment; grandparent as caregiver; Hispanic origin; hours worked; income in 1999 by type; industry (of employment); language spoken at home; marital status; veteran period of service; years of military service; occupation; person's weight; personal care limitation; place of birth; place of work public use microdata area (PUMA); place of work state; poverty status in 1999; race; relationship (to others in household); school enrollment and type of school; time of departure for work; travel time to work; vehicle occupancy (en route to work); weeks worked in 1999; work limitation status; and year of entry (to U.S.). [63]

Availability of PUMS files

PUMS files from the decennial censuses have been available from the Census Bureau for many decades. [64] PUMAs have been periodically redefined as populations have grown in some areas and population distributions have changed. Most Minnesota PUMA boundaries for 1990 differ from those for 2000, rendering comparisons of PUMS data from different decennial censuses meaningless in the cases of sub-state areas. PUMAs and corresponding PUMS data for the 7-county Twin Cities area for recent decennial censuses are an exception because this 7-county area is a governmental unit under the jurisdiction of the Metropolitan Council, and has remained unchanged in its boundaries since its creation in 1968 (Figure 5.3).

American Community Survey

Census 2000 was the final occasion for the Census Bureau to collect detailed household and housing information using long-form questionnaires as part of the decennial census. This means that the Bureau will no longer collect such data from approximately one-of-six housing units beginning in 2010. In its place, the Bureau inaugurated the American Community Survey (ACS), from which roughly comparable long-form data are being gathered. The ACS is a continuous Census Bureau project that intends to survey annually a national sample of housing units that is somewhat smaller than the former one-in-six decennial sampling rate. The new sampling rate will be about 3 million housing units per year, covering about 2.5 percent of all households, and will survey 12.5 percent (i.e., one-in-eight) of all occupied and unoccupied housing units over any given five-year period.

The ACS got underway in January 2005, with an initial mailing of 250,000 questionnaires distributed. In each subsequent month an additional sample of 250,000 housing units is surveyed. Surveying of persons living in group quarters is planned to begin in January 2006. A permanent staff of survey professionals will monitor responses and do the follow-up when questionnaires are not returned. The Census Bureau believes that the use of professionals on a continuous basis will yield higher-quality responses than have been available from previous decennial long-form returns when temporary census workers staffed the effort.

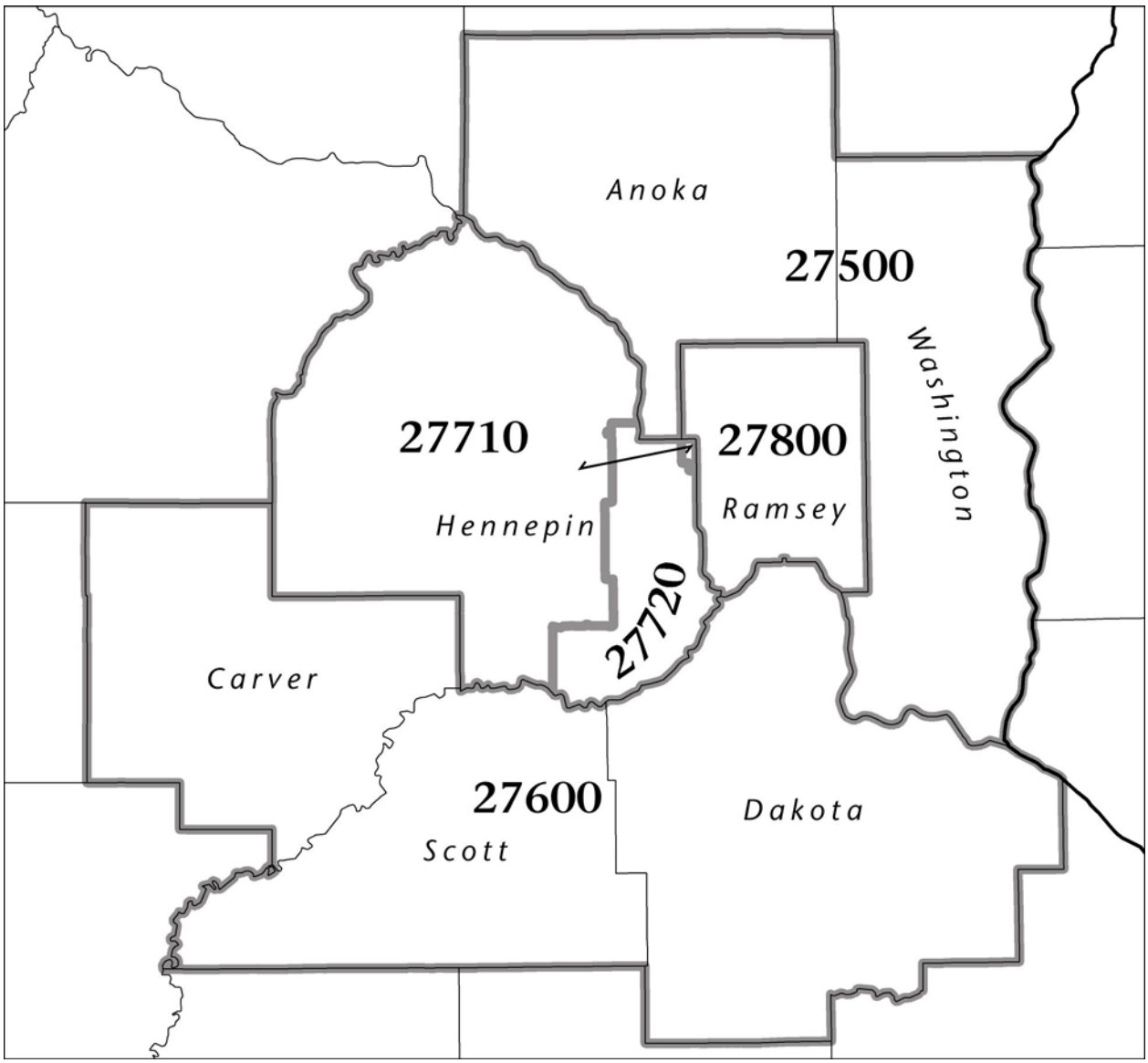

Figure 5.3. Five Super-PUMAs Cover the 7-County Minneapolis-St. Paul Metropolitan Area.
Source: Cartography Laboratory, University of Minnesota.

Data tables for population and housing from the ACS are expected to be similar in content to Census 2000 Summary File 3 (SF3) tables. Yearly estimates will be available for geographic area summary levels for places with populations greater than 65,000 in 2006 and beyond. Annual ACS estimates for areas with populations between 20,000 and 65,000 will be three-year averages, and will become available in 2008. Small-area census tract and block group estimates will be five-year averages (calculated from 60 monthly samples) beginning in 2010. Land use and transportation planners will eventually have access to higher-quality and more timely data for their purposes, although many transportation planning agencies may not have the resources to recalibrate their models more frequently than on a decennial basis.

PUMS files will change in character with the inauguration of the American Community Survey (ACS), and the elimination of the long-form decennial questionnaire. On the positive side, because surveys are carried out every month, data from the ACS will be more current than data from the decennial census. But confidentiality rules regulate the trade off between the *size of the area* for which data are needed and the *timeliness* of the data. For large areas (e.g., states) yearly estimates will be available from the ACS. For small areas (e.g., census tracts), five years of survey data will be needed before estimates can be released.

The Census Bureau plans to release data in August of each year based on samples collected through the previous December. For example, the 3-year averages mentioned above (for places with 20,000 to 65,000 population) will be based on samples collected in the 36-month period from January 2005 through December 2007 and will become available in August 2008. The following August, a new 3-year average will be released based on samples collected over the period 2006-2008. The small-area census tract and block group estimates will be calculated from 60 monthly samples collected from January 2005 through December 2009, and are planned to be released in August 2010. The carrying out of the ACS by the Census Bureau according to current plans depends entirely on Congressional approval and continuing appropriations, which are not at all certain. What *is* certain is that there will be no long-form questionnaire in the 2010 census.

If the ACS proceeds according to Census Bureau plans through 2009, then it will be possible for the Bureau to compile and publish PUMS files based on the 60 months of surveys carried out between 2005 and 2009. If that happens, then cross-tabs of the sort illustrated in this report and subsequent reports will be possible. What follows are illustrations of how such cross-tabs can be compiled and interpreted in ways that to shed fresh light on the demography, economy and travel behavior within sub-regions of Minnesota.

Goal of This Chapter

The goal of this chapter is to illustrate how to use PUMS files to investigate various relationships between *demographic characteristics* and *employment characteristics* of workers within PUMAs located in different parts of Greater Minnesota. One set of PUMS data portrays how the mix of occupations pursued by workers varies by workers' ages in three different PUMAs. A second PUMS data set compares the distribution of Hispanic-origin workers and non-Hispanic workers by the industries in which they are employed in the same three sample PUMAs.

Age and Occupation of Workers

If we want to inquire how *demographic characteristics* of workers are related to the *occupations* or the *industries* in which they work, PUMS data for a state, a Super-PUMA or a PUMA provide a means to answer such questions. For example, each household record in the PUMS files provides information on individual members of that household. Each household member who was at work during the week prior to the census was asked to specify the *kind of job* he or she held. This job information was then classified into the Census Bureau's standard occupational classification system.

Each household member was also asked to specify other demographic information, such as his or her *age*. Each worker could then be classified into a cross-tabulation with age categories (e.g., 0-4, 5-9, etc.) on one dimension, and occupational class on the other. By knowing occupation data and age data for a sample of workers in a PUMA, that sample can be expanded to describe all workers in that PUMA in 2000 classified by age and my occupation. The *working-age* population is officially defined as persons 15 to 64 years of age. This is a technical definition for purposes of statistical practice and is a source of some confusion because some persons below age 15 work for wages, and some fraction of the population 65 and over remains in the labor force, either working or actively looking for work.

A cross-tab thus produced from the PUMS data allows us to analyze the ways that *occupations vary by age class within a specific PUMA*. By producing similar cross-tabs for each of the 14 PUMAs containing one (or more) of the 26 regional centers, we can observe the similarities and differences in how occupations vary with age among the sub-areas of Minnesota outside the greater Twin Cities area. We can also observe differences among parts of the state depending on whether their local economies are expanding vigorously, expanding slowly, or stagnant or in decline.

Ethnic Origin and Industry of Workers

Each household member who was at work during the week prior to the Census 2000, was asked to specify the type of business or organization in which he or she worked. If he or she was not at work due to vacation, temporary layoff, illness or other reason, then he or she was asked to report their typical place and type of employment. This place-of-work information was then classified into the North American Industrial Classification System (NAICS), which is used by the Census Bureau to classify workers according to their *industry* of employment.

Each household member was also asked to provide demographic information, such as his or her ethnic origin, such as Hispanic or Latino origin. Each worker could then be classified into a cross-tabulation with *ethnic origin* on one dimension (e.g., Hispanic/Latino Origin vs. non-Hispanic/Latino), and *industrial* class on the other. By knowing industrial data and ethnic data for a sample of workers in a PUMA, that sample can be expanded to estimate the profile of all workers in that PUMA in 2000 classified by ethnicity and industry, and by occupation.

A cross-tab thus produced from the PUMS data allows us to analyze the ways that *industry of employment varies by ethnic origin within a specific PUMA.* By producing similar cross-tabs for each of the 14 PUMAs containing one (or more) of the 26 regional centers, we can observe the similarities and differences among the sub-areas of Minnesota in how industries vary with ethnicity. We can also observe differences among parts of the state depending on whether their local economies are expanding vigorously, or slowly, or are in decline. The demonstration cases that follow focus simply on Hispanic vs. non-Hispanic origin, but PUMS data can be expanded to as many ethnic and /or racial classes as may be of interest. For example, they can be used to illustrate ways that patterns differ depending on *growth rates* in various parts of the state– namely, places experiencing fast growth and attracting workers, moderate growth, or slow growth/declining areas from which workers may be leaving for opportunities elsewhere.

Findings and Analysis

Our 26 study areas were defined according to county-to-county commuting activity reported in the decennial census of 1990. The 26 regional centers were identified from a set of 49 across Greater Minnesota. Each regional center was located in what we termed a *central county*. Each county outside a central county that sent at least 5 percent of its daily commuters to that central county was defined as forming part of the commuting field or commute shed of the central county. In this way, 26 commuting fields were defined as our 26 study areas.

The Census Bureau's delineation of the 17 PUMAs covering Greater Minnesota outside the 7-county Minneapolis-St. Paul core was based on the requirement that counties be aggregated into PUMAs so that each PUMA would contain at least 100,000 persons in 2000. Minnesota had a population of 4.92 million in 2000. Since the 7-county Twin Cities area counted 2.29 million or 47 percent of the state total, the remaining 80 counties had 2.63 million–enough for 17 PUMAs. Fourteen of the 17 PUMAs (identified below with their codes) contain the 26 sample regional centers as follows. Three of the PUMAs are within the Minneapolis-St. Paul commuting field, and for that reason they do not contain any sample regional centers:

00100–contains East Grand Forks, Moorhead

00200–contains Detroit Lakes, Park Rapids, and Bemidji

00300–contains International Falls, and Grand Rapids

00400–contains Duluth, and Hibbing

00500–contains Brainerd

00600–contains Little Falls, Wadena, and Alexandria

00700–contains Fergus Falls

00*800–Stearns and Benton counties, which lie inside the Minneapolis-St. Paul commute field (and contains St. Cloud, which is not one of our sample regional centers)*

00*900–Wright, Sherburne, Isanti, Chisago Counties, which lie inside the Minneapolis-St. Paul commute field*

01800–contains Willmar

01900–contains Marshall, Montevideo, and New Ulm

02000–contains Waseca, and Mankato/NM

0*2100–contains Le Sueur, Rice and Goodhue Counties, which lie inside the Minneapolis-St. Paul commute field (and contains Le Sueur, Northfield, Red Wing, which are not among our sample regional centers)*

02200–contains Winona

02300–contains Rochester

02400–contains Owatonna

02500–contains Worthington, Fairmont, and Albert Lea

Three of the PUMAs, which we take as representative of different population growth experiences in the 1990s, are discussed in detail below. [65]

Brainerd Area, in Crow Wing County

The Brainerd study area is one of the places in Greater Minnesota–mainly in northern lake districts–that experienced above-average employment expansion during the 1990s. Brainerd is in Crow Wing County, which is in PUMA 00500, along with Aitkin, Carlton, Pine, Kanabec, and Mille Lacs counties in 2000. PUMA 00500, in turn, is located within 2000 Super-PUMA 27300, which extends west to Douglas County and Alexandria, southwest to Stearns County and St. Cloud, east to Pine County and the St. Croix River, and northeast to Carlton County near Duluth.

Willmar Area, in Kandiyohi County

The Willmar study area represents those areas with diversified economies and which experienced only moderate employment expansion during the 1990s. Willmar is in Kandiyohi county, which is in PUMA 01800, along with Meeker, McLeod, Sibley, Renville counties in 2000. PUMA 01800, in turn, is located within 2000 Super-PUMA 27400, which wraps around the seven-county Twin Cities area, from Chisago and Isanti Counties on the north, to Kandiyohi and Renville Counties on the west, then south and southeast through Le Sueur, Rice and Goodhue Counties.

Montevideo Area, in Chippewa County

The Montevideo study area represents areas that experienced stagnant natural-resource-based economies and slow-growth or declining employment during the 1990s. Montevideo is in Chippewa County, which is in PUMA 01900, along with Lac Qui Parle, Yellow Medicine, Lincoln, Lyon, Redwood, and Brown counties in 2000. PUMA 01900, in turn, is in 2000 Super-PUMA 27100 (which comprises 32 sparsely populated counties along the western border of Minnesota, from Kittson and Roseau in the far northwest bordering Canada, south through

Traverse and Big Stone Counties, then to Rock, Nobles, Jackson, Martin, and Faribault Counties along the Iowa border.

Age and Occupation of Workers in Three Sample PUMAs

Overview

It would be reasonable to expect that study areas that had solid increases in employment during the 1990s (e.g., Brainerd area) would display an age profile for their workers that differs from study areas that had only moderate growth (e.g., Willmar area) or slow growth (e.g., Montevideo Area). Fortunately, we can get some insight into this question using PUMS data for the PUMAs that contained these study areas. Unfortunately, the PUMAs to which the PUMS data apply are much more extensive in area than the three sample study areas of interest, so the estimates contain less precision than we would like to have.

The data show little difference in worker age profiles among the three PUMAs considered here (Table 5.1).

Table 5.1. Working-Age Workers by Age Classes, Three Sample PUMAs, 2000

	Age 14-19	Age 20-29	Age 30-39	Age 40-49	Age 50-59	Total 60-64	Total 15-64
Brainerd Area PUMA 500	4,972	13,214	18,854	21,714	13,160	2,586	74,500
% Workers 15-64	7	18	25	29	18	3	100
Willmar Area PUMA 1800	5,000	11,998	15,494	17,632	11,684	2,550	64,358
% Workers 15-64	8	19	24	27	18	4	100
Montevideo Area PUMA 1900	4,544	9,203	12,407	14,110	8,747	2,101	51,112
% Workers 15-64	9	18	24	28	17	4	100

Data source: U.S. Bureau of the Census, Public Use Microdata Samples, 2000.

Whether we examine one age group at a time (e.g., 20-29, 30-39, or 40-49), or age groups combined, little difference among the PUMAs is apparent. One might expect the fast-growing Brainerd area to display a greater share of younger workers who moved to job opportunities in the area or who grew up in the area and remained because jobs were available. Had that been the case, the 15-39 age group might have been conspicuously larger in 2000 than the same worker age groups in the other two sample PUMAs. But workers of that age in the PUMA with Brainerd accounted for 50 percent of workers, while they were also 50 percent in the PUMA with Willmar, and 51 percent in the PUMA containing Montevideo. Even though the PUMS data reveal more details than are available from aggregate census data, there are limits to what they can tell us.

In each of the PUMAs, almost half the workers reported no specific occupations. Among those workers reporting specific occupation within the 25 occupation groups listed, the profiles are highly similar among the three PUMAs. Six occupation groups led others across the three PUMAs:

Management Workers

Sales Workers

Office & Administrative Support Workers

Construction

Production Workers

Transportation & Material Moving Workers

Followed by:

Education, Training & Library Workers

Health Practitioners & Technical Workers

Food Preparation and Serving

"Military Specific" employment is especially prominent in PUMA 00500, due to the U.S. Army National Guard Training Center at Camp Ripley in Crow Wing County near Brainerd.

Worker Occupation by Age, PUMA 00500, Containing the Brainerd Area

The top occupations in the PUMA containing the Brainerd study area in 2000 were, in order of importance, (1) Office and Administrative Support, (2) Production, (3) Sales, (4) Construction, (tied for 5) Military Specific Workers, and Management, and (7) Transportation and Material Moving (Table 5.2).

These seven (of 25) occupational groups accounted for almost two-thirds (64.4 percent) of all workers aged 15 to 64.

Worker Occupation by Age, PUMA 01800, Containing the Willmar Area

The top occupations in the PUMA containing the Willmar study area in 2000 were, in order of importance, (1) Production, (2) Office and Administrative Support, (3) Sales, (4) Management, (5) Transportation & Material Moving, (6) Installation, Maintenance, and Repair, (7) Construction, and (8) Education, Training, and Library. The last three occupational groups were essentially tied at 5.3 percent each (Table 5.3).

These eight occupational groups accounted for close to three-quarters (70.9 percent) of all workers aged 15 to 64.

Table 5.2. Worker Occupation by Age, PUMA 00500 (contains Brainerd Area), 2000

Occupation	Ages 15-29	Percent of Total	Ages 30-39	Percent of Total	Ages 40-49	Percent of Total	Ages 50-59	Percent of Total	Ages 60-64	Percent of Total	Total Workers 15-64	Percent of Total
Management	542	3.0	1,281	6.8	2,084	9.6	1,258	9.6	192	7.4	5,357	7.2
Business Operations Specialists	170	0.9	139	0.7	195	0.9	199	1.5	54	2.1	757	1.0
Financial Specialists	90	0.5	204	1.1	462	2.1	112	0.9	0	0.0	868	1.2
Computer and Mathematical	331	1.8	207	1.1	165	0.8	135	1.0	0	0.0	838	1.1
Architecture and Engineering	125	0.7	245	1.3	508	2.3	133	1.0	18	0.7	1,029	1.4
Life, Physical, and Social Science	35	0.2	148	0.8	217	1.0	9	0.1	0	0.0	409	0.5
Community and Social Services	179	1.0	368	2.0	693	3.2	262	2.0	68	2.6	1,570	2.1
Legal Occupations	31	0.2	135	0.7	62	0.3	36	0.3	0	0.0	264	0.4
Education, Training, and Library	743	4.1	955	5.1	1,231	5.7	1,101	8.4	58	2.2	4,088	5.5
Arts, Design, Entertainment, Sports, and Media	126	0.7	249	1.3	206	0.9	81	0.6	9	0.3	671	0.9
Healthcare Practitioners and Technical	373	2.1	1,191	6.3	1,587	7.3	688	5.2	86	3.3	3,925	5.3
Healthcare Support	695	3.8	499	2.6	497	2.3	255	1.9	54	2.1	2,000	2.7
Protective Service	272	1.5	576	3.1	274	1.3	185	1.4	9	0.3	1,316	1.8
Food Preparation and Serving	2,341	12.9	793	4.2	775	3.6	805	6.1	90	3.5	4,804	6.4
Building and Grounds Cleaning and Maintenance	710	3.9	609	3.2	703	3.2	678	5.2	204	7.9	2,904	3.9
Personal Care and Service	782	4.3	666	3.5	544	2.5	414	3.1	67	2.6	2,473	3.3
Sales	2,938	16.2	1,606	8.5	2,002	9.2	1,245	9.5	304	11.8	8,095	10.9
Office and Administrative Support	2,131	11.7	2,556	13.6	2,610	12.0	1,744	13.3	486	18.8	9,527	12.8
Farming, Fishing, and Forestry	261	1.4	163	0.9	145	0.7	126	1.0	68	2.6	763	1.0
Construction	1,225	6.7	1,637	8.7	1,659	7.6	857	6.5	130	5.0	5,508	7.4
Extraction	13	0.1	9	0.0	27	0.1	0	0.0	0	0.0	49	0.1
Installation, Maintenance, and Repair Workers	503	2.8	884	4.7	1,172	5.4	487	3.7	103	4.0	3,149	4.2
Production	1,886	10.4	2,594	13.8	2,553	11.8	1,537	11.7	358	13.8	8,928	12.0
Transportation and Material Moving	1,675	9.2	1,140	6.0	1,343	6.2	813	6.2	228	8.8	5,199	7.0
Military Specific	542	3.0	1,281	6.8	2,084	9.6	199	1.5	192	7.4	5,357	7.2
TOTAL	18,186	100.0	18,854	100.0	21,714	100.0	1,258	9.6	2,586	100.0	74,500	100.0

Data Source: U.S. Census Bureau, Public Use Microdata Samples, 2000.

Table 5.3. Worker Occupation by Age, PUMA 01800 (contains Willmar Area), 2000

Occupation	Ages 15-29	Percent of Total	Ages 30-39	Percent of Total	Ages 40-49	Percent of Total	Ages 50-59	Percent of Total	Ages 60-64	Percent of Total	Total Workers 15-64	Percent of Total
Management	589	3.5	1,657	10.7	1,952	11.1	1,452	12.4	334	13.1	5,984	9.3
Business Operations Specialists	80	0.5	357	2.3	218	1.2	98	0.8	0	0.0	753	1.2
Financial Specialists	171	1.0	385	2.5	316	1.8	192	1.6	27	1.1	1,091	1.7
Computer and Mathematical	103	0.6	234	1.5	140	0.8	100	0.9	67	2.6	644	1.0
Architecture and Engineering	397	2.3	333	2.1	176	1.0	311	2.7	45	1.8	1,262	2.0
Life, Physical, and Social Science	69	0.4	112	0.7	112	0.6	58	0.5	0	0.0	351	0.5
Community and Social Services	200	1.2	317	2.0	358	2.0	273	2.3	81	3.2	1,229	1.9
Legal Occupations	68	0.4	45	0.3	64	0.4	59	0.5	13	0.5	249	0.4
Education, Training, and Library	634	3.7	777	5.0	858	4.9	981	8.4	148	5.8	3,398	5.3
Arts, Design, Entertainment, Sports, and Media	329	1.9	127	0.8	255	1.4	153	1.3	0	0.0	864	1.3
Healthcare Practitioners and Technical	432	2.5	613	4.0	1,005	5.7	570	4.9	117	4.6	2,737	4.3
Healthcare Support	849	5.0	259	1.7	425	2.4	241	2.1	46	1.8	1,820	2.8
Protective Service	241	1.4	176	1.1	107	0.6	45	0.4	45	1.8	614	1.0
Food Preparation and Serving	1,468	8.6	377	2.4	432	2.5	198	1.7	81	3.2	2,556	4.0
Building and Grounds Cleaning and Maintenance	557	3.3	357	2.3	586	3.3	284	2.4	108	4.2	1,892	2.9
Personal Care and Service	423	2.5	452	2.9	369	2.1	256	2.2	70	2.7	1,570	2.4
Sales	1,910	11.2	1,220	7.9	1,672	9.5	1,101	9.4	332	13.0	6,235	9.7
Office and Administrative Support	2,036	12.0	1,855	12.0	2,131	12.1	1,495	12.8	243	9.5	7,760	12.1
Farming, Fishing, and Forestry	668	3.9	134	0.9	188	1.1	62	0.5	4	0.2	1,056	1.6
Construction	834	4.9	913	5.9	1,044	5.9	509	4.4	113	4.4	3,413	5.3
Extraction	9	0.1	0	0.0	18	0.1	0	0.0	0	0.0	27	0.0
Installation, Maintenance, and Repair Workers	700	4.1	911	5.9	1,094	6.2	635	5.4	88	3.5	3,428	5.3
Production	2,607	15.3	2,990	19.3	2,678	15.2	1,671	14.3	398	15.6	10,344	16.1
Transportation and Material Moving	1,624	9.6	893	5.8	1,434	8.1	931	8.0	190	7.5	5,072	7.9
Military Specific	0	0.0	0	0.0	0	0.0	9	0.1	0	0.0	9	0.0
TOTAL	16,998	100.0	15,494	100.0	17,632	100.0	11,684	100.0	2,550	100.0	64,358	100.0

Data Source: U.S. Census Bureau, Public Use Microdata Samples, 2000.

Worker Occupation by Age, PUMA 01900, Containing the Montevideo Area

The top occupations in the PUMA containing the Montevideo study area in 2000 make a list similar to the previous two. In order of importance they include (1) Office & Administrative Support, (2) Production, (3) Management, (4) Sales, (5) Transportation and Materials Moving, (6) Education, Training, & Library Workers, and (7) Construction. (Table 5.4).

Like PUMA 00500 (Brainerd area) these seven occupational groups accounted for about two-thirds (67.2 percent) of all workers aged 15 to 64, and with a similar mix of leading occupations.

Ethnic Origin and Industry of Workers in Three Sample PUMAs

The Hispanic or Latino population comprised 12.5 percent of the total population in the U.S. in 2000. This broad group includes two-dozen different origins, ranging from Mexican (the largest), Puerto Rican and Cuban, to various origins in Central America, South America and Spain. In Minnesota, the Hispanic share of the total population was only 2.9 percent, or 143,382 persons.

Within the worker counts for the three PUMAs profiled below, Hispanic workers as a percentage of all workers ranged from 3.6 percent in PUMA 00500 (Willmar area) to 0.6 percent in PUMA 01800 (Brainerd area) (Table 5.5).

Worker Industry by Hispanic Origin, PUMA 00500, Containing the Brainerd Area

The 381 persons of Hispanic or Latino origin in Crow Wing County (Brainerd) as of Census 2000 comprised only 0.7 percent of the county population, with 48 percent of Mexican origin. For the entire PUMA 00500, there were an estimated 481 Hispanic workers in the labor force (Table 5.5).

Seven of ten Hispanic workers were engaged in five (of 16) industries: Retail Trade; Manufacturing; Arts, Entertainment, Recreation, Accommodations, and Food; Other Services; and Professional, Scientific, Management, Administrative, etc. (Table 5.6).

Worker Industry by Hispanic Origin, PUMA 01800, Containing the Willmar Area

In Kandiyohi County (Willmar), there were 3,295 persons of Hispanic or Latino origin enumerated. They accounted for 8.0 percent of that county's population as of Census 2000, with 62 percent estimated to be of Mexican origin. For the entire PUMA 01800, the census estimated 2,287 Hispanic workers, with more than half concentrated in manufacturing (Table 5.7).

The other leading industries with significant Hispanic employment were Educational, Health, and Social Service; Retail Trade; Agriculture, Forestry, Fishing & Hunting; and Arts, Entertainment, Recreation, Accommodations, and Food. These five industries employed almost seven of eight (85.6 percent) of all Hispanic workers.

Table 5.4. Worker Occupation by Age, PUMA 01900 (contains Montevideo Area), 2000

Occupation	Ages 15-29	Percent of Total	Ages 30-39	Percent of Total	Ages 40-49	Percent of Total	Ages 50-59	Percent of Total	Ages 60-64	Percent of Total	Total Workers 15-64	Percent of Total
Management	710	5.2	1,702	13.7	2,216	15.7	1,359	15.5	401	19.1	6,388	12.5
Business Operations Specialists	69	0.5	104	0.8	260	1.8	72	0.8	0	0.0	505	1.0
Financial Specialists	101	0.7	357	2.9	200	1.4	154	1.8	18	0.9	830	1.6
Computer and Mathematical	297	2.2	135	1.1	27	0.2	14	0.2	0	0.0	473	0.9
Architecture and Engineering	76	0.6	220	1.8	141	1.0	94	1.1	0	0.0	531	1.0
Life, Physical, and Social Science	108	0.8	73	0.6	45	0.3	23	0.3	0	0.0	249	0.5
Community and Social Services	203	1.5	195	1.6	257	1.8	218	2.5	18	0.9	891	1.7
Legal Occupations	4	0.0	18	0.1	31	0.2	59	0.7	0	0.0	112	0.2
Education, Training, and Library	471	3.4	712	5.7	1,009	7.2	707	8.1	63	3.0	2,962	5.8
Arts, Design, Entertainment, Sports, and Media	141	1.0	162	1.3	160	1.1	72	0.8	18	0.9	553	1.1
Healthcare Practitioners and Technical	350	2.5	623	5.0	699	5.0	355	4.1	50	2.4	2,077	4.1
Healthcare Support	607	4.4	341	2.7	317	2.2	211	2.4	99	4.7	1,575	3.1
Protective Service	169	1.2	148	1.2	68	0.5	107	1.2	0	0.0	492	1.0
Food Preparation and Serving	1,407	10.2	280	2.3	373	2.6	193	2.2	73	3.5	2,326	4.6
Building and Grounds Cleaning and Maintenance	335	2.4	203	1.6	354	2.5	344	3.9	139	6.6	1,375	2.7
Personal Care and Service	513	3.7	432	3.5	329	2.3	166	1.9	131	6.2	1,571	3.1
Sales	1,621	11.8	786	6.3	1,441	10.2	748	8.6	171	8.1	4,767	9.3
Office and Administrative Support	1,629	11.8	1,776	14.3	2,123	15.0	1,335	15.3	302	14.4	7,165	14.0
Farming, Fishing, and Forestry	440	3.2	210	1.7	194	1.4	92	1.1	18	0.9	954	1.9
Construction	851	6.2	605	4.9	922	6.5	314	3.6	71	3.4	2,763	5.4
Extraction	9	0.1	0	0.0	9	0.1	0	0.0	0	0.0	18	0.0
Installation, Maintenance, and Repair Workers	469	3.4	648	5.2	650	4.6	427	4.9	49	2.3	2,243	4.4
Production	1,907	13.9	1,789	14.4	1,414	10.0	1,020	11.7	319	15.2	6,449	12.6
Transportation and Material Moving	1,251	9.1	888	7.2	871	6.2	663	7.6	161	7.7	3,834	7.5
Military Specific	9	0.1	0	0.0	0	0.0	0	0.0	0	0.0	9	0.0
TOTAL	13,747	100.0	12,407	100.0	14,110	100.0	8,747	100.0	2,101	100.0	51,112	100.0

Data Source: U.S. Census Bureau, Public Use Microdata Samples, 2000.

Table 5.5. Workers by Ethnic Origin, Three Sample PUMAs, 2000

(Workers)	Not Hispanic	Mexican	Other Hispanic	Total Hispanic	Total
Brainerd Area–PUMA 00500					
All workers	74,019	228	253	481	74,500
Percent of all workers	99.4	0.3	0.3	0.6	100.0
Willmar Area–PUMA 01800					
All workers	62,071	1,788	499	2,287	64,358
Percent of all workers	96.4	2.8	0.8	3.6	100.0
Montevideo Area–PUMA 01900					
All workers	50,469	310	333	643	51,112
Percent of all workers	98.7	0.6	0.7	1.3	100.0

Data Source: U.S. Census Bureau, Public Use Microdata Samples, 2000.3 "Total" equals "Not Hispanic" plus "Total Hispanic".

Table 5.6. Worker Industry by Hispanic Origin, PUMA 00500 (contains Brainerd Area), 2000

Industry (NAICS)	Not Hispanic	Mexican	Other Hispanic	Total Hispanic	Total
Agriculture, Forestry, Fishing & Hunting	1,779	14	4	18	1,797
Mining	133	0	0	0	133
Utilities	822	9	0	9	831
Construction	6,249	13	0	13	6.262
Manufacturing	12,029	36	41	77	12,106
Wholesale Trade	1,590	18	0	18	1,608
Retail Trade	9,926	54	41	95	10,021
Transportation & Warehousing	3,014	0	0	0	3,014
Information and Communications	1,115	0	0	0	1,115
Finance. Insurance. Real Estate, & Rental and Leasing	3,224	8	25	33	3,257
Professional, Scientific, Management, Administrative, etc.	3,073	0	45	45	3,118
Educational, Health and Social Service	15,629	17	36	53	15,682
Arts, Entertainment, Recreation, Accommodations, and Food	8,451	50	22	72	8,523
Other Services	3,459	9	39	48	3,507
Public Administration	3,432	0	0	0	3,432
Armed Forces	94	0	0	0	94
TOTAL	74,019	228	253	481	74,500

Data Source: U.S. Census Bureau, Public Use Microdata Samples, 2000.3 "Total" equals "Not Hispanic" plus "Total Hispanic".

Table 5.7. Worker Industry by Hispanic Origin, PUMA 01800 (contains Willmar Area), 2000

Industry (NAICS)	Not Hispanic	Mexican	Other Hispanic	Total Hispanic	Total
Agriculture, Forestry, Fishing & Hunting	3,830	134	32	166	3,996
Mining	72	0	0	0	72
Utilities	625	0	0	0	625
Construction	4,348	85	9	94	4,442
Manufacturing	14,253	970	242	1,212	15,465
Wholesale Trade	1,655	13	0	13	1,668
Retail Trade	7,514	139	44	183	7,697
Transportation & Warehousing	2,394	18	0	18	2,412
Information and Communications	1,561	0	0	0	1,561
Finance. Insurance. Real Estate, & Rental and Leasing	2,158	27	0	27	2,185
Professional, Scientific, Management, Administrative, etc.	3,166	68	27	95	3,261
Educational, Health and Social Service	12,798	185	68	253	13,051
Arts, Entertainment, Recreation, Accommodations, and Food	3,389	104	40	144	3,543
Other Services	2,741	45	0	45	2,786
Public Administration	1,558	0	0	0	1,558
Armed Forces	9	0	27	27	36
TOTAL	62,071	1,788	499	2,287	64,358

Data Source: U.S. Census Bureau, Public Use Microdata Samples, 2000. "Total" equals "Not Hispanic" plus "Total Hispanic".

Worker Industry by Hispanic Origin, PUMA 01900, Containing the Montevideo Area

In Chippewa County (Montevideo), the Census 2000 count of 251 persons of Hispanic or Latino origin was 1.9 percent of the total, and of that total 82 percent were of Mexican origin. For the entire PUMA 01900, the census estimated that there were 643 Hispanic workers, with manufacturing industry employing about six of ten of the total (Table 5.8). Other industries with notable numbers of Hispanic workers were Agriculture, Forestry, Fishing & Hunting; and Educational, Health, and Social Service; and Construction.

The three tables presented and discussed above illustrate the level of detail available from the PUMS files for the PUMAs that contain our sample regional centers. A local level of detail more precise than what is yielded for each of the PUMAs is not possible under Census Bureau rules that protect confidentiality of individual households and persons. When census respondents provided no industry data in their census returns, the Census Bureau uses various estimating techniques to fill out the PUMS files so that those who did report are reliably distributed across almost industries. Hispanic or Latino workers are concentrated in six or seven industries, with manufacturing the most conspicuous in PUMA 00500 (Willmar area). Data for other PUMAs appear in the appendices.

Table 5.8. Worker Industry by Hispanic Origin, PUMA 01900 (contains Montevideo Area), 2000

Industry (NAICS)	Not Hispanic	Mexican	Other Hispanic	Total Hispanic	Total
Agriculture, Forestry, Fishing & Hunting	4,331	0	58	58	4,389
Mining	45	0	0	0	45
Utilities	507	0	0	0	507
Construction	3,127	46	0	46	3,173
Manufacturing	10,482	140	239	379	10,861
Wholesale Trade	1,558	22	0	22	1,580
Retail Trade	5,730	0	9	9	5,739
Transportation & Warehousing	2,001	0	0	0	2,001
Information and Communications	904	0	0	0	904
Finance. Insurance. Real Estate, & Rental and Leasing	2,207	9	0	9	2,216
Professional, Scientific, Management, Administrative, etc.	1,761	26	0	26	1,787
Educational, Health and Social Service	10,568	49	0	49	10,617
Arts, Entertainment, Recreation, Accommodations, and Food	3,219	4	27	31	3,250
Other Services	2,390	14	0	14	2,404
Public Administration	1,608	0	0	0	1,608
Armed Forces	31	0	0	0	31
TOTAL	50,469	310	333	643	51,112

Data Source: U.S. Census Bureau, Public Use Microdata Samples, 2000. "Total" equals "Not Hispanic" plus "Total Hispanic".

Summary and Conclusions

The main questions raised in this chapter asked how do demographic characteristics of workers (i.e., age, ethnic origin) vary by occupation and by industry in different parts of Greater Minnesota as revealed by PUMS data as they apply to PUMAs. The short answer appears to be: not by very much.

This chapter demonstrated how demographic characteristics of workers (i.e., age, ethnic origin) vary by occupation and by industry in different parts of Greater Minnesota as revealed by Census-based public use microdata samples (PUMS) of households and their individual members as they apply to multi-county public use Census-defined microdata areas (PUMAs). On the basis of PUMS data for three sample PUMAs, which contain the Brainerd, the Willmar and the Montevideo study areas in 2000, the profiles of workers by occupations arrayed by age groups appear to be much more similar than different. In each of the three PUMAs, about one in five workers reported no specific occupation. Among workers reporting a specific occupation within the 25 occupation groups, the profiles are highly similar among the three PUMAs. Six occupation groups dominated: (1) Management Workers; (2) Sales Workers; (3) Office & Administrative Support Workers; (4) Construction Workers; (5) Production Workers; and (6) Transportation & Material Moving Workers.

Although we might expect differences in the age profiles of workers among the three sample PUMAs, which varied significantly in their employment growth records prior to Census 2000,

the data show almost no difference in the age profiles. The sample PUMAs each cover a much larger area than the study areas that they contain, and with increased area size there is bound to be a muting of local differences in economic activity that might otherwise be revealed in county-level or study-area-level cross-tabulations with dimensions of the sort presented above. On the other hand, as the regional economies of Greater Minnesota increasingly focus increasingly on services, consumer-orientation, personal care, and life-style emphases, we probably should not be surprised to observe more similarities than sharp differences.

The Hispanic or Latino population comprised 12.5 percent of the U.S. population in 2000, but only 2.9 percent in Minnesota. In Greater Minnesota the proportions were even lower. In the PUMA containing the Brainerd area, PUMS data reveal an estimated 481 Hispanic workers primarily engaged in five of 16 industrial groups: (1) Retail Trade; (2) Manufacturing; (3) Arts, Entertainment, Recreation, Accommodation and Food; (4) Other Services; and (5) Professional, Scientific, Management, Administrative, etc. In the PUMA containing the Willmar study area, there were an estimated 2,287 Hispanic workers, with more than half concentrated in Manufacturing. The PUMA containing the Montevideo study had an estimated 643 Hispanic workers in 2000, with Manufacturing employing six of ten of them.

In addition to demonstrating the use of PUMS data for PUMAs, we anticipated that different rates of employment growth in the 1990s would distinguish one place from another. Specifically, we expected that the PUMA containing the fast-growing Brainerd area would display notable differences in its employment profiles compared with the PUMA containing the moderately expanding Willmar area, or the PUMA containing the slow-growth Montevideo area. That turned out not to be the case.

A more detailed comparison of the other PUMAs covering Greater Minnesota might reveal differences that failed to emerge in the comparisons of these three. Those data are included in the appendices to make such comparisons possible.

Chapter 6

Worker and Household Characteristics and Commuting in the Minnesota Countryside, 2000: Illustrations from Public Use Microdata Samples

Introduction

This chapter builds on Chapter 3, which demonstrated how the economic base of our study areas has been changing, and gradually coming to resemble in many respects the profile of major metro areas like the Twin Cities. Recall that in Economic Base Theory terms, our study areas can be thought of as small regional economies with regional centers at their cores. As small economies, they depend more heavily on their exports of goods and services and on money flowing in from outside than do large and relatively more self-sufficient metropolitan economies like that of the Twin Cities.

The goal here is to demonstrate ways to investigate various relationships using cross-tabs of socio-economic characteristics of workers (income; educational attainment) and their commuting times for workers living within PUMAs and commuting in different parts of Minnesota outside the greater Twin Cities area. One set of PUMS data portrays how commute times vary with the educational attainments of workers in three different sample PUMAs–one in a fast-growing region of Minnesota (around Brainerd), one in a moderate-growth area (around Willmar), and a third in a slow-growth PUMA (around Montevideo). A second PUMS data set presents cross-tabs showing how journey-to-work times vary with personal incomes of workers using the same three sample PUMAs. Interpretation of these findings concludes the chapter.

The goal of the present chapter is to illustrate ways to use PUMS data files to investigate selected relationships between *demographic characteristics* of workers and the *journey to work* by those who commute using a sample of PUMAs from different parts of Minnesota outside the greater Twin Cities.

Key Questions That Can Be Explored Using PUMS Data:

One question is whether there are any differences in the journey to work from one income class to another when commuters are classified by *personal income*. If differences appear, do the patterns of difference vary from one part of the state to another as suggested by cross-tabs from three sample PUMAs? That is, do patterns differ depending on *growth rates* of study areas, i.e., fast growth, moderate growth, or slow growth/declining?

A second question is whether there are any differences in the journey to work from one group of commuters to another when they are classified by *educational attainment*. And if differences do appear, do patterns of difference notably vary from one part of the state to another as suggested by cross-tabs from three sample PUMAs?

A third question that could be explored with PUMS data is whether there are important differences in the journey to work from one group of commuters to another when they are

classified by *household income*. And if differences do appear, do patterns of difference notably vary from one part of the state to another as suggested by cross-tabs from three sample PUMAs? This question tries to gain insights about the multiple-worker household, and could be investigated by comparing the time-cost of commuting with the income of the household. This provocative question lay beyond the scope of this study, but may be explored using PUMS data.

A fourth question is whether there are any differences in the journey to work from one group of commuters to another when they are classified by *household composition*. And, again, if differences appear, do the differences vary from one part of the state to another? PUMS data might provide insights about the multiple-worker household, and could be explored by comparing the time-cost of commuting for men and women working at home or commuting to jobs away from home. This question also lay beyond the scope of the present study.)

Findings and Analysis

Personal Income and Travel Time to Work

One question is whether notable differences appear from one income class to another when commuters are classified by *personal income* and average commute times in the journey to work. If differences appear, do patterns of difference vary from one part of the state to another as suggested by cross-tabs from three sample PUMAs? That is, do patterns differ depending on *growth rates* of study areas, i.e., fast growth, moderate growth, or slow growth/declining? First let us look at the profiles of reported personal incomes for three PUMAs. The distributions of personal incomes reported by workers in Census 2000 differ from one PUMA to another (Table 6.1).

PUMA 00500, containing the Brainerd study area, represents places that grew fast in the 1990s. The median income of workers in this PUMA, calculated by interpolation from the table, was $23,031 in 1999. The median in the Willmar area was slightly higher; that in the Montevideo area was significantly lower. In PUMA 01800, containing the moderate-growth Willmar study area, the median was $24,192, and in PUMA 01900 with slow-growth Montevideo study area the median was $20,910. It seems reasonable that the two PUMAs with the more vigorous economies would have the higher median incomes, and that the slow-growth Montevideo area would trail the other two. Despite the differences among the three PUMAs, there is likely to be even greater differences among the counties comprising the PUMAs. For example, PUMA 00500 covers a wide 6-county area (i.e., Crow Wing, Aitkin, Carlton, Pine, Kanabec, and Mille Lacs counties) with significant internal diversity. Recall that PUMS data used to compile the table pertain to *individual workers*. Median *household* incomes in 1999 in PUMA 00500 counties (Crow Wing: $37,589; Aitkin: $31,139; Carlton: $40,021; Pine: $37,379; Kanabec: $38,520; Mille Lacs: $36,977) revealed some variation, but were generally healthy.

Table 6.1. Personal Income, 1999, Three PUMAs Compared

	PUMA 00500 Includes Brainerd Area		PUMA 01800 Includes Willmar Area		PUMA 01900 Includes Montevideo Area	
Income in 1999 ($)	**Total**	**% of Total**	**Total**	**% of Total**	**Total**	**% of Total**
< = 10,000	14,286	**19.2**	12,569	**19.5**	11,791	**23.1**
10,001 – 20,000	18,239	**24.5**	13,272	**20.6**	12,724	**24.9**
20,001 – 30,000	15,587	**20.9**	15,120	**23.5**	11,434	**22.4**
30,001 – 40,000	11,308	**15.2**	10,364	**16.1**	7,274	**14.2**
40,001 – 50,000	7,263	**9.7**	5,970	**9.3**	3,253	**6.4**
50,001 – 60,000	3,096	**4.2**	2,806	**4.4**	1,923	**3.8**
60,001 – 70,000	1,635	**2.2**	1,343	**2.1**	851	**1.7**
70,001 – 80,000	821	**1.1**	710	**1.1**	591	**1.2**
80,001 – 90,000	724	**1.0**	466	**0.7**	236	**0.5**
90,001 – 100,000	328	**0.4**	347	**0.5**	146	**0.3**
100,000 +	1,213	**1.6**	1,391	**2.2**	889	**1.7**
Total	74,500	100.0	64,358	100.0	51,112	100.0

Data source: U.S. Bureau of the Census. Public Use Microdata Samples, 2000. Personal income reported in Census 2000 is income for the previous year, 1999. Data refer to workers 15 years of age and older.

Now, consider the cross tabulation of income and with travel times for PUMA 00500 (which includes the Brainerd area) (Table 6.2). The entries in the top half of the table are the estimated number of workers classified by personal income in 1999 and by travel time to work in 2000, based on PUMS data files for PUMA 00500. The entries in the lower half of the table are the "expected" number of workers in each cell. They are "expected" in the sense that *if* income and travel time were unrelated, for example with 42.3 percent of workers traveling 10 minutes or less to work, while 19.2 percent of workers earned between 0 and $10,000 in 1999, then we might expect .423 x .192 x 74,500 equals 6,038 workers as the "expected" number of workers with earnings between 0 and $10,000 *and* traveling ten minutes or less to work.

The number reported in that joint category from PUMS data was 7,257, or substantially more than 6,038. Entries in the top half of the table are in **bold** where the *actual* number exceeds the *expected* number, and the actual number exceed the expected number by 10 or more. The pattern of entries highlighted in bold suggests that the two variables *are related* in interesting ways, notably for low-income and high-income workers. This method of analysis, comparing expected to actual flows, reveals that many workers in the higher-income categories (i.e., between $20,000 and $60,000) spent more time in their journeys to work than might have been expected. This result implies that a disproportionate share of those with high incomes lived farther from their jobs than we expect, or, alternatively, that a disproportionate share of those with very low incomes (i.e., under $10,000) held jobs close to home. What do findings like this mean for planners and public officials? To the extent that it can be shown that it is the higher-income workers who are providing a disproportionate share of commuter traffic loads on roads, it may be appropriate that they bear a corresponding share of the cost of building and maintaining the roads through direct (e.g., gas taxes and tolls) and indirect (e.g., progressive property taxes on large residential lots; personal income taxes) charges.

Table 6.2. Workers Classified by Personal Income vs. Travel Time to Work in 2000, PUMA 00500 (includes Brainerd Study Area)

	Travel Time to Work (banded*)								
Income (banded*)	**Š 10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-59**	**60+**	**Total**	**% of Total**
<= 10000	**7,257**	3,436	2,142	476	362	0	613	14,286	19.2
10001 - 20000	7,716	4,522	2,884	747	**987**	46	1,337	18,239	24.5
20001 - 30000	6,043	**4,427**	**2,374**	802	**807**	27	1,107	15,587	20.9
30001 - 40000	4,091	**2,947**	1,681	**552**	**707**	**63**	**1,267**	11,308	15.2
40001 - 50000	2,985	1,620	1,025	**329**	**452**	**54**	798	7,263	9.7
50001 - 60000	1,227	700	**543**	129	**171**	**45**	281	3,096	4.2
60001 - 70000	**754**	319	**279**	32	53	0	198	1,635	2.2
70001 - 80000	**414**	148	**148**	9	18	9	75	821	1.1
80001 - 90000	284	**247**	53	32	31	0	77	724	1.0
90001 - 99999	91	76	**71**	4	**27**	0	59	328	0.4
100000+	**625**	**351**	81	22	22	0	112	1,213	1.6
Total	31,487	18,793	11,281	3,134	3,637	244	5,924	74,500	100.0
Percent of Total	42.3	25.2	15.1	4.2	4.9	0.3	8.0	100.0	

Data source: U.S. Bureau of the Census. Public Use Microdata Samples, 2000. * PUMS files present data using more classes than the number used here; classes have been combined for ease of interpretation. Data refer to workers 15 years of age and older.

"Expected" Number of Workers Classified by Personal Income vs. Travel Time to Work in 2000, PUMA 00500 (includes Brainerd Study Area)**

	Travel Time to Work (banded)								
Income (banded)	**Š 10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-59**	**60+**	**Total**	**% of Total**
<= 10000	6,038	3,604	2,163	601	697	47	1,136	14,286	19.2
10001 - 20000	7,709	4,601	2,762	767	890	60	1,450	18,239	24.5
20001 - 30000	6,588	3,932	2,360	656	761	51	1,239	15,587	20.9
30001 - 40000	4,779	2,852	1,712	476	552	37	899	11,308	15.2
40001 - 50000	3,070	1,832	1,100	306	355	24	578	7,263	9.7
50001 - 60000	1,309	781	469	130	151	10	246	3,096	4.2
60001 - 70000	691	412	248	69	80	5	130	1,635	2.2
70001 - 80000	347	207	124	35	40	3	65	821	1.1
80001 - 90000	306	183	110	30	35	2	58	724	1.0
90001 - 99999	139	83	50	14	16	1	26	328	0.4
100000+	513	306	184	51	59	4	96	1,213	1.6
Total	31,487	18,793	11,281	3,134	3,637	244	5,924	74,500	100.0
Percent of Total	42.3	25.2	15.1	4.2	4.9	0.3	8.0	100.0	42.3

** "Expected" in the sense that if income and travel time were unrelated: e.g., 42.3 percent of workers traveled 10 minutes or less to work, while 19.2 percent of workers earned between 0 and $10,000 in 1999, so .423 x .192 x 74,500 equals 6,038 which is the expected number of workers with earnings between 0 and $10,000 *and* traveling ten minutes or less to work. The number reported in that joint category from PUMS data was 7,257, or substantially more than 6,038. Entries in the top table are in bold where the *actual* number exceeds the *expected* number, and the actual number is 10 or more. The pattern of entries in bold suggests that the two variables are related in interesting ways, notably for low-income and high-income workers. (Note: calculations were made with non-rounded percentages.)

Low-income workers may be part-time workers, which we could detect through further analysis of the PUMS data. They could be female workers with a spouse or partner working full time, or young workers and students with part-time jobs. In situations where a household's second income comes from a part-time job, it is common for that job to be located close to home and associated with a short, quick journey to work. High-income workers may be farm operators, with place of work and home located close together. They may also be owners of local businesses or professionals who see a need to live close to where they work, either for availability in emergencies (e.g., physicians) or for public relations purposes (e.g., small business owners). Again, additional information of this kind may be distilled from the PUMS files.

For the middle-income groups ($20,000 to $60,000), the actual numbers often exceed the expected numbers for travel times from 11 minutes to 60 minutes or more, and sometimes to a significant degree. This comparison is consistent with our findings in our previous study on low-density development in the Minnesota countryside.

The patterns revealed for PUMA 00500 are repeated in PUMA 01800 (containing the Willmar study area) and PUMA 01900 (containing the Montevideo study area) (Tables 6.3 and 6.4).

The same discrepancies between actual number of workers and expected number appear for the lowest income class and the highest for travel times ten minutes or less. That is, the actual numbers are much higher than the expected.

Again, similar to PUMA 00500, the actual number of workers in both PUMAs exceeds the expected for most cases of incomes between $10,000 and $60,000 and for travel times from 11 minutes to 60 minutes or more. These discrepancies are consistent with the low-density developments in the vicinity of regional job centers, which extend the journey to work and increase the travel times reported by workers in response to census questions.

Educational Attainment and Travel Time to Work

A second question is whether there are any differences in commute time from one group of commuters to another when they are classified by *years of school completed*. And if differences do appear, are patterns of difference varying notably from one part of the state to another as suggested by cross-tabs from three sample PUMAs?

In an initial comparison, we see that there is little difference in the educational profiles of the three PUMAs (Table 6.5).

The median educational attainment of workers for each sample PUMA lies within the "Some college, no degree" class, but that fact obscures some differences. The proportion of workers with no formal schooling or grade school only educational attainments (through 8th grade only) were low and varied somewhat: PUMA 00500–0.8 percent; PUMA 01800–2.1 percent, and PUMA 01900–1.2 percent. At the other end of the distribution, the differences were negligible. The proportions with bachelor's degree or more were: PUMA 00500–16.9 percent, PUMA 01800–16.8 percent, and PUMA 01900–18.7 percent.

Table 6.3. Workers Classified by Personal Income vs. Travel Time to Work in 2000, PUMA 01800 (includes Willmar Study Area)

	Travel Time to Work (banded*)								
Income (banded*)	**Š 10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-59**	**60+**	**Total**	**% of Total**
<= 10000	**7,830**	2,597	967	350	328	0	497	12,569	19.5
10001 - 20000	**6,724**	**3,165**	**1,842**	333	**625**	9	574	13,272	20.6
20001 - 30000	6,702	**3,828**	**2,401**	**663**	**673**	**54**	799	15,120	23.5
30001 - 40000	4,829	**2,405**	**1,407**	**398**	**541**	23	**761**	10,364	16.1
40001 - 50000	2,765	1,222	718	**301**	**297**	**27**	**640**	5,970	9.3
50001 - 60000	1,275	620	271	**118**	**202**	0	**320**	2,806	4.4
60001 - 70000	552	195	**241**	27	50	**41**	**237**	1,343	2.1
70001 - 80000	399	134	61	28	**46**	0	42	710	1.1
80001 - 90000	**271**	96	18	18	9	0	**54**	466	0.7
90001 - 99999	**190**	76	27	0	0	0	**54**	347	0.5
100000+	**869**	277	90	45	22	9	79	1,391	2.2
Total Workers	32,406	14,615	8,043	2,281	2,793	163	4,057	64,358	100.0
Percent of Total	50.4	22.7	12.5	3.5	4.3	0.3	6.3	100.0	

Data source: U.S. Bureau of the Census. Public Use Microdata Samples, 2000. * PUMS files present data using more classes than the number used here; classes have been combined for ease of interpretation. Data refer to workers 15 years of age and older.

"Expected" Number of Workers Classified by Personal Income vs. Travel Time to Work in 2000, PUMA 01800 (includes Willmar Study Area)**

	Travel Time to Work (banded)								
Income (banded)	**Š 10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-59**	**60+**	**Total**	**% of Total**
<= 10000	6,329	2,854	1,571	445	545	32	792	12,569	19.5
10001 - 20000	6,683	3,014	1,659	470	576	34	837	13,272	20.6
20001 - 30000	7,613	3,434	1,890	536	656	38	953	15,120	23.5
30001 - 40000	5,219	2,354	1,295	367	450	26	653	10,364	16.1
40001 - 50000	3,006	1,356	746	212	259	15	376	5,970	9.3
50001 - 60000	1,413	637	351	99	122	7	177	2,806	4.4
60001 - 70000	676	305	168	48	58	3	85	1,343	2.1
70001 - 80000	358	161	89	25	31	2	45	710	1.1
80001 - 90000	235	106	58	17	20	1	29	466	0.7
90001 - 99999	175	79	43	12	15	1	22	347	0.5
100000+	700	316	174	49	60	4	88	1,391	2.2
Total Workers	32,406	14,615	8,043	2,281	2,793	163	4,057	64,358	100.0
Percent of Total	50.4	22.7	12.5	3.5	4.3	0.3	6.3	100.0	

** "Expected" in the sense that if income and travel time were unrelated: e.g., 50.4 percent of workers traveled 10 minutes or less to work, while 19.5 percent of workers earned between 0 and $10,000 in 1999, so .504 x .195 x 64,358 equals 6,329 which is the expected number of workers with earnings between 0 and $10,000 *and* traveling ten minutes or less to work. The number reported in that joint category from PUMS data was 7,830, or substantially more than 6,329. Entries in the top table are in bold where the *actual* number exceeds the *expected* number, and the actual number is 10 or more. The pattern of entries in bold suggests that the two variables are related in interesting ways, notably for low-income and high-income workers. (Note: calculations were made with non-rounded percentages.)

Table 6.4. Workers Classified by Personal Income vs. Travel Time to Work in 2000, PUMA 01900 (includes Montevideo Study Area)

	Travel Time to Work (banded*)								
Income (banded*)	**Š 10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-59**	**60+**	**Total**	**% of Total**
<= 10000	**8,414**	1,674	1,063	260	174	13	193	11,791	23.1
10001 - 20000	7,819	**2,640**	1,287	231	**266**	0	**481**	12,724	24.9
20001 - 30000	6,533	**2,654**	**1,400**	**320**	216	0	311	11,434	22.4
30001 - 40000	4,517	**1,583**	681	112	**148**	14	219	7,274	14.2
40001 - 50000	2,055	578	303	**97**	**89**	0	**131**	3,253	6.4
50001 - 60000	1,183	320	**231**	9	27	0	**153**	1,923	3.8
60001 - 70000	**631**	45	80	**45**	9	0	**41**	851	1.7
70001 - 80000	**456**	90	36	9	0	0	0	591	1.2
80001 - 90000	**164**	0	36	36	0	0	0	236	0.5
90001 - 99999	**114**	9	0	0	0	0	23	146	0.3
100000+	**648**	139	45	4	5	0	**48**	889	1.7
Total	32,534	9,732	5,162	1,123	934	27	1,600	51,112	100.0
Percent of Total	63.7	19.0	10.1	2.2	1.8	0.1	3.1	100	

Data source: U.S. Bureau of the Census. Public Use Microdata Samples, 2000. * PUMS files present data using more classes than the number used here; classes have been combined for ease of interpretation. Data refer to workers 15 years of age and older.

"Expected"** Number of Workers Classified by Personal Income vs. Travel Time to Work in 2000, PUMA 01900 (includes Montevideo Study Area)

	Travel Time to Work (banded)								
Income (banded)	**Š 10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-59**	**60+**	**Total**	**% of Total**
<= 10000	7,505	2,245	1,191	259	215	6	369	11,791	23.1
10001 - 20000	8,099	2,423	1,285	280	233	7	398	12,724	24.9
20001 - 30000	7,278	2,177	1,155	251	209	6	358	11,434	22.4
30001 - 40000	4,630	1,385	735	160	133	4	228	7,274	14.2
40001 - 50000	2,071	619	329	71	59	2	102	3,253	6.4
50001 - 60000	1,224	366	194	42	35	1	60	1,923	3.8
60001 - 70000	542	162	86	19	16	0	27	851	1.7
70001 - 80000	376	113	60	13	11	0	19	591	1.2
80001 - 90000	150	45	24	5	4	0	7	236	0.5
90001 - 99999	93	28	15	3	3	0	5	146	0.3
100000+	566	169	90	20	16	0	28	889	1.7
Total	32,534	9,732	5,162	1,123	934	27	1,600	51,112	100.0
Percent of Total	63.7	19.0	10.1	2.2	1.8	0.1	3.1	100	

** "Expected" in the sense that if income and travel time were unrelated: e.g., 63.7 percent of workers traveled 10 minutes or less to work, while 23.1 percent of workers earned between 0 and $10,000 in 1999, so .637 x .231 x 51,112 equals 7,505 which is the expected number of workers with earnings between 0 and $10,000 *and* traveling ten minutes or less to work. The number reported in that joint category from PUMS data was 8,414, or substantially more than 7,505. Entries in the top table are in bold where the *actual* number exceeds the *expected* number, and the actual number is 10 or more. The pattern of entries in bold suggests that the two variables are related in interesting ways, notably for low-income and high-income workers. (Note: calculations were made with non-rounded percentages.)

Table 6.5. Educational Attainment of Workers, 2000, Three PUMAs Compared

	PUMA 00500 Includes Brainerd Area		PUMA 01800 Includes Willmar Area		PUMA 01900 Includes Montevideo Area	
Educational Attainment	**Total**	**% of Total**	**Total**	**% of Total**	**Total**	**% of Total**
No School Completed	114	**0.2**	379	**0.6**	123	**0.2**
1st-4th grade	0	**0.0**	166	**0.3**	84	**0.2**
5th-8th grade	514	**0.7**	810	**1.3**	427	**0.8**
9th grade	1,126	**1.5**	1,321	**2.1**	791	**1.5**
10th grade	2,595	**3.5**	2,093	**3.3**	1,764	**3.5**
11th grade	2,881	**3.9**	2,140	**3.3**	1,739	**3.4**
12th grade, no diploma	2,025	**2.7**	1,566	**2.4**	970	**1.9**
High school graduate, or GED	25,270	**33.9**	21,529	**33.5**	16,410	**32.1**
Some college, no degree	20,505	**27.5**	16,472	**25.6**	14,661	**28.7**
Associate degree, occupational program	6,893	**9.3**	7,041	**10.9**	4,577	**9.0**
Bachelors degree	8,824	**11.8**	8,294	**12.9**	7,596	**14.9**
Masters degree	2,678	**3.6**	1,501	**2.3**	1,282	**2.5**
Professional degree	972	**1.3**	833	**1.3**	524	**1.0**
Doctorate degree	103	**0.1**	213	**0.3**	164	**0.3**
Percent of Total	74,500	**100.0**	64,358	**100.0**	51,112	**100.0**

Data source: U.S. Bureau of the Census. Public Use Microdata Samples, 2000. Personal income reported in Census 2000 is income for the previous year, 1999. Data refer to workers 15 years of age and older.

Now, consider the cross tabulation of educational attainment and with travel times for PUMA 00500 (which includes the Brainerd area) (Table 6.6).

The entries in the top half of the table are the estimated number of workers classified by reported educational attainment as of census time 2000 by travel time to work in 2000, based on PUMS data files for PUMA 00500. As in the examples above, the entries in the lower half of the table are the "expected" number of workers in each cell. They are "expected" in the sense that *if* income and travel time were unrelated, for example with 42.2 percent of workers traveling 10 minutes or less to work, while 33.9 percent of workers were high school graduates or had earned their GED, then we might expect .422 x .339 x 74,500 equals 10,680 workers as the "expected" number of workers with high school educations or GED *and* traveling ten minutes or less to work.

The number reported in that joint category from PUMS data was 10,108, or substantially less than 10,680. Entries in the top half of the table are in **bold** where the *actual* number exceeds the *expected* number, and the actual number is 10 or more. The pattern of entries in bold suggests that the two variables are related in interesting ways, and in ways that resemble the earlier analysis based on incomes and travel times. But that similarity should not be too surprising because educational attainment and income typically are correlated variables.

Table 6.6. Educational Attainment vs. Travel Time to Work in 2000, PUMA 500 (Includes Brainerd Study Area)

(Number of Workers)	Travel Time to Work (banded*)								
Educational Attainment	**Š 10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-59**	**60+**	**Total**	**% of Total**
No school completed	9	21	**59**	0	0	0	**25**	114	0.2
5th-8th grade	203	**145**	54	28	31	0	53	514	0.7
9th grade	499	295	**197**	0	64	**22**	49	1,126	1.5
10th grade	**1,239**	**675**	376	36	81	0	188	2,595	3.5
11th grade	1,206	**754**	**491**	68	100	**54**	208	2,881	3.9
12th grade, no diploma	**919**	**530**	216	45	98	0	**217**	2,025	2.7
High school graduate, or GED	10,108	**6,594**	3,560	**1,089**	**1,346**	72	**2,501**	25,270	33.9
Some college, no degree	8,579	4,973	**3,188**	**940**	**1,110**	64	**1,651**	20,505	27.5
Assoc degree, occupat prog'm	2,646	**1,772**	**1,206**	**415**	**389**	18	447	6,893	9.3
Bachelors degree	**4,206**	**2,317**	1,213	**402**	244	14	428	8,824	11.8
Masters degree	**1,294**	434	**601**	89	125	0	135	2,678	3.6
Professional degree	**512**	251	120	22	49	0	18	972	1.3
Doctorate degree	**67**	32	0	0	0	0	4	103	0.1
Total	31,487	18,793	11,281	3,134	3,637	244	5,924	74,500	100.0
Percent of total	42.2	25.2	15.1	4.2	4.9	0.3	8.0	100	

Data source: U.S. Bureau of the Census. Public Use Microdata Samples, 2000. * PUMS files present data using more classes than the number used here; classes have been combined for ease of interpretation. Data apply to workers 15 years of age and older.

"Expected" Number of Workers by Educational Attainment vs. Travel Time to Work in 2000, PUMA 500

(Expected Number of Workers)	Travel Time to Work (banded)								
Educational Attainment	**Š 10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-59**	**60+**	**Total**	**% of Total**
No school completed	48	29	17	5	6	0	9	114	0.2
5th-8th grade	217	130	78	22	25	2	41	514	0.7
9th grade	476	284	171	47	55	4	90	1,126	1.5
10th grade	1,097	655	393	109	127	8	206	2,595	3.5
11th grade	1,218	727	436	121	141	9	229	2,881	3.9
12th grade, no diploma	856	511	307	85	99	7	161	2,025	2.7
High school graduate, or GED	10,680	6,374	3,826	1,063	1,234	83	2,009	25,270	33.9
Some college, no degree	8,666	5,172	3,105	863	1,001	67	1,630	20,505	27.5
Assoc degree, occupat prog'm	2,913	1,739	1,044	290	337	23	548	6,893	9.3
Bachelors degree	3,729	2,226	1,336	371	431	29	702	8,824	11.8
Masters degree	1,132	676	406	113	131	9	213	2,678	3.6
Professional degree	411	245	147	41	47	3	77	972	1.3
Doctorate degree	44	26	16	4	5	0	8	103	0.1
Total	31,487	18,793	11,281	3,134	3,637	244	5,924	74,500	100.0
Percent of total	42.2	25.2	15.1	4.2	4.9	0.3	8.0	100	

Entries in the top table are in bold where the *actual* number exceeds the *expected* number, and the actual number is 10 or more.

In the PUMA 00500 case, the entries for workers with levels of schooling at the high school level or higher are typically higher than expected compared with those with less educational attainment. That is, the higher the levels of educational attainment, the greater the chance that workers will commute more minutes than expected given their levels of schooling. To the extent that levels of schooling increase and recent trends continue, we may expect longer commutes to follow.

The patterns revealed in the PUMS data for PUMA 01800 and) 1900 are quite similar to those for PUMA 00500 (Tables 6.7 and 6.8).

Household Income and Commuting

These tables presented and discussed above illustrate how PUMS data files can illuminate different questions about the correlated of commuting times–in these cases, worker income and worker schooling. The questions asked of the data files can be elaborated by acknowledging that some households have more than one worker, and that fact affects the income picture as well as the overall commuting profile of the household.

A third question is therefore whether there are any differences in the journey to work from one group of commuters to another when they are classified by *household income*. Answering this question would provide insights about the multiple-worker household, and would allow an appraisal of the time-cost of commuting with the income of the household. This is a question for further research and lies beyond the scope of the present study.

Another question is whether there are significant differences in the time of the journey to work from one group of commuters to another when they are classified by *household composition*. Answering this question using PUMS data might provide some insight about the multiple-worker household, and could be explored by comparing, for example, the time-cost of commuting for men and women working at home or commuting to jobs away from home. Like the previous question, this is a matter for further research and lies beyond the scope of the present study.

Table 6.7. Educational Attainment vs. Travel Time to Work in 2000, PUMA 01800 (Includes Willmar Study Area)

	Travel Time to Work (banded*)								
Educational Attainment	**Š 10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-59**	**60+**	**Total**	**% of Total**
No school completed	161	85	25	**72**	0	0	36	379	0.6
1st-4th grade	76	0	**36**	0	**45**	0	9	166	0.3
5th-8th grade	352	**200**	73	23	**72**	0	**90**	810	1.3
9th grade	**861**	223	143	26	18	0	50	1,321	2.1
10th grade	1,048	**552**	261	80	58	9	85	2,093	3.3
11th grade	**1,224**	**548**	171	40	68	0	89	2,140	3.3
12th grade, no diploma	**844**	312	**210**	55	**109**	0	36	1,566	2.4
High school graduate, or GED	10,352	**5,295**	**2,975**	655	**992**	59	1,201	21,529	33.5
Some college, no degree	**8,392**	3,681	1,947	559	**814**	41	1,038	16,472	25.6
Assoc degree, occupat prog'm	3,099	1,447	**1,269**	**379**	189	27	**631**	7,041	10.9
Bachelors degree	**4,362**	1,868	770	329	337	18	**610**	8,294	12.9
Masters degree	**997**	222	96	54	0	0	**132**	1,501	2.3
Professional degree	**493**	150	58	0	**91**	0	41	833	1.3
Doctorate degree	**145**	32	9	9	0	9	9	213	0.3
Total	32,406	14,615	8,043	2,281	2,793	163	4,057	64,358	100.0
Percent of total	50.4	22.7	12.5	3.5	4.3	0.3	6.3	100.0	

Data source: U.S. Bureau of the Census. Public Use Microdata Samples, 2000. * PUMS files present data using more classes than the number used here; classes have been combined for ease of interpretation. Data apply to workers 15 years of age and older.

"Expected" Number of Workers by Educational Attainment vs. Travel Time to Work in 2000, PUMA 01800

	Travel Time to Work (banded)								
Educational Attainment	**Š 10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-59**	**60+**	**Total**	**% of Total**
No school completed	191	86	47	13	16	1	24	379	0.6
1st-4th grade	84	38	21	6	7	0	10	166	0.3
5th-8th grade	408	184	101	29	35	2	51	810	1.3
9th grade	665	300	165	47	57	3	83	1,321	2.1
10th grade	1,054	475	262	74	91	5	132	2,093	3.3
11th grade	1,078	486	267	76	93	5	135	2,140	3.3
12th grade, no diploma	789	356	196	56	68	4	99	1,566	2.4
High school graduate, or GED	10,840	4,889	2,691	763	934	55	1,357	21,529	33.5
Some college, no degree	8,294	3,741	2,059	584	715	42	1,038	16,472	25.6
Assoc degree, occupat prog'm	3,545	1,599	880	250	306	18	444	7,041	10.9
Bachelors degree	4,176	1,883	1,037	294	360	21	523	8,294	12.9
Masters degree	756	341	188	53	65	4	95	1,501	2.3
Professional degree	419	189	104	30	36	2	53	833	1.3
Doctorate degree	107	48	27	8	9	1	13	213	0.3
Total	32,406	14,615	8,043	2,281	2,793	163	4,057	64,358	100.0
Percent of total	50.4	22.7	12.5	3.5	4.3	0.3	6.3	100.0	

Entries in the top table are in bold where the *actual* number exceeds the *expected* number, and the actual number is 10 or more.

Table 6.8. Educational Attainment vs. Travel Time to Work in 2000, PUMA 01900 (Includes Montevideo Study Area)

(Number of Workers)	Travel Time to Work (banded*)								
Educational Attainment	**Š 10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-60**	**61+**	**Total**	**% of Total**
No school completed	22	**63**	**38**	0	0	0	0	123	0.2
1st-4th grade	49	4	**31**	0	0	0	0	84	0.2
5th-8th grade	227	**129**	9	0	13	0	49	427	0.8
9th grade	**572**	125	31	**27**	0	0	36	791	1.5
10th grade	**1,238**	274	131	**58**	36	0	27	1,764	3.5
11th grade	**1,202**	286	184	22	13	0	32	1,739	3.4
12th grade, no diploma	550	171	**109**	26	**48**	0	**66**	970	1.9
High school graduate, or GED	10,013	**3,526**	**1,680**	263	288	14	**626**	16,410	32.1
Some college, no degree	9,323	**2,860**	**1,595**	308	276	0	299	14,661	28.7
Assoc degree, occupat prog'm	2,699	880	**535**	**158**	**103**	0	**202**	4,577	9.0
Bachelors degree	**5,198**	1,102	756	216	139	13	172	7,596	14.9
Masters degree	**952**	203	31	36	18	0	42	1,282	2.5
Professional degree	**412**	63	18	0	0	0	31	524	1.0
Doctorate degree	77	46	14	9	0	0	18	164	0.3
Total	32,534	9,732	5,162	1,123	934	27	1,600	51,112	100.0
Percent of total	63.7	19.0	10.1	2.2	1.8	0.1	3.1	100.0	

Data source: U.S. Bureau of the Census. Public Use Microdata Samples, 2000. * PUMS files present data using more classes than the number used here; classes have been combined for ease of interpretation. Data apply to workers 15 years of age and older.

"Expected" Number of Workers by Educational Attainment vs. Travel Time to Work in 2000, PUMA 01900

(Expected Number of Workers)	Travel Time to Work (banded)								
Educational Attainment	**Š 10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-60**	**61+**	**Total**	**% of Total**
No school completed	78	23	12	3	2	0	4	123	0.2
1st-4th grade	53	16	8	2	2	0	3	84	0.2
5th-8th grade	272	81	43	9	8	0	13	427	0.8
9th grade	503	151	80	17	14	0	25	791	1.5
10th grade	1,123	336	178	39	32	1	55	1,764	3.5
11th grade	1,107	331	176	38	32	1	54	1,739	3.4
12th grade, no diploma	617	185	98	21	18	1	30	970	1.9
High school graduate, or GED	10,445	3,125	1,657	361	300	9	514	16,410	32.1
Some college, no degree	9,332	2,792	1,481	322	268	8	459	14,661	28.7
Assoc degree, occupat prog'm	2,913	871	462	101	84	2	143	4,577	9.0
Bachelors degree	4,835	1,446	767	167	139	4	238	7,596	14.9
Masters degree	816	244	129	28	23	1	40	1,282	2.5
Professional degree	334	100	53	12	10	0	16	524	1.0
Doctorate degree	104	31	17	4	3	0	5	164	0.3
Total	32,534	9,732	5,162	1,123	934	27	1,600	51,112	100.0
Percent of total	63.7	19.0	10.1	2.2	1.8	0.1	3.1	100.0	

Entries in the top table are in bold where the *actual* number exceeds the *expected* number, and the actual number is 10 or more.

Summary and Conclusions

This chapter raised two main questions that can be addressed using PUMS data from Census 2000: first, are there notable differences in the journey to work from one income class to another when commuters are classified by *personal income*; and second, are there significant differences in the journey to work from one group of commuters to another when they are classified by *educational attainment*. In both cases, if differences do appear, do patterns of difference notably vary from one part of the state to another.

We demonstrated how to exploit PUMS files to disclose relationships between population characteristics and commuting behavior, with examples at the individual worker level of the relation between commuting and income, and between commuting and education. Cross-tabs and statistical analysis prepared to examine workers' travel time to work (7 classes: ≤ 10 minutes, to ≥ 60 minutes) with their income (11 classes: ≤ $10,000, to ≥ $100,000) reveal that disproportionate numbers of workers in middle-income categories spent more time in their journeys to work than might have been expected, or, alternatively, a disproportionate share of workers with very low incomes (i.e., under $10,000; perhaps mainly part-time workers) held jobs close to home, and that workers with levels of schooling at the high school level or higher are typically higher than expected compared with those with less educational attainment. That is, the higher the level of educational attainment, the greater the chance that worker will commute more minutes than expected given their levels of schooling. To the extent that levels of income and schooling increase and recent trends continue, we may expect longer commutes to follow.

PUMS data files provide an opportunity to assess travel activity by the individual workers in a household when households are classified by household income, and also the total commuting time by household as that total varies by household income, but such an inquiry lay beyond the scope of the present study.

Chapter 7

Regional Economic Vitality and Travel Behavior in the Minnesota Countryside, 1990-2000: Insights from Public Use Microdata Samples

Introduction

The chapter demonstrates ways to use PUMS data files to investigate selected attributes of workers who commute within PUMAs in different parts of Minnesota outside the greater Twin Cities area using three sets of cross-tabs: (1) worker occupation by travel time to work; (2) means of transportation to work by travel time to work; and (3) vehicle occupancy by travel time to work. As in previous chapters, one set of PUMS-based cross-tabs focuses on a fast-growing region of Minnesota (around Brainerd), a second on a moderate-growth area (around Willmar), and a third on a slow-growth PUMA (around Montevideo). Summary data for the 14 PUMAs that cover Minnesota outside the Twin Cities commute shed are presented for comparison with the three sample PUMAs that are examined and discussed in detail.

National Household Travel Surveys (NHTS), carried out in 1969, 1977, 1983, 1990, 1995, and 2001, are the main source of detailed datasets on travel behavior of household members based on a nationwide sample. The 2001 sample included 26,000 households who reported on the amount, nature, and characteristics of personal (non-commercial) travel by all modes of transportation in the U.S., including person trips and person miles of travel by all modes of transportation. Especially rich data on the journey-to-work are provided by the NHTS, but the data reflect the national sample and not small areas of the sort examined in this report. In this section we review a variety of travel behavior data sources for Minnesota and sub-state areas within Minnesota.

Background

Chapter 4 provided an overview of commuting activity within our 26 study areas using aggregate data from the decennial censuses of 1980, 1990, and 2000. Data aggregated at the county level that was presented in Chapter 4 described (1) the share of workers commuting to their jobs; (2) the share of workers commuting to jobs outside their county of residence; and (3) the share of commuters driving alone to work.

Commuting Times

We reported on changes in commute times, by county, during the decade of the 1980s and again for the decade of the 1990s, with study areas grouped by their growth experiences in the 1990s, namely: (1) study areas where commute *field* populations grew faster than regional *center*; (2) study areas where regional *center* population grew faster than commute *field* population; and (3) study areas with population loss in the regional center, or the commute field, or both. We anticipated that growth patterns might have something to do with changes in average commuting times. From these data on mean commuting times per county we calculated a weighted average

of the commute times for each of the 26 study areas using the *number of commuters* in each county and the *mean commute time* in each county for each of the three census years, 1980, 1990, and 2000 (Table 7.1).

The data revealed the following:

- © Mean commute times in 1980 were under 20 minutes in each of the 26 study areas;
- © Every study area reported an increase in average commuting time in each of the two decades, 1980s and 1990s;
- © Eleven of the 26 study areas reported an increase in commuting time of over 40 percent between 1980 and 2000;
- © There seemed to be little difference among the study areas grouped by their population growth experiences in their experiences regarding persistent overall increases in commuting times; and
- © The data do not reveal whether the greater times spent commuting are due to longer commutes, slower commutes, more complex commutes (e.g., due to stops along the way), or some combination of factors.

Another source of data on daily commuting activity is available from periodic statewide "omnibus" surveys carried out by the Minnesota Center for Survey Research at the University of Minnesota. [66] On an annual basis, a sample of Minnesota residents statewide is surveyed, and a second sample of Twin Cities-area residents is surveyed. Various clients propose questions and pay for their share of the surveys. The Minnesota Department of Transportation periodically sponsors questions. Surveys in 1995 and 1996 yielded the following results (Table 7.2).

The estimated mean values for commuting times statewide in the mid-1990s are roughly comparable with the Census-based *mean* commute times for the 26 study areas reported in Table 7.1 for 1990 and 2000. The extra insight revealed in Table 7.2 is provided by the *median* values, which are much lower than the corresponding means. The distribution of commute times is heavily skewed by a small number of long-distance commuters, which exaggerates the mean values. The median is more representative of average commute times. The MCSR warns against reading too much into the differences between the two years because of both sampling and non-sampling errors. [67]

The estimated mean values for commuting times statewide in the mid-1990s are roughly comparable with the Census-based *mean* commute times for the 26 study areas reported in Table 7.1 for 1990 and 2000. The extra insight revealed in Table 7.2 is provided by the *median* values, which are much lower than the corresponding means. The distribution of commute times is heavily skewed by a small number of long-distance commuters, which exaggerates the mean values. The median is more representative of average commute times. The MCSR warns against reading too much into the differences between the two years because of both sampling and non-sampling errors.

In Chapter 4 we reported details by county on mean minutes commuting for commutes exceeding 45 minutes. The discussion was organized by growth patterns during the 1990s within study areas.

Table 7.1. Mean Commute Times (minutes), 1980, 1990, and 2000, 26 Study Areas

Study Area	1980	1990	2000	Change in Average Commute Time, 1980 to 2000 (%)
Commute Field Populations Grew Faster Than Regional Center Population, 1990-2000				
Brainerd Area	16.8	19.0	21.5	28
Fergus Falls Area	13.6	16.6	19.2	41
Wadena Area	13.7	16.7	21.8	59
Mankato-No. M Area	13.1	16.9	17.8	36
Duluth-Superior Area	17.6	19.3	19.7	12
Bemidji Area	15.5	18.7	20.3	31
Waseca Area	12.5	16.8	17.6	41
Regional Center Populations Grew Faster Than Commute Field Population, 1990-2000				
Fargo-Moorhead Area	15.0	17.9	19.4	29
Alexandria Area	13.5	16.5	19.3	43
Rochester Area	14.6	18.3	18.7	28
Detroit Lakes Area	16.4	19.9	22.9	40
Owatonna Area	13.6	17.5	18.2	34
Park Rapids Area	16.7	19.8	22.2	33
Little Falls Area	15.6	19.6	24.0	54
Winona Area	13.1	16.2	17.0	30
Willmar Area	12.0	16.2	17.6	47
New Ulm Area	11.3	13.9	14.8	31
Regional Center Lost Population; Commute Field Gained Population, 1990-2000				
Grand Rapids Area	17.6	20.3	22.0	25
Hibbing Area	17.9	19.5	19.8	11
Regional Center Gained Population; Commute Field Lost Population, 1990-2000				
Worthington Area	11.6	15.3	16.8	45
Marshall Area	11.4	14.5	15.9	39
Albert Lea Area	12.1	16.1	18.1	50
Regional Center Lost Population; Commute Field Lost Population, 1990-2000				
Montevideo Area	11.5	15.3	16.3	42
Fairmont Area	11.7	14.1	15.8	35
Grand Forks-East GF	12.9	17.0	18.6	44
International Falls Area	12.0	14.8	15.5	29

Data Source: U.S. Bureau of the Census. Weighted averages calculated by the authors using average commuting time by county and number of commuters per county in each census year.

Table 7.2. Distance, Time and Speed in the Journey to Work in Minnesota, 1995-1996

	Statewide				Twin Cities Metropolitan Area			
	Means		Medians		Means		Medians	
	1995	1996	1995	1996	1995	1996	1995	1996
Average Distances to Work (miles)	14.6	13.6	9.4	9.3	11.9	12.4	9.3	9.4
Average Travel Times to Work (minutes)	21.6	20.2	15.0	14.7	20.6	21.6	17.2	19.2
Average Speed (MPH) to Work (based on the above distances and travel times)	40.6	40.3	37.7	38.1	34.7	34.6	32.5	29.3

Data Source: Minnesota Center for Survey Research, University of Minnesota; and Mn/DOT Working Paper, 11 April 1997. Commuting time, 1996 sample sizes, Minnesota n = 529, TCMA n = 569; commuting distance 1996 sample sizes: Minnesota n = 533; TCMA n = 571.

- In the seven study areas where *commute field* populations grew faster than *regional center* populations there were a total of 21 counties. In all of them, the mean minutes commuting to work by those spending 45 minutes or more going to work increased markedly between 1980 and 2000. In three counties (Aitkin in the Brainerd area; Le Sueur in the Mankato area; and Clearwater in the Bemidji area) the mean declined somewhat after 1990.
- In the ten areas where *regional center* population grew faster than the *commute field* population, the mean minutes commuting by workers whose commutes exceeded 45 minutes ranged from 67.1 minutes to 80.4 minutes in 2000, and had increased between 1980 and 2000 in all counties except Nicollet County north of Mankato in the New Ulm Area.
- In the remaining nine study areas there are three clusters of study areas and each experienced a different pattern of demographic challenge. In the first group (Grand Rapids and Hibbing areas) the regional center lost population in the 1990s, while the overall study areas gained. In the second group (Worthington, Marshall, and Albert Lea, areas) the regional centers gained population while each of their overall study areas lost population. The third set (Montevideo, Fairmont, Grand Forks-EGF, and International Falls areas) includes study areas where both the regional center and the overall study area lost population. For commuters who spent more than 45 minutes in the journey to work, the patterns here resemble those in the previous two tables. With only two exceptions (Nobles, Red Lake) the time spent one way on the journey to work by those with commutes exceeding 45 minutes rose, sometime by only three or four minutes (Jackson in the Worthington area; Marshall in the East Grand Forks area), but in more than half the counties the *increase* exceeded 10 minutes, bringing the average to over 70 minutes in almost all of these counties.

Other Data on Travel Times

The main focus of this study concerns what can be learned from transportation-related data from decennial censuses of population and housing, and demonstrating how to exploit public use microdata files to their full extent. But as illustrated above, an additional source of transportation-related data is the Minnesota Center for Survey Research at the University of Minnesota.

Questions on transportation and driving were included in surveys in 1983, 1984, and 1986 to 2000, with some questions asked of statewide samples and some focused only on the Twin Cities area. [68] Questions asked covered attitudes toward roads and driving (1984), problems with drunk driving and highway construction (1989), levels of satisfaction with road conditions, winter roads, litter, mowing, landscaping, and weed control (1990), traffic safety, seat belt use, emergency response to accidents, and willingness to pay more gas tax to improve emergency response services (2002), distance to work and time to work (1995 and 1996, see above), traffic safety, transportation of children and seat belts, where children ride in the car or van, and programs to reduce traffic deaths (2003). No transportation-related questions were asked in 2004.

In 2000, Mn/DOT sponsored a series of questions asking: QE2. "How safe do you feel using the actual highways themselves;" QE3. "How safe have you felt when driving or riding through highway construction areas this past summer;" and QE3. "How confident are you about Mn/DOT's ability to build, maintain a plan, communicate with the public, etc."

The most useful question from the point of view of this study was QE1. "How satisfied are you with the TIME it takes you to travel to the places you want to go?" This question has been asked several times in recent years and the downward trends in levels of satisfaction revealed in survey responses are interesting (Table 7.3).

Table 7.3. Changing Levels of Satisfaction in Time Needed to Reach Destinations

	1991		1995		1997		2000	
	Frequency	**%**	**Frequency**	**%**	**Frequency**	**%**	**Frequency**	**%**
Very satisfied	334	**41**	360	**45**	276	**35**	255	**32**
Somewhat satisfied	399	**49**	339	**43**	376	**47**	388	**49**
Not very satisfied	53	7	74	9	96	12	109	14
Not at all satisfied	31	4	22	3	49	6	46	6
Don't know	7		6		3		3	
Refused to answer	1		1		1		0	

Source: Minnesota Center for Survey Research, Statewide surveys for 1991, 1995, 1997, and 2000. See for example, 2000 Minnesota State Survey, Part 1, Results and Technical Report, January 2001. Data collected, September-November 2000. Response rate, 52 percent. Response rates have been dropping steadily in recent years.

The proportion of respondents who expressed satisfaction in the time needed to reach their destinations dropped steadily from 90 percent in 1991 to 81 percent in 2000. Some of this dissatisfaction may be traceable to longer trips (e.g., due to greater distances between home and

work by certain commuters), but some might also be due to slower average speeds on certain trips (e.g., commuting, or weekend travel), while still other explanations may lie in changing expectations or perceptions (e.g., more traffic on the roads although average speeds may be unchanged). [69]

Commute Distances

The time spent commuting tells us nothing about the distance of commutes. The long-form decennial census questionnaire asks about time, but not about distance. Distance estimates for the state come from other sources. For example, a 1999 MCSR survey with 554 responses reported the following commuting distances (Table 7.4).

Table 7.4. Distance One-way to Normal Workplace (miles), Minnesota Commuters, 1999

Miles To Workplace	Number of Commuters	Percent of Total
1	64	12
2	43	8
3	41	7
4	30	5
5	39	7
6	14	3
7	24	4
8	19	3
9	13	2
10	29	5
11-15	73	13
16-20	65	12
21-30	64	12
31+	36	6
Total	554	100

Source: Lewis Horner. 1999 Statewide Transportation Tracking Study: Results and Technical Report. Technical Report #99-10. Minneapolis: Minnesota Center for Survey Research, University of Minnesota. 27 June 1999. p. B-9.

Responses from the survey reveal that 49.8 percent of the commuters statewide who were surveyed in 1999 (n = 554) traveled 8 miles or less, and 52.1 percent traveled 9 miles or less, so the median was between 8 and 9 miles. This compares with the medians of 9.4 miles (in 1995) and 9.3 miles (in 1996). Considering both sampling and non-sampling errors in these surveys, the medians appear to be consistent.

What we seem to know from these various data sources is the following: (1) mean commuting *times* in our 26 study areas as reported in census data for 1980, 1990 and 2000 rose steadily over the two decades; and (2) median commuting *distances* statewide for several years in the 1990s appear to be relatively unchanged. The rising mean commuting time (reported from Census

sources) and the apparently constant median commuting distances (from MCSR sources) suggest decreasing average commuting speeds. We do not have enough information to confirm this speculation with the available samples.

Working at Home and/or Telecommuting

The same survey shed limited light on workers who work at home some of the time, but the extent of non-responses limit the usefulness of the results (Table 7.5).

Table 7.5. Number of Days Per Week Working at Home

Number of Days	Number of Workers	Percent
0	21	2.6
1	17	2.1
2	10	1.3
3	4	.5
4	1	.1
5	1	.1
No Reply	746	93.1

Source: Lewis Horner. 1999 Statewide Transportation Tracking Study: Results and Technical Report. Technical Report #99-10. Minneapolis: Minnesota Center for Survey Research, University of Minnesota. 27 June 1999. p. B-13.

MCSR surveys in the mid-1990s addressed telecommuting directly (Table 7.6).

Table 7.6. Estimated Penetration, Frequency, and Level of Telecommuting in Minnesota, 1994-96

	Statewide (percent)			Twin Cities Metropolitan Area (percent)		
Penetration: Percentage of Employees Telecommuting (1 day/month or more)***	1994	1995	1996	1994	1995	1996
© From Home	15	13	13	18	11	15
© From Satellite Location	3	*	7	3	*	7
© Total	18		20	21		22
Frequency: Average Telecommuting Days per Week						
© From Home	2.3	2.3	1.6	2.0	1.5	1.6
© From Satellite Location	3.5	*	2.5	4.0	*	2.2
Level: Percentage of Employees Telecommuting per Workday **						
© From Home	6.8	5.7	3.9	7.1	3.5	4.7
© From Satellite Location	2.3	*	3.6	2.4	*	3.2
© Total	9.1		7.5	9.5		7.9

Data Source: Minnesota Center for Survey Research, University of Minnesota; and Mn/DOT working paper, 22 May 1997. * Not asked in 1995. ** Calculated from the two previous categories. *** Sampling error is ± 3 percent.

The report that accompanied results of the 1996 survey included the following definitions and observations:

"Telecommuting is defined as employees working at a paid job at home or at a satellite work location at least once per month instead of commuting to their normal workplace. This definition excludes those who said that they are self-employed and work at home since they do not commute at all and are thus beyond the scope of this transportation-centered analysis.

"Two separate surveys were conducted of telecommuting in 1996–one statewide and the other in the seven-county Twin Cities Metropolitan Area. Both surveys asked a sampling of employees whether they telecommuted from home or a satellite location and the frequency of their telecommuting (i.e., days per week). The results appear in Table 6. Also shown for comparative purposes are the results from previous surveys. (Possible reasons for year-to-year differences include: sampling error, non-sampling error, and actual year-to-year differences.) …

"Telecommuters were also asked why they telecommuted and what equipment they used. … In addition, former telecommuters were asked why they no longer telecommuted. The majority said "personal choice." Non-telecommuters were asked whether they would like to telecommute in an "ideal world." Respondents replied "yes" 62 percent statewide, and 71 percent in the TCMA." [70]

With improvements in electronic communications and the use of the Internet, many work tasks could be accomplished more easily at home in 2005 than was the case in the mid-1990s. On the other hand, some jobs that were done by employees in the mid-1990s are now performed by self-employed contractors performing work that has been outsourced by former employers. Despite the obvious importance of telecommuting as revealed by survey responses, structural changes in the economy (i.e., differential growth of industrial sectors) along with new arrangements for the doing of work (i.e., employees vs. consultants) make comparisons between decades unreliable.

To summarize, the goal of this report is to illustrate the possibilities and the limitations of using PUMS files to investigate selected relationships between *occupation of workers* and their *journey to work*, the *means used* in the journey to work, and *vehicle occupancy* patterns in the journey to work, using a sample of three diverse PUMAs in different parts of Minnesota outside the greater Twin Cities area.

The key questions are:

- © How can PUMS data can be used to illustrate ways that *occupational characteristics* of workers are related to the *journey to work* by household members?

- © How *travel time* to work differs by *means* used, and by *vehicle occupancy*? and

- © Are there any differences in commuting patterns depending on *growth rates* of study areas? (fast growth; slower growth; slow growth/declining)?

The foregoing summary of measures from statewide surveys and from census data aggregated to the county or the study-area scale, provide one kind of insight into commuting activity, which is a major source of loads on the roads in greater Minnesota. We turn next to an exploration of how public use microdata samples can provide additional insights about how commuting activity is related to other data. The PUMS files allow us to look more deeply into the characteristics of those who commute, and to assess differences among those commuters.

Worker Occupation and Travel Time to Work in Three Sample PUMAs

The public use microdata samples permit the preparation of cross-tabs describing how persons in 25 different occupation categories reported different commute times in Census 2000 (Tables 7.7, 7.8 and 7.9). There are two different ways to compare the tables for these three PUMAs, which contain our three sample study areas–Brainerd area (fast growing in the 1990s), Willmar area (moderate growth), and Montevideo area (slow growing). We can note the percentage breakdowns by occupation class (row totals in the tables), or by travel times to work (column totals). In comparing the *distribution of workers by occupations*, they are remarkably similar despite some variations in workforce sizes. In comparing the *distribution of workers by their travel times to work* (which were consolidated into seven classes from a more detailed breakdown in the PUMS files, and discussed earlier), again there is not much difference.

Consider the share of workers traveling 20 minutes or less: 00500 with Brainerd area, 67.5 percent; 01800 with Willmar area, 73.1 percent; and 01900 with Montevideo area, 82,7 percent. A tentative conclusion from these data is that by Census 2000, these three regions in greater Minnesota were highly similar in their occupational and commute-time profiles. This conclusion should be tempered with the additional observation that because PUMAs cover large multi-county areas, they inevitably will appear more similar in their profiles and localized distinctiveness at the county or city scale will be obscured.

Another framework for comparison is the aggregate profile for all 14 PUMAs in Greater Minnesota (including the three sample PUMAs) (Table 7.10). The distribution of workers by occupation (i.e., row percentages) closely resembles those of the three sample PUMAs discussed above. The title of this study is "Urbanization of the Minnesota Countryside." To the degree that we argue that the regional economies of Greater Minnesota are becoming more similar, as revealed by worker occupations at the scale of PUMAs, there is little in these occupational profiles to refute that claim. As mentioned above, it is likely that at a more local scale differences are more pronounced, but many local areas even at the scale of the individual county have too few workers for census samples to yield reliable occupational profiles with the detail of 25 occupational categories.

Means of Transportation to Work and Travel Time to Work in Three Sample PUMAs

The PUMS data files permit the construction of cross-tabs for PUMAs with means of transportation to work (11 classes, including "Worked at home") arrayed by travel time to work (7 classes) (Table 7.11). It comes as no surprise that commuting by "Auto, truck, or van"

Table 7.7. Occupation vs. Travel Time to work in 2000, PUMA 00500 (contains Brainerd area)

	Travel Time to Work (banded)								
Occupation (banded)	**≤ 10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-59**	**60+**	**Total**	**% of Total**
Management	2,831	1,019	670	217	213	67	340	5,357	**7.2**
Business Operations Specialists	296	181	99	0	45	0	136	757	**1.0**
Financial Specialists	369	260	149	18	18	0	54	868	**1.2**
Computer and Mathematical	380	112	161	45	31	0	109	838	**1.1**
Architecture and Engineering	447	246	238	9	44	0	45	1,029	**1.4**
Life, Physical, and Social Science	144	108	72	27	9	23	26	409	**0.5**
Community and Social Services	750	408	180	76	53	9	94	1,570	**2.1**
Legal Occupations	148	40	49	0	9	0	18	264	**0.4**
Education, Training, and Library	2,001	999	689	157	129	0	113	4,088	**5.5**
Arts, Design, Entertainment, Sports, and Media	323	109	86	54	18	0	81	671	**0.9**
Healthcare Practitioners and Technical	1,544	1,183	700	185	239	0	74	3,925	**5.3**
Healthcare Support	999	369	392	81	95	0	64	2,000	**2.7**
Protective Service	549	370	117	104	68	0	108	1,316	**1.8**
Food Preparation and Serving	2,444	1,329	528	176	138	0	189	4,804	**6.4**
Building and Grounds Cleaning and Maintenance	1,195	902	464	71	63	9	200	2,904	**3.9**
Personal Care and Service	1,180	615	310	85	112	0	171	2,473	**3.3**
Sales	4,031	1,892	1,143	316	287	0	426	8,095	**10.9**
Office and Administrative Support	3,703	2,631	1,518	451	473	9	742	9,527	**12.8**
Farming, Fishing, and Forestry	397	145	114	31	31	0	45	763	**1.0**
Construction	1,409	1,200	969	286	494	32	1,118	5,508	**7.4**
Extraction	18	22	0	0	9	0	0	49	**0.1**
Installation, Maintenance, and Repair Workers	1,333	876	503	107	158	0	172	3,149	**4.2**
Production	2,960	2,607	1,363	443	603	64	888	8,928	**12.0**
Transportation and Material Moving	2,027	1,170	767	195	298	31	711	5,199	**7.0**
Military Specific	9	0	0	0	0	0	0	9	**0.0**
Total	31,487	18,793	11,281	3,134	3,637	244	5,924	74,500	**100.0**
Percent of Total	**42.3**	**25.2**	**15.1**	**4.2**	**4.9**	**0.3**	**8.0**	**100.0**	

Data source: U.S. Bureau of the Census. Public Use Microdata Samples, 2000. Data refer to workers 15 years of age and older.

Table 7.8. Occupation vs. Travel Time to Work in 2000, PUMA 01800 (contains Willmar area)

	Travel Time to Work (banded)								
Occupation (banded)	**≤ 10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-59**	**60+**	**Total**	**% of Total**
Management	4,002	898	533	126	121	18	286	5,984	**9.3**
Business Operations Specialists	179	139	180	45	93	0	117	753	**1.2**
Financial Specialists	626	173	89	72	35	0	96	1,091	**1.7**
Computer and Mathematical	279	67	90	5	76	27	100	644	**1.0**
Architecture and Engineering	608	249	135	23	9	0	238	1,262	**2.0**
Life, Physical, and Social Science	174	86	68	23	0	0	0	351	**0.5**
Community and Social Services	730	238	145	22	58	0	36	1,229	**1.9**
Legal Occupations	103	73	0	18	14	0	41	249	**0.4**
Education, Training, and Library	1,851	967	274	184	58	9	55	3,398	**5.3**
Arts, Design, Entertainment, Sports, and Media	531	104	98	23	31	0	77	864	**1.3**
Healthcare Practitioners and Technical	999	827	525	73	162	0	151	2,737	**4.3**
Healthcare Support	866	589	248	45	23	0	49	1,820	**2.8**
Protective Service	300	167	71	36	27	0	13	614	**1.0**
Food Preparation and Serving	1,534	654	172	14	115	0	67	2,556	**4.0**
Building and Grounds Cleaning and Maintenance	977	423	214	50	68	0	160	1,892	**2.9**
Personal Care and Service	964	225	157	72	81	0	71	1,570	**2.4**
Sales	3,486	1,324	633	188	247	9	348	6,235	**9.7**
Office and Administrative Support	4,073	1,958	947	162	245	14	361	7,760	**12.1**
Farming, Fishing, and Forestry	574	248	66	31	109	0	28	1,056	**1.6**
Construction	1,343	704	430	77	182	40	637	3,413	**5.3**
Extraction	14	0	0	9	0	0	4	27	**0.0**
Installation, Maintenance, and Repair Workers	1,462	761	606	167	212	5	215	3,428	**5.3**
Production	4,434	2,510	1,537	637	641	14	571	10,344	**16.1**
Transportation and Material Moving	2,297	1,222	825	179	186	27	336	5,072	**7.9**
Military Specific	0	9	0	0	0	0	0	9	**0.0**
Total	32,406	14,615	8,043	2,281	2,793	163	4,057	64,358	**100.0**
Percent of Total	**50.4**	**22.7**	**12.5**	**3.5**	**4.3**	**0.3**	**6.3**	**100.0**	

Data source: U.S. Bureau of the Census. Public Use Microdata Samples, 2000.

Table 7.9. Occupation vs. Travel Time to Work in 2000, PUMA 01900 (contains Montevideo area)

	Travel Time to Work (banded)								
Occupation (banded)	**≤ 10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-59**	**60+**	**Total**	**% of Total**
Management	5,119	618	445	72	18	0	116	6,388	**12.5**
Business Operations Specialists	340	84	36	14	13	0	18	505	**1.0**
Financial Specialists	576	147	71	23	4	0	9	830	**1.6**
Computer and Mathematical	356	31	41	9	18	0	18	473	**0.9**
Architecture and Engineering	232	115	44	63	63	0	14	531	**1.0**
Life, Physical, and Social Science	100	108	0	18	9	0	14	249	**0.5**
Community and Social Services	506	215	63	36	9	0	62	891	**1.7**
Legal Occupations	94	0	9	0	0	0	9	112	**0.2**
Education, Training, and Library	2,063	569	142	89	40	0	59	2,962	**5.8**
Arts, Design, Entertainment, Sports, and Media	366	98	67	0	9	13	0	553	**1.1**
Healthcare Practitioners and Technical	1,101	513	329	41	45	0	48	2,077	**4.1**
Healthcare Support	1,014	314	129	59	18	0	41	1,575	**3.1**
Protective Service	335	68	80	0	9	0	0	492	**1.0**
Food Preparation and Serving	1,678	343	238	13	54	0	0	2,326	**4.6**
Building and Grounds Cleaning and Maintenance	866	284	124	9	52	0	40	1,375	**2.7**
Personal Care and Service	1,247	193	109	4	0	0	18	1,571	**3.1**
Sales	3,266	764	449	53	50	0	185	4,767	**9.3**
Office and Administrative Support	4,464	1,531	728	149	113	14	166	7,165	**14.0**
Farming, Fishing, and Forestry	595	215	80	23	28	0	13	954	**1.9**
Construction	1,411	532	383	78	126	0	233	2,763	**5.4**
Extraction	9	9	0	0	0	0	0	18	**0.0**
Installation, Maintenance, and Repair Workers	1,337	556	228	18	77	0	27	2,243	**4.4**
Production	3,507	1,681	741	275	71	0	174	6,449	**12.6**
Transportation and Material Moving	1,952	744	617	77	108	0	336	3,834	**7.5**
Military Specific	0	0	9	0	0	0	0	9	**0.0**
Total	32,534	9,732	5,162	1,123	934	27	1,600	51,112	**100.0**
Percent of Total	**63.7**	**19.0**	**10.1**	**2.2**	**1.8**	**0.1**	**3.1**	**100.0**	

Data source: U.S. Bureau of the Census. Public Use Microdata Samples, 2000.

Table 7.10. Occupation vs. Travel Time to Work in 2000, 14 Greater Minnesota PUMAs

	Travel Time to Work (banded)								
Occupation (banded)	**≤ 10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-59**	**60+**	**Total**	**% of Total**
Management	49,733	13,504	6,117	1,465	1,507	135	2,432	74,893	**9.1**
Business Operations Specialists	4,590	2,451	1,363	307	367	63	520	9,661	**1.2**
Financial Specialists	6,625	3,226	1,545	401	336	41	492	12,666	**1.5**
Computer and Mathematical	6,116	2,750	1,301	246	580	36	702	11,731	**1.4**
Architecture and Engineering	5,803	3,284	1,568	373	328	50	527	11,933	**1.5**
Life, Physical, and Social Science	2,653	1,868	653	204	194	23	255	5,850	**0.7**
Community and Social Services	8,588	3,999	1,955	404	417	94	689	16,146	**2.0**
Legal Occupations	2,339	704	237	86	131	0	213	3,710	**0.5**
Education, Training, and Library	26,972	12,690	4,693	1,354	1,374	87	1,250	48,420	**5.9**
Arts, Design, Entertainment, Sports, and Media	6,297	2,044	981	249	258	13	497	10,339	**1.3**
Healthcare Practitioners and Technical	20,367	14,166	6,509	1,775	1,668	112	1,418	46,015	**5.6**
Healthcare Support	11,890	7,075	3,343	657	540	22	598	24,125	**2.9**
Protective Service	5,975	2,349	1,108	356	374	27	559	10,748	**1.3**
Food Preparation and Serving	27,528	10,615	3,564	935	712	84	1,077	44,515	**5.4**
Building and Grounds Cleaning and Maintenance	13,638	6,989	3,107	594	673	31	1,194	26,226	**3.2**
Personal Care and Service	16,036	4,388	1,436	412	494	9	730	23,505	**2.9**
Sales	47,196	19,634	8,164	2,036	1,969	67	3,261	82,327	**10.0**
Office and Administrative Support	57,465	30,513	12,487	3,196	3,603	165	3,416	110,845	**13.5**
Farming, Fishing, and Forestry	6,960	2,815	1,402	356	325	26	637	12,521	**1.5**
Construction	17,287	11,823	6,926	1,756	3,069	167	6,063	47,091	**5.7**
Extraction	337	483	185	72	150	0	68	1,295	**0.2**
Installation, Maintenance, and Repair Workers	16,040	9,620	4,969	1,264	1,511	90	1,883	35,377	**4.3**
Production	41,402	25,417	12,699	3,996	4,079	128	4,364	92,085	**11.2**
Transportation and Material Moving	26,243	14,346	7,890	2,051	2,155	179	4,704	57,568	**7.0**
Military Specific	73	94	45	9	0	0	0	221	**0.0**
Total	428,153	206,847	94,247	24,554	26,814	1,649	37,549	819,813	**100.0**
Percent of Total	**52.2**	**25.2**	**11.5**	**3.0**	**3.3**	**0.2**	**4.6**	**100.0**	

Data source: U.S. Bureau of the Census. Public Use Microdata Samples, 2000.

Table 7.11–Means of Transportation to Work vs. Travel Time to Work in 2000, Three Sample PUMAs in Greater Minnesota

Means of Travel to Work	PUMA 00500 (contains Brainerd Area) Travel Time to Work (minutes)							
	< 10	11-20	21-30	31-40	41-50	51-59	60+	Total
N/A (& not reported in 1960)	1,303	0	0	0	0	0	0	1,303
Auto, truck, van	24,995	18,225	11,088	3,125	3,472	244	5,771	66,920
Motorcycle	9	14	14	0	8	0	0	45
Bus or trolley bus	45	108	35	0	63	0	41	292
Streetcar, trolley car								
Subway or elevated	0	0	0	0	0	0	8	8
Taxicab	0	13	0	0	0	0	0	13
Bicycle	18	27	0	0	45	0	0	90
Walked only	1,857	276	72	0	40	0	22	2,267
Other	211	130	72	9	9	0	82	513
Worked at home	3,049	0	0	0	0	0	0	3,049
Total	31,487	18,793	11,281	3,134	3,637	244	5,924	74,500

Means of Travel to Work	PUMA 01800 (contains Willmar Area) Travel Time to Work (minutes)							
	< 10	11-20	21-30	31-40	41-50	51-59	60+	Total
N/A (& not reported in 1960)	800	0	0	0	0	0	0	800
Auto, truck, van	25,609	14,337	7,891	2,277	2,663	163	3,972	56,912
Motorcycle	13	0	0	0	9	0	0	22
Bus or trolley bus	85	117	56	4	63	0	40	365
Streetcar, trolley car								
Subway or elevated								
Taxicab	63	45	0	0	0	0	0	108
Bicycle	76	0	0	0	9	0	0	85
Walked only	2,235	80	69	0	49	0	14	2,447
Other	108	36	27	0	0	0	31	202
Worked at home	3,417	0	0	0	0	0	0	3,417
Total	32,406	14,615	8,043	2,281	2,793	163	4,057	64,358

Means of Travel to Work	PUMA 01900 (contains Montevideo Area) Travel Time to Work (minutes)							
	< 10	11-20	21-30	31-40	41-50	51-59	60+	Total
N/A (& not reported in 1960)	687	0	0	0	0	0	0	687
Auto, truck, van	24,921	9,289	5,021	1,123	890	27	1,516	42,787
Motorcycle	5	0	0	0	0	0	0	5
Bus or trolley bus	122	39	31	0	35	0	48	275
Streetcar, trolley car	32	0	14	0	0	0	0	46
Subway or elevated	0	9	0	0	0	0	0	9
Taxicab	0	5	0	0	0	0	0	5
Bicycle	192	55	0	0	0	0	0	247
Walked only	2,731	299	40	0	9	0	9	3,088
Other	157	36	56	0	0	0	27	276
Worked at home	3,687	0	0	0	0	0	0	3,687
Total	32,534	9,732	5,162	1,123	934	27	1,600	51,112

Source: Bureau of the Census, Public Use Microdata Sample files, 2000. Data refer to workers 15 years of age and older.

accounts for the vast preponderance of workers commuting away from home to work, with most of the remainder walking. In almost all parts of Greater Minnesota PUMAs, with the exception of a few cities with public bus service, there are seldom other realistic options available.

As in the previous sets of cross-tabs, there are two ways to compare the tables for these three PUMAs, which contain our three sample study areas–Brainerd area, Willmar area, and the Montevideo area. One way is to examine the percentage breakdowns by *travel times* to work (column totals–compare top three panels in Table 7.12); the other is by *means of travel to work* (row totals–see bottom panel in Table 7.12)). Most commutes are 20 minutes or less in all three PUMAs, and in PUMA 01800 (Willmar area) and PUMA 01900 (Montevideo area) the majority of commutes (including those working at home) were 10 minutes or less in 2000. In comparing the three PUMAs in terms of the distribution of workers by their travel times to work, again there is not much difference as noted earlier. Commuting by car, truck or van completely dominates.

Still another way to assess the variations revealed by the PUMS data for the three sample PUMAs is to compare them with the averages for all 14 PUMAs covering Greater Minnesota outside the Twin Cities commuting field (Table 7.13). Of those who worked outside the home and reported their means of transportation to work, over 98 percent drive or walked to work.

Vehicle Occupancy and Travel Time to Work in Three Sample PUMAs

In our final example of how PUMS data files permit the construction for PUMAs of cross-tabs, we examine vehicle occupancy (7 classes) arrayed by travel time to work (7 classes) (Table 7.14). As in the previous sets of cross-tabs, there are two ways to compare the tables for these three PUMAs containing our three sample study areas–the Brainerd area, Willmar area, and the Montevideo area. One is to examine the percentage breakdowns by vehicle occupancy (row totals); a second is by travel times to work (column totals) (Table 7.15).

In comparing the *distribution of workers by vehicle occupancy*, the distributions are similar, although the non-response shares are sufficiently high that they call into question the validity of the other results. On the other hand, the question may have been difficult for workers to answer if they did not have a consistent pattern of commuting to describe. For example, if a worker has a spouse who works part-time, and on the days when the spouse works they commute together, a respondent may have made no response, or else produced a response that could not be unambiguously slotted into one of the available categories. In comparing the *distribution of workers by their travel times to work*, the distributions are somewhat the same as in the two other sets of cross-tabs presented above, with not too much difference as noted earlier. A closer look reveals that the proportion of commuters in PUMA 01900 (Montevideo area) traveling ten minutes of less (63.7 percent) was higher than that measure for PUMA 01800 (Willmar area–50.4 percent) or PUMA 00500 (Brainerd area–42.3 percent). One explanation might be that the more vigorous economy in and around the Brainerd area attracts commuters from farther away, while PUMA 01900 and the Montevideo area with a weaker economy feature fewer new jobs and more workers with jobs closer to home. Another possibility is heavier traffic in the more

Table 7.12. Means of Transportation to Work vs. Travel Time to Work in 2000, Three Sample PUMAs in Greater Minnesota Compared

Means of Travel to Work	PUMA 00500 (contains Brainerd Area) Travel Time to Work (minutes)							
	< 10	11-20	21-30	31-40	41-50	51-59	60+	Total
Total	31,487	18,793	11,281	3,134	3,637	244	5,924	74,500
Percent of total	**42.3**	**25.2**	**15.1**	**4.2**	**4.9**	**0.3**	**8.0**	**100**

Means of Travel to Work	PUMA 01800 (contains Willmar Area) Travel Time to Work (minutes)							
	< 10	11-20	21-30	31-40	41-50	51-59	60+	Total
Total	32,406	14,615	8,043	2,281	2,793	163	4,057	64,358
Percent of total	**50.4**	**22.7**	**12.5**	**3.5**	**4.3**	**0.3**	**6.3**	**100**

Means of Travel to Work	PUMA 01900 (contains Montevideo Area) Travel Time to Work (minutes)							
	< 10	11-20	21-30	31-40	41-50	51-59	60+	Total
Total	32,534	9,732	5,162	1,123	934	27	1,600	51,112
Percent of total	**63.7**	**19.0**	**10.1**	**2.2**	**1.8**	**0.1**	**3.1**	**100**

Means of Travel to Work	PUMA 00500 (with Brainerd)		PUMA 01800 (with Willmar)		PUMA 01900 (with Montevideo)	
	Total	**Percent**	**Total**	**Percent**	**Total**	**Percent**
N/A (& not reported in 1960)	1,303	**2**	800	**1**	687	**1**
Auto, truck, van	66,920	**90**	56,912	**88**	42,787	**84**
Motorcycle	45	**-**	22	**-**	5	**-**
Bus or trolley bus	292	**-**	365	**1**	275	**1**
Streetcar, trolley car					46	**-**
Subway or elevated	8	**-**			9	**-**
Taxicab	13	**-**	108	**-**	5	**-**
Bicycle	90	**-**	85	**-**	247	**-**
Walked only	2,267	**3**	2,447	**4**	3,088	**6**
Other	513	**1**	202	**-**	276	**1**
Worked at home	3,049	**4**	3,417	**5**	3,687	**7**
Total	74,500	**100**	64,358	**100**	51,112	**100**

Source: Bureau of the Census, Public Use Microdata Sample files, 2000. (-) = rounds to zero. Data refer to workers 15 years of age and older.

Table 7.13. Means of Transportation to Work vs. Travel Time to Work in 2000, 14 PUMAs in Greater Minnesota (totaled)

Means of Travel to Work	14 PUMAs in Greater Minnesota Outside Greater Twin Cities Area Travel Time to Work (minutes)							
	< 10	11-20	21-30	31-40	41-50	51-59	60+	Total (Percent)
N/A (& not reported in 1960)	12,720	0	0	0	0	0	0	12,720 **1.6**
Auto, truck, van	335,409	198,870	90,955	24,161	25,687	1,538	35,687	712,307 **86.9**
Motorcycle	223	59	59	13	17	0	5	376 **-**
Bus or trolley bus	1,976	2,353	1,458	141	725	43	912	7,608 **0.9**
Streetcar, trolley car	32	14	14	0	9	0	0	69 **-**
Subway or elevated	59	9	0	0	0	0	17	85 **-**
Railroad	27	0	0	0	0	0	0	27 **-**
Taxicab	385	122	0	0	0	0	0	507 **0.1**
Bicycle	1,364	357	243	23	54	0	50	2,091 **0.3**
Walked only	30,818	4,187	1,146	144	205	68	269	36,837 **4.5**
Other	1,948	876	372	72	117	0	609	3,994 **0.5**
Worked at home	43,192	0	0	0	0	0	0	43,192 **5.3**
Total	428,153	206,847	94,247	24,554	26,814	1,649	37,549	819,813
Percent	**52.2**	**25.2**	**11.5**	**3.0**	**3.3**	**0.2**	**4.6**	**100.0**

Source: Bureau of the Census, Public Use Microdata Sample files, 2000. Data refer to workers 15 years of age and older.

Table 7.14. Vehicle Occupancy by Travel Time to Work, 2000, Three Sample PUMAs in Greater Minnesota

	PUMA 00500 (contains Brainerd Area) Travel Time to Work (minutes)								
	< 10	11-20	21-30	31-40	41-50	51-59	60+	Total	% of Total
Not Applicable	6,492	568	193	9	165	0	153	7,580	**10.2**
Drives Alone	22,397	16,189	9,645	2,664	2,844	150	4,497	58,386	**78.4**
2 People	2,021	1,649	1,128	435	479	85	870	6,667	**8.9**
3	325	226	180	26	68	9	275	1,109	**1.5**
4	234	104	49	0	81	0	90	558	**0.7**
5	0	49	68	0	0	0	9	126	**0.2**
7+ (asked in 1980)	18	8	18	0	0	0	30	74	**0.1**
Total	31,487	18,793	11,281	3,134	3,637	244	5,924	74,500	**100.0**
Percent of Total	**42.3**	**25.2**	**15.1**	**4.2**	**4.9**	**0.3**	**8.0**	**100.0**	

	PUMA 01800 (contains Willmar Area) Travel Time to Work (minutes)								
	< 10	11-20	21-30	31-40	41-50	51-59	60+	Total	% of Total
Not Applicable	6,797	278	152	4	130	0	85	7,446	**11.6**
Drives Alone	23,210	12,776	6,440	1,797	2,076	136	3,051	49,486	**76.9**
2 People	1,869	1,204	1,225	328	431	0	701	5,758	**8.9**
3	298	206	172	59	98	9	157	999	**1.6**
4	59	64	23	30	40	18	28	262	**0.4**
5	54	40	31	63	9	0	26	223	**0.3**
7+ (asked in 1980)	119	47	0	0	9	0	9	184	**0.3**
Total	32,406	14,615	8,043	2,281	2,793	163	4,057	64,358	**100.0**
Percent of Total	**50.4**	**22.7**	**12.5**	**3.5**	**4.3**	**0.3**	**6.3**	**100.0**	

	PUMA 01900 (contains Montevideo Area) Travel Time to Work (minutes)								
	< 10	11-20	21-30	31-40	41-50	51-59	60+	Total	% of Total
Not Applicable	7,613	443	141	0	44	0	84	8,325	**16.3**
Drives Alone	22,058	7,975	4,117	926	813	27	1,321	37,237	**72.9**
2 People	2,486	994	715	152	50	0	128	4,525	**8.9**
3	247	190	121	41	27	0	54	680	**1.3**
4	53	108	55	0	0	0	13	229	**0.4**
5	31	14	13	4	0	0	0	62	**0.1**
7+ (asked in 1980)	46	8	0	0	0	0	0	54	**0.1**
Total	32,534	9,732	141	0	44	27	1,600	51,112	**100.0**
Percent of Total	**63.7**	**19.0**	**10.1**	**2.2**	**1.8**	**0.1**	**3.1**	**100.0**	

Source: Bureau of the Census, Public Use Microdata Sample files, 2000. Data refer to workers 15 years of age and older.

Table 7.15. Vehicle Occupancy vs. Travel Time to Work in 2000, Three Sample PUMAs in Greater Minnesota Compared

Vehicle Occupancy	PUMA 00500 (contains Brainerd Area) Travel Time to Work (minutes)							
	< 10	11-20	21-30	31-40	41-50	51-5	60+	Total
Total	31,487	18,793	11,281	3,134	3,637	244	5,924	74,500
Percent of total	**42.3**	**25.2**	**15.1**	**4.2**	**4.9**	**0.3**	**8.0**	**100.0**

Vehicle Occupancy	PUMA 01800 (contains Willmar Area) Travel Time to Work (minutes)							
	< 10	11-20	21-30	31-40	41-50	51-59	60+	Total
Total	32,406	14,615	8,043	2,281	2,793	163	4,057	64,358
Percent of total	**10.6**	**0.4**	**0.2**	**0.0**	**0.2**	**0.0**	**0.1**	**11.6**

Vehicle Occupancy	PUMA 01900 (contains Montevideo Area) Travel Time to Work (minutes)							
	< 10	11-20	21-30	31-40	41-50	51-59	60+	Total
Total	32,534	9,732	5,162	1,123	934	27	1,600	51,112
Percent of total	**63.7**	**19.0**	**10.1**	**2.2**	**1.8**	**0.1**	**3.1**	**100.0**

Vehicle Occupancy	PUMA 00500 (with Brainerd)		PUMA 01800 (with Willmar)		PUMA 01900 (with Montevideo)	
	Total	**Percent**	**Total**	**Percent**	**Total**	**Percent**
Not Applicable	7,580	10.2	7,446	11.6	8,325	16.3
Drives Alone	58,386	78.4	49,486	76.9	37,237	72.9
2 People	6,667	8.9	5,758	8.9	4,525	8.9
3	1,109	1.5	999	1.6	680	1.3
4	558	0.7	262	0.4	229	0.4
5	126	0.2	223	0.3	62	0.1
7+ (asked in 1980)	74	0.1	184	0.3	54	0.1
Total	**74,500**	**100.0**	**64,358**	**100.0**	**51,112**	**100.0**

Source: Bureau of the Census, Public Use Microdata Sample files, 2000.

Table 7.16. Vehicle Occupancy vs. Travel Time to Work in 2000, Aggregate of 14 PUMAs in Greater Minnesota

Vehicle Occupancy	Travel Time to Work (minutes)							
	< 10	**11-20**	**21-30**	**31-40**	**41-50**	**51-60**	**61+**	**Total (Percent)**
Not Applicable	92,744	7,977	3,292	393	1,127	111	1,862	107,506 **13.1**
Drives Alone	302,431	173,999	75,773	19,900	20,014	1,125	27,939	621,181 **75.8**
2 People	26,887	19,680	12,152	3,153	4,126	270	5,272	71,540 **8.7**
3	4,060	3,547	1,962	675	937	112	1,512	12,805 **1.6**
4	1,240	1,100	466	348	351	31	505	4,041 **0.5**
5	488	416	473	85	152	0	293	1,907 **0.2**
7+ (asked in 1980)	303	128	129	0	107	0	166	833 **0.1**
Total	428,153	206,847	94,247	24,554	26,814	1,649	37,549	819,813
	52.2	**25.2**	**11.5**	**3.0**	**3.3**	**0.2**	**4.6**	**100.0**

Source: Bureau of the Census, Public Use Microdata Sample files, 2000.

densely settled Brained region slows people down on their way to work. Because we lack measures of distance traveled and average speeds we can only speculate on the basis for the discrepancies between PUMAs 01900 and 00500.

Finally, we compiled a cross-tab of vehicle occupancy against travel time for the 14 PUMAs covering Greater Minnesota and it is plain that each of the three sample PUMAs closely resemble the aggregate profile for the 14 PUMAs (Table 7.16). Again, the patterns of vehicle occupancy and the profile of travel times all resemble one another.

Summary and Conclusions

Public use microdata samples (PUMS) derived from Census 2000 long-form census returns can be processed into detailed 1-way, 2-way, and multi-dimensional cross-tabulations to shed light on questions pertaining to worker characteristics, and how workers travel to jobs away from home: (1) workers' occupations (25 classes) compared with travel times to work; (2) workers' means of transportation to work (11 classes, including "worked at home") arrayed by travel time to work (7 classes); and (3) vehicle occupancy (7 classes, including "not applicable" to account for those working at home or walking to work) arrayed by travel time to work. PUMS data pertain to public use microdata areas (PUMAs), which are composed of one or more counties. Journey-to-work attributes such as travel time, means of travel to work, and vehicle occupancy

can be cross-tabulated by a variety of worker attributes and their housing arrangements (e.g., occupation, industry, household composition, workers per household, personal income, household income, vehicles per household, and so forth). These cross-tabs reveal aspects of workers' journeys to work that are unavailable from aggregate census tabulations for tracts, enumeration areas, minor civil divisions, counties, metropolitan areas or states.

In this chapter, and the chapters that preceded this one, we have tried to shed light on how the Minnesota countryside is rapidly urbanizing and what that might mean for highway transportation planning. We showed that *economic profiles* of study areas and PUMAs, as measured by the share of workers in each occupational class and each industry class, despite differences in sizes are rapidly coming to resemble those of the state's major urban areas.

New housing on large lots is dispersing across the countryside, while average commuting times are steadily increasing. The data presented in this and in previous reports appear to be consistent with the idea that households select places to live in the general vicinity of available employment opportunities, but at the same time once they decide where to live they are willing to drive to available jobs, sometimes with a commute of an hour or more. Neither the location of jobs nor the location of housing opportunities is fixed in space. Both distributions are in constant flux. After jobs and housing opportunities are matched up, the journey to work is the result. In cases where a worker holds multiple jobs away from home, more than one journey is needed. In cases where more than one household member works away from home the household undertakes multiple journeys to work.

The total population of greater Minnesota (i.e., outside the Twin Cities commute shed) increased only slowly during the 1990s, but selected regional centers and some of the commute fields adjacent to them experienced population growth well above average rates. Disparate rates of population growth in greater Minnesota can be expected to continue in the coming two decades. Moreover, additional dispersion of population is likely to occur, not only in the high-amenity forest and lake districts, but also in sparsely population parts of the state experiencing only modest growth – or no growth at all.

People seem to like spreading out, many preferring low-density living over high density, and as long as easy movement on the state's trunk highways and the roads that feed them are available and well maintained, our sense is that the trends toward dispersion with more time spent commuting seem likely to continue. Road capacity in most parts of greater Minnesota seems more than adequate to handle *commuting* loads, although that is only one element in total traffic loads. Besides the journey to work, as discussed earlier, congestion during certain hours (due to commuting) and parts of certain days (daily and weekend *shopping and recreation* traffic) on segments of the Interstates and other trunk highways has been building steadily. Finally, over-the-road *trucking and business traffic* provides an important share of highway traffic, but that is beyond the purview of this study.

Chapter 8

Conclusions and Recommendations

Summary and Findings

We undertook this study as a follow-up to an earlier investigation that focused on the "urbanization of the Minnesota countryside." That study examined population change and low-density residential development in cities and townships within commuting range of a selection of Minnesota's regional centers. In this study, we expanded our sample to 26 regional centers and their commute sheds in Greater Minnesota, and examined population and housing change (Chapter 2), changes in industrial activity and occupational changes (Chapter 3), and characteristics of commuters and the journey to work for those working away from home (Chapter 4). The final three chapters explored ways in which a new data source from the U.S. Bureau of the Census, namely the Public Use Microdata Samples (PUMS) and Public Use Microdata Areas (PUMAs) might be exploited to shed additional insight into the changing nature of the demographic, economic and commuting patterns that are now pervasive throughout Greater Minnesota. These data were evaluated to explore links between demographic and economic features of working-age populations (Chapter 5), and relationships between worker and household characteristics on the one hand, with aspects of commuting activity on the other (Chapter 6). The final chapter examined regional economic vitality and travel behavior across the Minnesota Countryside (Chapter 7).

This study documented that Greater Minnesota is diverse in demographic and economic terms. When population change in sample regional centers in the 1990s was compared with change in the nearby counties that make up the centers' commuting fields, four situations appeared: those where centers and their commuting fields both had population increases; centers with declining populations, but increases in the commuting fields; centers with growing populations, but with declines in their commuting fields; and situations where both the center and the commute field lost population. A good portion of the 1990s net population growth in the 26 study areas reflected growth in non-white and Hispanic populations.

Population increases impose pressures on the housing stocks within some of the study areas. In the 1990s, the statewide housing inventory increased, with many of the same growth leaders of the previous period maintaining or exceeding the state in net additions of new housing units. Steady expansion of the housing stock in a study area usually accompanied house price inflation, which yields positive *wealth effects* for residents, which stimulate additional rounds of local consumption and investment.

Employment changes were examined in terms of *industries* of employment as well as by the changing mix of *occupations* pursued. The study areas were grouped into (1) fast-growing recreation and retirement areas, located mainly in northern lake districts; (2) areas with mixed economies and moderate job growth; and (3) slow-growth areas in the west and southwest parts of Minnesota that depend on a weak farm economy, plus northern areas supported largely by mining and forest products industries. Structural changes in regional economies bring about changes in household activity within those sub-regions, and vice-versa. Along with changes in

economic activity and household behavior come changes in daily travel behavior, which yield corresponding impacts on the state's trunk highways.

During the 1990s, the three geographic settings displayed the following trends: (1) areas of *fast growth*, mainly in the northern lake districts, saw employment expansion; (2) areas of *modest growth* and diversified economies had employment growth; while (3) slow-growth natural-resource-based economies lagged with employment change.

In every one of the Minnesota counties included in the study areas, the percentage of workers who commuted to jobs outside their county of residence increased between 1980 and 2000. The number and the percentage of workers driving alone to work rose sharply in the 1980s. Daily commuting traffic has been rising steadily, partly due to a greater number of workers, but increasingly due to workers commuting alone. Moreover, those solo commuters, on average, are spending more time in their commutes. There seemed to be little difference among the study areas grouped by growth rates in their experiences regarding average commuting times. The census data did not reveal whether the longer commute times were due to longer commutes, slower commutes, more complex commutes (e.g., due to stops along the way), or some combination of factors.

Pairing of these data sets implies relationships and issues explored in chapters 5, 6, and 7, using illustrations from Census-provided Public Use Microdata Sample (PUMS) files. The study demonstrated how demographic characteristics of workers (i.e., age, ethnic origin) vary by occupation and by industry in different parts of Greater Minnesota, as revealed by PUMS data for households and their individual members within Census-defined multi-county Public Use Microdata Areas (PUMAs). On the basis of PUMS data for three sample PUMAs, the profiles of workers by occupations arrayed by age groups appear to be much more similar than different.

Although we might expect differences in the age profiles of workers among the three sample PUMAs, which varied significantly in their employment growth records prior to Census 2000, the data show almost no difference in the age profiles. The sample PUMAs each cover a much larger area than the study areas that they contain, and with increased area size there is bound to be a muting of local differences in economic activity that might otherwise be revealed in county-level or study-area-level cross-tabulations with dimensions of the sort presented above. On the other hand, as the regional economies of Greater Minnesota increasingly focus primarily on services, consumer-orientation, personal care, and life-style emphases, we probably should not be surprised to observe more similarities than sharp differences.

In addition to demonstrating the use of PUMS data for PUMAs, we anticipated that different rates of employment growth in the 1990s would distinguish one place from another. Specifically, we expected that the PUMA containing the fast-growing area would display notable differences in its employment profiles compared with the PUMA containing the moderately expanding area, or the PUMA containing the slow-growth area. However, that turned out not to be the case.

The report demonstrated how to exploit PUMS files to disclose relationships between population characteristics and commuting behavior, with examples at the individual worker level of the

relation between commuting and income, and between commuting and education. Cross-tabulations and statistical analyses, prepared to examine workers' travel time to work with their income, revealed that disproportionate numbers of workers in middle-income categories spent more time in their journeys to work than might have been expected, or, alternatively, a disproportionate share of workers with very low incomes held jobs close to home.

Cross-tabs and statistical analyses comparing workers' travel time to work with educational attainment revealed that the entries for workers with levels of schooling at the high school level or higher are typically higher than expected compared with those with less educational attainment. That is, the higher the level of educational attainment, the greater the chance that worker will commute more minutes than expected given their levels of schooling. To the extent that levels of income and schooling increase and recent trends continue, we may expect longer commutes to follow.

The report provided three examples illustrating how PUMS data files permit the construction of useful cross-tabs for PUMAs: (1) workers' occupations compared with travel times to work; (2) workers' means of transportation to work arrayed by travel time to work; and (3) vehicle occupancy arrayed by travel time to work. We analyzed three sample PUMAs with the first set of cross-tabs with the following result: in comparing the distribution of workers by occupations, the three were remarkably similar despite variations in the sizes of their workforces; and in comparing the distribution of workers by their travel times to work in the three PUMAs, again there was little difference. The second and third sets of cross-tabs were analyzed, and the same result emerged. There was little difference in the profiles among the three sample PUMAs. From the data in this and other chapters, it appears that economic profiles of study areas and PUMAs, as measured by the share of workers in each occupational class and each industry class, despite differences in population sizes and rates of growth, are coming to resemble those of the state's major urban areas.

In this study and the one that preceded it we have tried to shed light on how the Minnesota countryside is rapidly urbanizing and what that might mean for highway transportation planning. New housing on large lots is dispersing across the countryside, while average commuting times are steadily increasing. Evidently households select places to live in the general vicinity of available employment opportunities, but once they decide where to live, they seem willing to drive to available jobs, sometimes with a commute of an hour or more. Neither the location of jobs nor the location of housing opportunities is fixed in space. Both are in constant flux. Once jobs and housing are matched up, the journey to work is the result. In cases where a worker holds multiple jobs away from home, more than one journey is needed. In cases where more than one household member works away from home, the household undertakes multiple journeys to work.

Disparate rates of population growth in Greater Minnesota can be expected to continue in the coming two decades. Moreover, additional dispersion of population is likely to occur, not only in the high-amenity forest and lake districts, but also in sparsely populated parts of the state experiencing only modest growth–or no growth at all. People seem to like spreading out, many (probably most) preferring low-density living over high density, and as long as easy movement on the states trunk highways and the roads that feed them is available and roads are well

maintained, our sense is that the trends toward dispersion with more time spent commuting seem likely to continue.

Road capacity in most parts of greater Minnesota seems more than adequate to handle *commuting* loads, although that is only one element in total traffic loads. Besides the journey to work, as discussed in an earlier report, congestion during certain hours (due to commuting) and parts of certain days (daily and weekend *shopping and recreation* traffic) on segments of the Interstates and other trunk highways has been building steadily. Finally, over-the-road *trucking and business traffic* provides an important share of highway traffic, but that is beyond the purview of this study.

Looking Ahead: Recommendations

One goal of the research reported above has been to provide fresh frameworks for portraying social and economic change at the sub-state level in Greater Minnesota–i.e., at a scale of the *study area* or *commute field*–a scale that is more local than the entire state, but broader than the road segment, the local township, or even a regional center. In addition to discussing underlying causes of changes in travel demand at the local level, we described and analyzed new data series from the Census Bureau in the form of PUMS files, PUMAs, and the American Community Survey, now underway.

In parts of Minnesota where population and economic activity continue expanding, intensity of highway use and *demand* for incremental road capacity also expand, although the *rate of expansion* could diminish if motor fuel prices continue their likely upward trajectory. In places where population and economic activity are stable or declining, the need persists to maintain the road system, and to establish priorities for allocating maintenance budgets while considering whether seldom-used roads should be maintained at all, and by whom.

Most of the human activity that generates road traffic arises from activity within society over which Mn/DOT has no direct control. That being the case, what kinds of insights do the foregoing types of description and analysis offer to transportation planners at state and local levels?

Frameworks for Highway Planning

Planning, building, and maintaining a road system–whether trunk highways, county and township local roads, or city streets–is an engineering challenge, but it is more than that. A road system responds to society's needs while activating latent demand for additional trips and travel. It absorbs public and private investment dollars while augmenting or diminishing land values and capital value of improvements to the land depending on which places are served well, and which are bypassed.

A road system intrudes into soil, water and vegetation systems in ways too numerous to mention. Improved roads are seen by some as devices for addressing regional development problems while viewed by others as a cause of long-term political, fiscal and environmental problems.

Comprehensive land use and transportation planning could serve us well at state, regional and local levels, but such planning is seldom popularly supported or practiced. Despite Mn/DOT's thoughtful long-range planning program, too often our tendency as a state has been to force Mn/DOT and other government agencies to tackle issues in piecemeal fashion, to limit the resources provided to do their job, and to force it to address short-term localized problems at the expense of long-term system-wide issues. The net results are much less than we need.

For example, one clear goal for highway planners and managers is to build and operate trunk highways so as to achieve the objective of maintaining average travel speeds at safe and satisfactory levels on each segment of the system with a minimum level of environmental impact. If a segment of roadway or an intersection becomes congested, or is seriously deteriorating, it is scheduled for improvement. Mn/DOT, in cooperation with its district engineers, maintains an elaborate record-keeping system for all the road segments for which it is responsible. It monitors traffic loads on each segment, and keeps track of the physical condition and status of each segment (i.e., pavement type and condition, drainage, intersections, bridges, signals, signage, road striping, vegetation, right-of-way, hazards, easements, noise, noise barriers, etc.). Using a multi-year plan that is constantly updated, it schedules maintenance and improvements for each segment, and budgets and programs work on the segments, reconciling the urgency of needs (from an engineering and safety standpoint), performance goals (e.g., maintaining average speeds), community pressures (including pressure from elected officials and the press), and the financial and staff resources that are available to respond.

Mn/DOT's trunk highways are linked with county highways, township roads and local streets and parkways within an integrated road system. Unfortunately, land use pressures and decisions occur at the *local* level by cities, townships, and counties, with Mn/DOT having little or no control over those local decisions. To be sure, if Mn/DOT undertakes to construct a grade-separated intersection on an Interstate or other major trunk highway, parcels of land near that intersection are endowed with a degree of accessibility (and market value) that is superior to parcels remote from the intersection. Depending on local demographic and economic conditions in the vicinity of the intersection and local government action, real estate development may occur at or near that intersection that would otherwise occur elsewhere or not occur at all had the intersection not been built.

Current Challenges

Beyond demonstrating how to analyze social and economic change at the sub-state level in Greater Minnesota and commenting on some of Mn/DOT's statewide responsibilities, we are drawn to the issue of how governance traditions in Minnesota and the means for financing public goods are working against effective long-range transportation and land use planning. There are at least four main challenges: (1) local government is highly fragmented in Minnesota as it is in most states, (2) society has become more individualistic in outlook and self-centered in its behaviors, (3) the boundary between public goods and private goods has blurred, yet (4) people expect continued access to publicly provided services–including roads–but are increasingly reluctant to pay for them.

Fragmented government: Minnesota has 87 counties, 853 cities, 1,789 organized townships, and over 350 school districts and other special districts (e.g., Metropolitan Council, soil and water conservation districts, etc.), or about one government for every 1,625 people. Just about every road project or other major public action involves several governments, but getting them to cooperate and come to a consensus about what to do and how to do it is increasingly difficult and sometimes impossible for large projects. Yet transportation projects by their very nature involve all levels of government, and require cooperation or at least acquiescence on the part of all units affected by proposed road improvements, or abandonment of roads used so little that maintenance is hard to justify. One goal of this project has been to demonstrate how interrelated and interdependent activities within commute fields are related to the local governments included in those commute fields.

Individualism. Individualistic outlooks have flourished in recent decades accompanied by an eclipsing of both an *understanding* of traditional community agendas as well as willingness to support them in ways that were more common before the 1960s when people often conceded that "government probably knows best," and government agencies operated with a much freer hand. Today there is less confidence in government, greater polarity in political agendas, and diminished influence of traditional media. Some public officials complain that various interest groups are more skilled today at *preventing* government from acting than in *cooperating* to define and to accomplish community objectives. For example, it is hard to imagine that the Interstate highway system could be comprehensively planned and built today.

Providing for and Producing Public Goods. In an earlier time, it was common for governments at every level to produce by themselves the services that they were charged to ensure were provided–from national defense, to state police and state prisons, to county welfare and parks, to city water and sewer departments. Today, *provision* of public goods is often separated from *production* of such goods. Increasingly, governments decide that a specific service should be provided, then contract with private vendors to produce and deliver the service. When private interests have a business stake in whether or not a service shall be provided, those private interests, whether they are manufacturing fighter planes, paving roadways, or designing city plans, are involved in the policy process to an important degree.

Paying for Public Goods. Deciding whether or not a public good like a road or a road improvement shall be provided usually turns on who will benefit, how it will be paid for, and who will pay. Local officials try to push the cost to a higher level of government (state or federal) if they can, with the cost paid by general revenues (personal and business income taxes, sales taxes). Meanwhile the government providing the service increasingly tries to identify the main beneficiaries of the service and pass the costs to them in the form of user fees as is done with metered water and electricity usage, money in a parking meter, or with an excise tax like the automobile fuel tax. The introduction of High-Occupancy Toll (HOT) lanes on freeways is a step in this direction as a partial solution for congested stretches of Minnesota trunk highways.

Unfortunately, in the case of a public good like a road, it is hard to match up the costs and the benefits precisely and to charge beneficiaries accordingly, although experiments with HOT lanes represent a controversial a step in just this direction.

One step that could be adopted in Minnesota would be for the legislature to authorize local units of government (counties, municipalities) to levy *development impact fees* or *exactions* to pay for off-site infrastructure capital costs that are made necessary by new developments (e.g., new roads, water and sewer, schools, parks, public facilities, police and fire protection, libraries). Impact fees are currently used in almost half the states of the U.S., but not authorized for use in Minnesota. When development impact fees are an option for local or county governments, then something closer to the full cost that new land development imposes on already-developed communities can be assigned to the direct beneficiaries of the new developments instead of being passed on to existing residents.

As described in detail in a previous CTS/Mn/DOT study [1], local governments face a continuing challenge of escalating demands but without sufficient resources to meet them. Impact fees are viewed as a way for "growth to pay its way." For growing jurisdictions, impact fees represent a store of potential revenue that can be tapped at lower political cost than other sources of revenue, but they pose several legal, economic, technical, administrative, and other considerations simultaneously. The main rationale for imposing development impact fees is to make new development pay its way rather than shifting its costs to others. The advantages of impact fees include (1) heightened user equity, (2) political advantage for developers (because fees mute local opposition to new development), (3) political advantage for elected officials (who get extra revenue without raising taxes), (4) reduced borrowing by local governments which can pay for new infrastructure up front, (5) a slowing down of development, and (6) the promotion of improved local land use planning and economic and community planning.

The disadvantages include (1) an increase in new house prices, which can be significant for communities trying to expand their inventory of low- and moderate-priced units, and (2) an inter-generational equity argument: existing residents never had to pay impact fees, so new residents and businesses should not be obliged to do so.

Consequences for Roads

These four issues (fragmented government, individualism, providing public goods, paying for public goods) collide wherever growth occurs and road congestion develops. For example, as land development continues on the fringes of the Twin Cities and in certain study areas in Greater Minnesota, townships or parts of townships incorporate as cities and add pressure on local roads and on budgets needed to maintain and improve them. In response, the cities directly encourage or passively allow land development to proceed without imposing development impact fees. But in cases where the benefits for developers, builders and their customers occur *here and now*, while the associated costs are distributed to *other places and later times*, the inevitable result will be low-density development, which stimulates additional road building, road maintenance, and road usage beyond what would have occurred had the beneficiaries been obliged to pay the full cost of what their actions impose on others.

These outcomes are understandable, but lamentable and avoidable. Local officials, some of whom are land owners and developers themselves, often are honestly convinced that by increasing their local tax base through land development it will be easier to reduce tax rates per dollar of assessed property value while increasing total tax revenues for their jurisdiction.

Landowners proceed to sell off parcels of 3, 5 and 10 acres for low-density residential development. The cities expect county roads in developing areas to be used as the city streets, with the effect of shifting what would otherwise be local fiscal burdens from the city to the county.

A second result is low development densities along the county roads. This sequence of actions involves misaligned incentives and inefficient development, with beneficiaries receiving benefits they fail to pay for, while others incur unnecessary costs while receiving no benefits. It means more vehicle miles traveled than would have occurred had developers and customers paid something closer to the full cost of the infrastructure and other benefits that they receive. In many cases reported in the public administration and planning literatures, it also leads to costs for the municipality rising faster than revenues, especially where land development has involved an emphasis on commercial and industrial development rather than on residential. [2] Recent research on a sample of small communities in Greater Minnesota demonstrated that "changing the location and density of new residential development within a region changes the impact of the development on local government' budgets. In addition, development than spans jurisdictions can have differing effects on the budgets of those jurisdictions. Therefore, local and regional governments considering a development should carefully consider the location and density of the development and work together with other jurisdictions." [3]

Among the litany of topics and questions provoked by this study, another issue deserves attention: what is called *access management*. According to the Minnesota Statewide Transportation Plan, average speeds on interregional corridor segments are an important Mn/DOT performance measure, so commuting times and distances, which taken together yield speeds, deserve continued investigation and access management in developing areas is one focus of concern. Throughout Greater Minnesota, wherever population growth and economic expansion stimulate low-density residential development along with commercial development, the new commercial enterprises like to cluster at major road intersections, for visibility as well as customer convenience. Such development sites frequently occur where a trunk highway (under Mn/DOT jurisdiction) crosses a local road, sometime with a grade separation and sometimes without. Mn/DOT sees its job as keeping the traffic moving safely without a reduction of speed. Local interests, on the other hand, want traffic to stop. The retailers want customers, and the customers want convenient access to goods and services. The stage is set for conflict. These local situations are set within larger issues.

Access management involves moving traffic away from intersections quickly and safely, while making it easy for motorists to gain access to businesses. One way to accomplish this goal is to prohibit access and egress from businesses onto main roads within specified distances of the intersection. When access is regulated in this way, customers must drive farther from the intersection and then return to their destinations via a frontage road. The inconvenience thereby created is the price paid for enhanced safety and smooth traffic flow to and through the intersection. But for this outcome to occur, state and local officials must share a common set of goals, and cooperate by means of local regulations that are consistent with those goals, even in the face of opposition from motorists and business owners who view systems operation through excessively narrow lenses.

The Research Horizon

This study began by noting three major trends that were underway across Greater Minnesota: (1) population and housing change, (2) the restructuring of the state's economy, and (3) changes in daily travel behavior, specifically the journey to work and other daily and weekly personal travel on the state's highways. In the chapters that followed, these topics were discussed selectively, with attention paid to specialized census data sources that can be used to shed light on trends in sub-areas of Greater Minnesota.

In the course of completing this study, we encountered the work of other scholars and organizations that were analyzing trends playing out across the Midwestern countryside. Some of the work is descriptive and analytical. It tries to figure out what is happening and attempts to explain the forces that are operating. But tenacious local parochialism, myths about family farms, nostalgia about old-fashioned agriculture perpetuated by perceptions of "amber waves of grain" all prevent realistic thinking about what Greater Minnesota *is* and *is becoming*. As University of Minnesota Vice President Charles Muscoplat says, "Driving through Greater Minnesota, seeing and believing are often wrong."

Some of the published work discussing change in the Midwestern countryside is devoted to action, either to build up regional economies, integrate their parts and make them more sustainable, or to ease the impact of their decline when future growth prospects appear to be dim or non-existent. Topics and themes addressed in these venues include the following:

- © Underemployment of high-skill workers continues to be a problem in Rural America while other parts of the country are experiencing a shortage of those skills. [4]

- © The "unemployment rate" for a place consists of (A) divided by (A + B), where (A) equals those not working but actively looking for work, and (B) equals persons 16 to 65 who are working. Groups excluded from the labor force are (C) those 16-65 not working and not looking for work; (D) those in the active duty armed forces; and (E) persons under age 16. Unemployment rates are low in many countryside regions in Minnesota and elsewhere in the Midwest because many potential workers have moved from group (B) into group (C). [5]

- © First-time homebuyers in recent years in Minnesota and the Upper Midwest come disproportionately from the ranks of upper-income renters. As home-ownership rates approach 70 percent "the cream skimmed from the rental market," leaving the ranks of the renter population comparatively poorer–a process that plays out differently in different parts of metropolitan and Greater Minnesota. In parts of Greater Minnesota where the economy is weak and net out-migration and weak rental markets are the norm, some renter households are able to rent housing at extremely modest prices (in such an area renters often face a "buyer's market"), and commute long distances as necessary to find employment. In many instances, households in Greater Minnesota outside of cities and towns turn to the manufactured home market for affordable housing. "Manufactured housing has long had a niche among rural home buyers. For one, building contractors

can be tough to find in rural areas, and long drives for labor and materials tend to increase the cost without increasing a home's quality. Land use (regulations) are also less restrictive in rural areas, making it easier to find a suitable site for a new manufactured home." [6]

© Farmland values have been booming across much of the U.S. due to strong farm incomes, speculation, recreation, residential and other development, investment/purchase to lease, low interest rates, and tax advantages, but the expansion in land values carries several downsides as well, such as new loans on high-priced farm land that cannot be serviced with farm income alone. [7]

© The Center for Small Towns at the University of Minnesota-Morris occasionally sponsors conferences on the future of small towns, addressing issues of out-migration of young people, the need to diversify natural-resource based economies, and the over-valuing of material consumption compared with the quality of life available for many in small-town settings. [8]

© Another view of the opportunities available to parts of Greater Minnesota and similar settings elsewhere in the Midwest argues that "jobs requiring high-skill workers are becoming a crucial part of the rural economy–accounting for nearly 60% of today's rural jobs," yet many companies and policy experts cling to the myth that these areas lack skills needed in today's economy. There are two educational paths for regional economic success. If we distinguish between (1) schooling that leads to four-year academic degrees from (2) associate degree programs that produce community college graduates with high levels of occupational skills matched to local economic needs, the value of the community colleges in the future of Greater Minnesota is plain. They represent a tremendous asset for nurturing "rural America's emerging knowledge economy," especially in regional settings rich with natural amenities, which appear to be especially attractive to knowledge workers. [9]

© The research staff at the Center for the Study of Rural America at the Kansas City Federal Reserve Bank argues that "the growing consensus among policy analysts and officials is that rural development must be founded on four pillars: focusing on regions instead of sectors; shifting more solutions from federal to regional officials; stoking the fire of innovation; and investing in the public goods that sustain new economies. [10]

A New National Settlement Geography?

This study described and analyzed features of Greater Minnesota's emerging settlement system, and associated transportation demands. Meanwhile, a serious conversation is underway at the national scale about the nature of emerging "megapolitan areas" and what they mean for transportation throughout the continental U.S. The earlier understanding of the American urban settlement system and its transportation requirements was based on the concept of a "central place hierarchy."

- © At the middle of the 20th century, that hierarchy had the New York area at its pinnacle as the *national metropolis*.

- © At the next rank were a series of *regional metropolises* (the Boston, Philadelphia, Detroit, Chicago, San Francisco-Oakland, and Los Angeles-Long Beach areas).

- © At a still lower rank were a series of two-dozen *metropolitan centers* like Minneapolis-St. Paul, which dominated their adjacent trade areas in providing high-order of goods and services throughout a broad region (in our case, the Upper Midwest), and competed with neighboring centers of similar or higher rank (in the Twin Cities case: Seattle, Denver, Kansas City, St. Louis, Chicago).

- © In 1955, the Interstate Highway program was about to be launched as an effort to link the nation's major metropolitan areas. U.S. highways connected the cities, state highways continued to link cities with adjacent rural areas, and railroads continued tying the countryside to the cities, and American cities with one another.

A half-century later, the map of major American metropolitan centers still resembles the map of 1955, but much has changed–not only in the Minnesota countryside, but also across the country. In 1955, the U.S. economy was essentially a closed economy. We consumed most of what we produced, and produced almost all of what we consumed. But as a stroll through a Target or Wal-Mart store today will reveal, the competition today is not between Minneapolis-St. Paul and Denver, or Kansas City, or Chicago. Competition today is between the U.S. and a rapidly developing world.

This fact raises challenging questions: How does Greater Minnesota fit into this new world of global competition and rapid economic change? And what will the state need in the way of highway and other transportation improvements in order to participate successfully in this challenging environment?

With leadership from the Lincoln Institute of Land Policy and the Regional Plan Association of New York, a serious effort has begun to redefine the geography of urban and metropolitan America, and to evaluate how major metro-centered regions will be positioned to engage successfully in global competition. As a first step, analysts working with the Lincoln Institute defined ten *Megapolitan Areas* that in 2003 contained less than one-fifth of all land area in the lower 48 states, but more than two-thirds of the U.S. population–almost 200 million people (Figure 8.1.). [11]

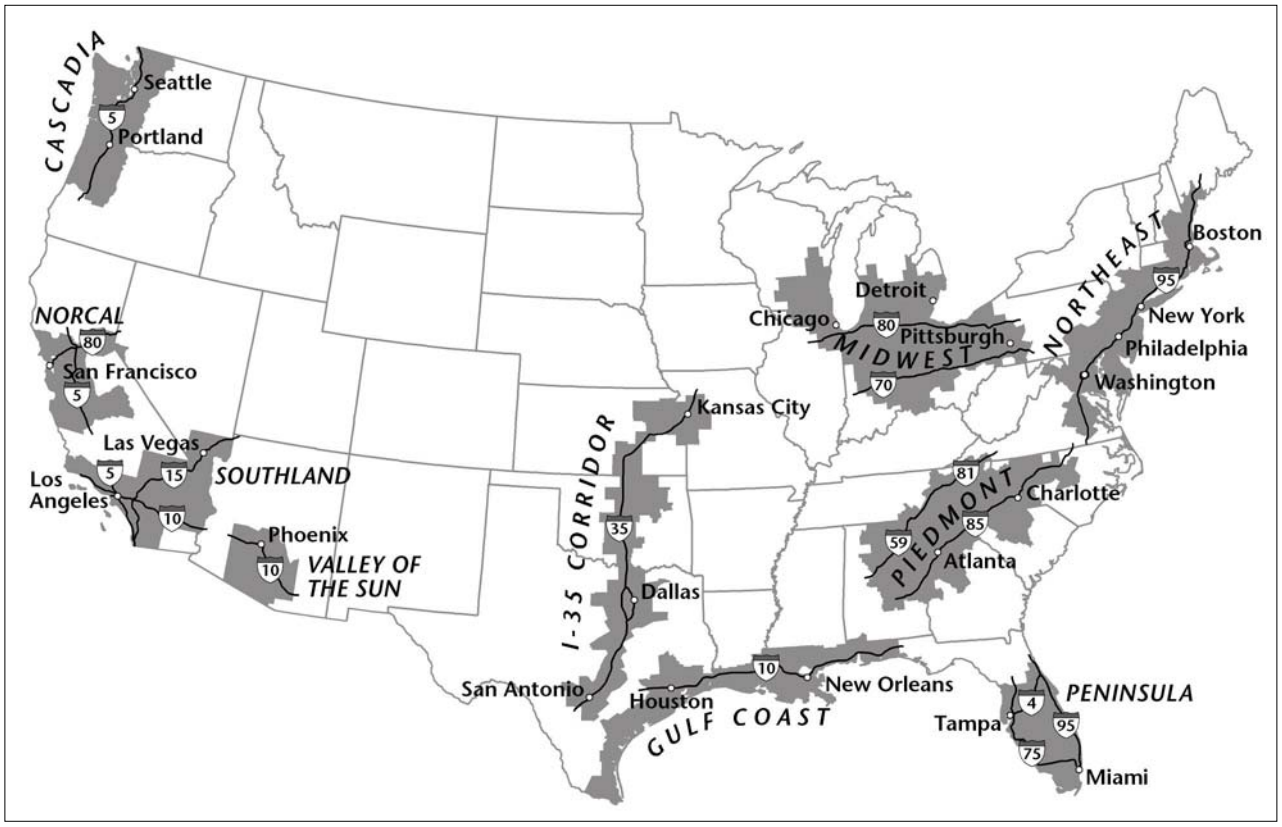

Figure 8.1. Ten Megapolitan Areas and their Interstate Highways
Source: Cartography Laboratory, University of Minnesota. Adapted from: Robert E. Lang and Dawn Dhavale. Beyond Megalopolis. Exploring America's New "Megapolitan" Geography. Metropolitan Institute Census Report Series. Census Report 05:01 (May 2005). Metropolitan Institute at Virginia Tech.

A megapolitan area as described in this effort displays the following characteristics: [12]

- © Combines two or more metropolitan areas, and may include dozens;
- © Projected to include at least 10 million population by 2040;
- © Composed of contiguous metropolitan and micropolitan areas (defined for the first time for Census 2000);
- © Forms an organic cultural region with shared history and identity;
- © Occupies a roughly similar physical environment;
- © Large centers are well linked through major transportation infrastructure;
- © Forms a functional urban network by means of goods and service flows;

- © Creates a usable regional geography that is suitable for large-scale regional planning;
- © Lies within the U.S.; and is
- © Composed of counties as the basic building blocks.

In this formulation, and limiting the list to the Top Ten, the Upper Midwest region centered on Minneapolis-St. Paul fails to make the cut because of its smaller functional size–although its areal extent across the 9th Federal Reserve District is vast. The concept, however, remains valid as a conceptual framework for reflecting on the economic geography of Greater Minnesota and places beyond its borderlands, the nature of their ties to the Twin Cities area, and how the Upper Midwest region is evolving in an integrated fashion along lines similar to the Chicago-centered "Midwest."

The urbanization of the Minnesota countryside is underway as part of a much wider regional transformation, and highways will form the major transportation arteries moving people and freight. In the face of growing regional demand for freight transportation capacity, rail service continues to be crucial for transporting bulk cargo, and air transportation provides vital linkages for business travel, recreation, mail, and air cargo. The role of rail in passenger transportation may expand in parts of the region (Twin Cities-centered passenger rail corridors have already been tentatively defined for development), but successful rail plans will require partnerships with local units of government willing to buy into a clearly articulated *regional vision* along the lines of a cooperative, mutually interdependent megapolitan area, which is supported by sustained leadership from government and business.

In the meantime, the trunk highways and subsidiary roads in Greater Minnesota will be traveled more heavily as the "city streets" of an increasingly urbanized countryside. The hope is that economic development and population expansion can proceed across many parts of Greater Minnesota without destroying the very features of the countryside that make it so attractive as a place to live, to work, and to play. [13]

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   For an account of how the U.S. Census Bureau measured the journey to work as part of Census 2000, together with a facsimile of the census long-form questions asked regarding the journey to work, and summary data from across the U.S., see: Clara Reschovsky. Journey to Work: 2000. Census 2000 Brief. Pub. No. C2KBR-33. March 2004. Washington, DC: U.S. Census Bureau. 13pp.

2. For an extensive discussion of how the metro/non-metro and urban/rural distinctions have increasingly become obsolete as effective means for describing settlement systems of the modern era see: John S. Adams, Barbara J. VanDrasek, and Eric Phillips. "The Definition of Metropolitan Statistical Areas." Urban Geography 20:8 (1999) 695-726. See also: Robert C. Klove. "The Definition of Standard Metropolitan Areas," Economic Geography 28:2 (1952), pp. 95-104.

3. Minnesota Department of Transportation. Minnesota Statewide Transportation Plan: A Work in Progress. St. Paul: Minnesota Department of Transportation, 1995.

4. Minnesota Department of Transportation. "Better Connections for Minnesota's Future: Interregional Corridor Study." St. Paul: Minnesota Department of Transportation, 1999. 8pp. This is an executive summary of the study's main points. For the full report see: http://www.oim.dot.state.mn.us/projects/irc/index.html. The study made significant use of data and analysis in: William Casey. Trade Centers of the Upper Midwest: 1999 Update. Minneapolis: University of Minnesota, Center for Urban and Regional Affairs, 1999. Mn/DOT subsequently commissioned an update of the 1999 report: SRF Consulting Group. Trade Centers of the Upper Midwest: 2003 Update. St. Paul: Minnesota Department of Transportation, 2003. This report identified 55 centers ranked 0-3, five more than were identified in the 1999 study. Worthington dropped one rank in importance, several centers rose in rank, and a few other centers were added to the earlier 50. There were no major changes in the overall array of trade centers in Minnesota and serving as nodes on the state's interregional trunk highway corridors.

5. Five percent of daily commuters is a low threshold to measure the functional integration of counties. Within Greater Minnesota, however, this threshold is an adequate indicator of such

integration, given population density patterns. Moreover, the 5-percent threshold provides a forecast of intensified highway interaction. The counties that are already linked by daily commuting and other interactions with a regional center (and its county) seem likely to become even more closely linked during the present decade.

The maps of regional trade centers, and of commute-sheds based on the five-percent threshold, bear out the assertion. Only three counties fall into three distinct commuting fields, and each of these is situated between two regional centers (Becker County, between Fargo/Moorhead and Park Rapids; Todd County, between Alexandra and Little Falls; and Waseca County, between Mankato and Owatonna). Much of Minnesota's countryside has low population densities, interspersed by towns and small cities that typically serve as workplace clusters.

Since 2000, the Bureau of the Census has used a 25-percent commuting threshold to define counties that comprise Metropolitan Areas. Under the 2000 standards, an outlying county can be linked to a central county (or counties) if at least 25 percent of employed residents from the outlying county work in the central county (or counties) or at least 25 percent of the employment in the outlying county is accounted for by workers residing in the central county (or counties). We would expect counties within metropolitan areas to be more tightly integrated with each other than those in less urbanized areas, due to higher residential and workplace densities.

6. Gary Barnes, Minnesota Journal 18 Sept 2001, and "Sprawl Doesn't Equal Congestion." Minnesota Journal, 26 Feb 2002, p. 2.

7. In a memo to Gina Baas, Center for Transportation Studies, University of Minnesota, dated 19 February 2003, Technical Advisory Panel member Perry Plank comments further on Gary Barnes's research and the relationship between development densities and traffic congestion. Plank notes that commuting speeds averaged 25 mph in the developed suburbs, and 29 mph in the developing suburbs–14 percent and 31 percent faster than in the denser central cities of Minneapolis and St. Paul (22 mph). In addition, he writes, and contrary to conventional wisdom, the average commuting distance in the developed suburbs is about the same (i.e., only 2 percent higher) as in the central cities (cf. 1990 Twin Cities Transportation Behavior Inventory, p. 45).

   It seems clear that in many cases the streets, thoroughfares and freeways in Minneapolis, St. Paul and the older developed suburbs often are carrying more vehicle traffic than they were built to accommodate; not only traffic that *originates* within those older-developed areas, but also traffic that originates from suburbs farther out and converges as it moves toward and through the core and overwhelms the available street capacity. Traffic loads on those inner routes are additionally burdened by traffic that is moving through the city from one side to another on streets and highways originally built to provide access to the downtowns. The three sources of traffic – internally generated traffic in areas built during the electric streetcar era, plus traffic arriving in the city and older suburbs, plus traffic passing through the city – increasingly overwhelm the capacity of city streets and highways available to carry it.

Development densities vary from high to low moving from downtowns to the outer developing suburbs, and this variation in density corresponds with a reduction in congestion moving from center to edge, but the reduction in density is not the cause of the reduction in congestion. The reduction in congestion is due to the fact that demand for road capacity in developing areas often falls well short of the supply of road capacity in those areas while they are developing. In fact, it is the convenient accessibility of those developing areas to other a Twin Cities locations (e.g., Eagan in the 1980s following the improvements in I-494 and the Cedar Avenue Bridge; Woodbury and Maple Grove in the 1990s, St. Michael in 2005; or St. Croix County after the new Stillwater Bridge is completed) that targets them for development as the greater Twin Cities area continues its brisk economic and population growth.

Initially, movement to, from and within those places is easy, but as they grow they impose traffic loads on adjacent communities. To the extent that density can be a direct driver of congestion it is when lower densities are associated with longer trips, trips that may be encouraged by the initially easy movement within and from those newly developing areas. If, however, sufficient road capacity accompanies new development so that supply of capacity exceeds demand for that capacity within newly developing areas and afterwards, then congestion within those areas may be forestalled, perhaps indefinitely. But whether trips originating from those new developments and ending elsewhere, or originating elsewhere and moving through those new areas, will be easily accommodated depends on the supply of available road capacity, and in previously developed areas that capacity is likely to fall short of demand for it if the greater metropolitan areas continues to grow.

8. Peter Calthorpe and William Fulton. The Regional City. Washington, DC: Island Press, 2001. p. xv. Calthorpe has been a leading advocate for "Smart Growth" policies, and was a principal consultant to the Twin Cities Metropolitan Council.
9. Plank memo, 4 March 2005.
10. Gary Barnes, "Land Use and Travel Choices in the Twin Cities, 1958-1990." CTS Report 01-01, TRG Report #6, 7/01, p. 30.
11. Laurie Blake, "It's a Slow Cruise Up to the Cabin." StarTribune, 3 July 2005, pp. A1, A15.
12. ibid.
13. Plank memo, 4 Mar 2005.
14. Peter Gordon and Harry Richardson. "Peak-Period Fees to Relieve Traffic Congestion." In Curbing Gridlock. Transportation Research Board Special Report 242, Vol. 2, 1994.

    The Texas Transportation Institute, as part of its continuing focus on possible links between road building, road use, settlement density, and traffic congestion, reported on a study for the Federal Highway Administration [With calculations from US Census Bureau data and drawing from Catherine E. Ross and Anne E. Dunning, "Land Use and Transportation Interaction: An Examination of the 1995 NPTS Data," Searching for Solutions: Nationwide Personal Transportation Survey Symposium, US Federal Highway Administration, October 29-31, 1997], which examined the relationship between density and vehicle miles generated,

and concluded that "there is a strong positive relationship between higher population density and higher traffic volumes". This analysis was done as part of a critique of "smart growth" policies that purport to alleviate congestion. [Reported in: http://www.publicpurpose.com/pp57-density.htm] The crude correlations and comparisons (e.g., Atlanta with Milwaukee) make no reference to the supply of road capacity compared with the demand for that capacity as density rises.

See an extended analysis in Anthony Downs, Stuck in Traffic (Washington, DC: Brookings Institution & Lincoln Institute of Land Policy, 1992), and Anthony Downs. Traffic: Why It's Getting Worse, What Government Can Do. Brookings Institution. POLICY BRIEF #128, January 2004 at: http://www.brook.edu/comm/policybriefs/pb128.htm.

Another study, New Highways and Highway Driving, from the Thoreau Institute and using data from the Texas Transportation Institute on 64 urban areas and challenging arguments in support of Smart Growth concluded, "Highway data show that building new freeways increases per capita freeway driving. However, it does not increase total per capita driving. Instead, it shifts driving from ordinary streets to the freeways. Since freeways are safer, and ordinary street driving is particularly dangerous for pedestrians, new freeways are the ultimate pedestrian-friendly design.

This update also shows that reductions in density ("sprawl") have no effect on driving. Nor does increased congestion, suggesting that planners' hopes that more congestion will lead people to shift from driving to public transit are unfounded. … Smart-growth advocates argue that sprawl leads people to drive more. If true, then there should be a strong correlation between changes in population density and per capita driving. Yet the data show that there is absolutely no correlation. Thus, driving is independent of density or sprawl." [http://www.ti.org/vaupdate14.html]

These and other studies yield results that are consistent with our general comment regarding demand and supply of road capacity and the question of road congestion.

15. J. S. Adams. Review article based on Henry C. Binford. The First Suburbs: Residential Communities on the Boston Periphery, 1815-1860 (Chicago: University of Chicago Press, 1985), and Matthew Edel, Elliott D. Sclar, and Daniel Luria. Shaky Palaces: Homeownership and Social Mobility in Boston's Suburbanization (New York: Columbia University Press, 1984), in Annals, Association of American Geographers, Vol. 76, No. 3 (1986), pp. 426-432.

16. For example, the cities of West Allis, Cudahy and South Milwaukee near Milwaukee, Wisconsin, South St. Paul near St. Paul, Minnesota, and Hopkins near Minneapolis, Minnesota. See also: David Rusk. Cities without Suburbs, 2nd. Ed. Baltimore: Johns Hopkins University Press, 1995. The U.S. Census of 1920 recorded for the first time that more people lived in *urban* places (i.e., incorporated places of more than 2,500 persons) than in rural places. Following the 1920 census, rural-dominated state legislatures generally ceased reapportioning legislative districts, behavior that eventually prompted the U.S. Supreme Court in Baker *vs*. Carr (369 US 186 (1962)) to mandate "one man, one vote," and to required reapportionment of congressional seats, thereby tipping the political balance to

suburbs and rural interests and against the large central cities. At the same time, state legislatures ceased reapportioning, many of them passed statutes making it difficult or impossible for large central cities to expand geographically through annexation as wealthy households and new industry and commercial activities began concentrating in suburbs. Not only did suburban interests resist the higher taxes cities levied to support city services, city transportation, and employment opportunities that suburbanites depended on, but the legislatures curried their favor by making it easy for those suburbs to incorporate as separate cities in their own right. See: Jon C. Teaford. The Twentieth Century American City, 2nd. Ed. Baltimore: The Johns Hopkins University Press, 1993. Pp. 72-73, 107-09, 146.

17. We use the term "Greater Minnesota" for areas of the state outside the 25-county Twin Cities commuting field, which extends into Wisconsin. We use the term "non-metro Minnesota" for counties outside the 25-county Twin Cities area and also outside the other Minnesota MSAs, i.e., Duluth-Superior, Fargo-Moorhead, Grand-Forks-E. Grand Forks, etc. See: Brian W. Ilbery (ed.). The Geography of Rural Change. Harlow: Longmans, 1998.

18. For example, "Throughout the country many have been taken by surprise by the new Census numbers indicating a high rate of growth in the Latino population. In some rural Minnesota communities, the Latino population now accounts for approximately one-quarter of the community's residents." See Deborah Bushway. The Vitality of Latino Communities in Rural Minnesota. Mankato, MN: Center for Rural Policy and Development, Minnesota State University, Mankato, 2001. p. i. Seven communities selected for the Bushway study include Willmar, Worthington, Albert Lea, St. James, Owatonna, Pelican Rapids, and Long Prairie.

19. Ronald A. Wirtz. "Rural Census: Half Full or Half Empty." Federal Reserve Bank of Minneapolis. Fed Gazette14:5 (September 2002). Pp. 4ff.

20. Center for Transportation Studies. Transportation in Rural America: Challenges and Opportunities. James L. Oberstar Forum on Transportation Policy and Technology, 2004. Minneapolis: University of Minnesota, Center for Transportation Studies, 2004. The complete text of Congressman Oberstar's speech may be found at www.cts.umn.edu/oberstarforum.

21. "Changing Places: Shifting Livelihoods of People and Communities in Rural Minnesota." Perspectives: Critical Issues (August 2001). St. Paul: Minnesota Planning, 2001.

22. Peter K. Froelich. "Summary of Points from the Great Plains Population Symposium on State and Local Policies for Addressing Population Loss." A New Paradigm 3 (Summer 2003). Pp. 3-13. (From the Great Plains Population Symposium, headquartered at Dickinson State University, Dickinson, ND.)

23. Edward L. Glaeser and Jesse M. Shapiro. "City Growth and the 2000 Census: Which Places Grew and Why." Survey Series, Census 2000. Washington, DC: The Brookings Institution, Center on Urban & Metropolitan Policy, 2001. p. 9.

24. Bridget Abraham. "An Update on Rural Broadband." The Main Street Economist. (October 2003). Kansas City, MO: Federal Reserve Bank of Kansas City, Center for the Study of

Rural America. Pp. 1-2.

25. Jason Henderson. "Wildlife Recreation: Rural America's Newest Billion-Dollar Industry." The Main Street Economist. (April 2004). Kansas City, MO: Federal Reserve Bank of Kansas City, Center for the Study of Rural America. Pp. 1-2.

26. "Growing Companies, Growing Communities: Study of Communication, Transportation Links Sheds Light on How Regional Economies Prosper." Places and Networks: New Hierarchies in Access and Activity. Minneapolis: University of Minnesota, Humphrey Institute of Public Affairs, 2003. pp. 10-13.

27. Jason Henderson and Nancy Novack. "Building New Competitive Advantages for the 21st Century." The Main Street Economist. (January 2003). Kansas City, MO: Federal Reserve Bank of Kansas City, Center for the Study of Rural America. Pp. 1-2.

28. Jason Henderson. "Seizing High-Skill Services in Rural America." The Main Street Economist. (August 2003). Kansas City, MO: Federal Reserve Bank of Kansas City, Center for the Study of Rural America. Pp. 1-4. Center for the Study of Rural America. Main Streets of Tomorrow: Growing and Financing Rural Entrepreneurs. Kansas City, MO: Federal Reserve Bank of Kansas City, 2003. For a discussion of attitudes of residents toward non-urban landscapes, see Thomas Harvey and Martha A. Works. The Rural Landscape as Urban Amenity: Land Use on the Rural-Urban Interface in the Portland, Oregon, Metropolitan Area. Lincoln Institute of Land Policy Working Paper. Cambridge, MA: Lincoln Institute of Land Policy, 2001. Available at: http://www.rlua.pdx.edu/.

29. Kendall McDaniel. "Thinking Regionally, Acting Locally: Emerging Rural Regions in the U.S." The Main Street Economist. (May 2003). Kansas City, MO: Federal Reserve Bank of Kansas City, Center for the Study of Rural America. Pp. 1-4. Center for the Study of Rural America. Innovations in Rural Governance. 2003 Annual Report. Kansas City, MO: Federal Reserve Bank of Kansas City, 2003. (Addresses the question: how can rural regions throughout the nation build new economic engines?)

30. Melinda L. Erickson and Randal J. Barnes. "Arsenic in Groundwater: Recent Research and Implications for Minnesota." CURA Reporter 34:2 (Spring 2004). Pp. 1-7. "Because the construction of a water treatment facility capable of removing arsenic can cost $1 million or more, Minnesota's small water suppliers—located primarily in economically challenged rural communities—are faced with a severe financial burden in complying with the new drinking water standards."

31. Center for Transportation Studies. Transportation in Rural America: Challenges and Opportunities. James L. Oberstar Forum on Transportation Policy and Technology, 2004. Minneapolis: University of Minnesota, Center for Transportation Studies, 2004. p. 3.

32. Minnesota Statewide Transportation Plan, pp. 3-1, 4-15.

33. Minnesota Statewide Transportation Plan, pp. 3-19, 3-22, 4-19.

34. John S. Adams, Barbara J. VanDrasek, and Joel Koepp. Urbanization of the Minnesota Countryside: Population Change and Low-Density Development Near Minnesota's Regional Centers, 1970-2000. Report No. 10 in the Series: Transportation and Regional Growth Study. Report 03-01. Minnesota Department of Transportation, Center for Transportation Studies, University of Minnesota. 2003. 189pp.

35. John R. Borchert and Donald P. Yaeger. Atlas of Minnesota Resources and Settlement. Minneapolis: University of Minnesota, Department of Geography. 1968. pp. 1-5.

36. U.S. Bureau of the Census. Historical Statistics of the United States: Colonial Times to 1970, Bicentennial Edition, Part 1. Washington, DC: 1975. Tabs. A-195, 202, 203.

37. Theodore C. Blegen. Minnesota: A History of the State. Minneapolis: University of Minnesota Press, 1963. pp. 359-83.

38. ibid., pp. 189-98.

39. Borchert and Yaeger op. cit., pp. 7-41.

40. Brian J. L. Berry. Geography of Market Centers and Retail Distribution. Englewood Cliffs: Prentice-Hall, 1967; Ronald F. Abler, John S. Adams, and Peter Gould. "Urban Locations in a Rural Landscape." Spatial Organization: The Geographer's View of the World. Englewood Cliffs: Prentice-Hall, 1971. pp. 362-379.

41. John R. Borchert and Russell B. Adams. Trade Centers and Trade Areas of the Upper Midwest. Urban Report No. 3. Minneapolis: University of Minnesota, Upper Midwest Economic Study. 1963, pp. 2-18. A later report increased the scope and updated the description and analysis of the region: Thomas L. Anding, John S. Adams, William Casey, Sandra de Montille and Miriam Goldfein. Trade Centers of the Upper Midwest: Changes from the 1960s to 1989. Pub. No. CURA 90-12. Minneapolis: University of Minnesota, Center for Urban and Regional Affairs, 1990.

42. John R. Borchert. America's Northern Heartland. Minneapolis: University of Minnesota Press, 1987.

43. John R. Borchert. The Urbanization of the Upper Midwest, 1930-1960. Urban Report No. 2. Minneapolis: University of Minnesota, Upper Midwest Economic Study. 1963. p. 51

44. U.S. Bureau of the Census. Historical Statistics of the United States: Colonial Times to 1970, Bicentennial Edition, Part 1. Washington, DC: 1975. Series K.

45. ibid.

46. For an analysis of non-farm populations living on farmsteads see: Donald C. Dahmann. Geographic Entities to Represent the U.S. Settlement System Washington, DC: U.S. Bureau of the Census, 1992. For a discussion of the declining usefulness of the urban/rural distinction, see: John S. Adams, Barbara J. VanDrasek, and Eric G. Phillips. "Metropolitan

Area Definition in the United States." Urban Geography 20 (1999) 695-726.

47. John S. Adams et al. Urbanization of the Minnesota Countryside: Population Change and Low-Density Development Near Minnesota's Regional Centers.

48. There is overlap between the census categories "Non-White" and "Hispanic". These populations are examined separately, and should not be summed, as some individuals are double-counted.

49. The Minnesota Department of Transportation and the Center for Transportation Studies were lead sponsors of the *Transportation and Regional Growth (TRG) Study*, which was undertaken at the University of Minnesota in the late 1990s. Research reports from the TRG study are available at: www.cts.umn.edu/trg/index.html.

    The study had six components. The first was titled "Twin Cities Regional Dynamics," and analyzed a 24-county area defined by commuting patterns disclosed in the 1990 Census of Population and Housing. Each county from which 5 percent or more of its worker residents commuted to the 7-county Twin Cities to work was included in the Twin Cities commuting field so defined. Those 24 counties were: Hennepin, Ramsey, Washington, Anoka, Carver, Scott, and Dakota; plus Chisago, Pine, Isanti, Kanabec, Mille Lacs, Sherburne, Wright, Meeker, McLeod, Sibley, LeSueur, Rice and Goodhue; plus Burnett (WI), Polk (WI), St. Croix (WI), and Pierce (WI). The Office of Management and Budget defines the Minneapolis-St. Paul Metropolitan Statistical Area in the early 1990s as including only 13 counties, but used more restrictive criteria than our 5-percent commuting criterion. We feel that our more liberal definition characterizes well the extent of the greater Twin Cities area that this fast growing (and spreading) region is filling and will continue to fill for the foreseeable future.

50. Henderson, James M. and Anne O. Krueger. 1965. National Growth and Economic Change in the Upper Midwest. Minneapolis: University of Minnesota Press. p. 13.

51. Executive Office of the President, Office of Management and Budget. 1987. Standard Industrial Classification Manual 1987. Washington, DC: U.S. Government Printing Office. P. 11.

52. Executive Office of the President, Office of Management and Budget, 1998. North American Industry Classification System: United States, 1997. Lanham, MD: Bernan Press. P. 3.

53. Ibid. p. 26. For another approach to the problem of classifying industries and occupations, see: Christian, Charles M., and Robert A. Harper, eds. Modern Metropolitan Systems. 1982. "Industrial and Occupational Characteristics of the Labor Force." Columbus, OH: Charles E. Merrill Pub. Co., pp. 89-94; and Abler, Ronald F. and John S. Adams. 1977. "The Industrial and Occupational Structure of the American Labor Force." Papers in Geography. University Park, PA: Department of Geography, The Pennsylvania State University. These sources summarize the history of official classification systems, and present a way to classify industries and occupations that distinguish between *custom work* and *routine, repetitive work*, while also distinguishing between work with *tangibles* and work with *intangibles*. In

the course of the development of an economy, custom work is first routinized, and eventually automated.

54. Scoville, James. (1965) "The Development and Relevance of U.S. Occupational Data." Industrial and Labor Relations Review (October 1965), 70-79.

55. Abler and Adams op. cit., pp.7-8.

56. U. S. Census Bureau. 2003. Statistical Abstract of the United States 2003. Washington, DC. Table 587.

57. John S. Adams, Barbara J. VanDrasek and Joel Koepp. Urbanization of the Minnesota Countryside: Population Change and Low-Density Development Near Minnesota's Regional Centers, 1970-2000. Report No. 10 in the Series: Transportation and Regional Growth Study. Report 03-01. Minnesota Department of Transportation, Center for Transportation Studies, University of Minnesota. 2003. 189pp.

58. Gary Barnes, Minnesota Journal 18 Sept 2001, and "Sprawl Doesn't Equal Congestion." Minnesota Journal, 26 Feb 2002, p. 2.

59. A related investigation into long-distance commuting in Minnesota as reported by Census 2000 (one-way commutes longer than 90 minutes) was underway in 2005 by Gary Barnes, Center for State and Local Policy, University of Minnesota, with support from Mn/DOT and the Center for Transportation Studies, University of Minnesota.

60. Taken from: http://landview.census.gov/geo/puma2000.html; dated 5/29/03.

61. U.S. Census Bureau, 2000 Census of Population and Housing, Public Use Microdata Sample, United States: Technical Documentation, 2003. The PUMAs for 1-percent and 5-percent samples are dissimilar geographical areas. In some states, (but not Minnesota) one or more PUMAs include non-contiguous parts. In the 1-percent file, an effort was made to separate metropolitan areas from non-metropolitan areas. On the 5-percent file, an effort was made to keep meaningful socio-economic planning areas together. In sparsely populated areas, it may have been necessary to delineate PUMAs with non-contiguous parts to meet the minimum population criterion when adjacent counties belonged to a metropolitan area or a local planning area.

    "For the 1-percent state-level files, the Super-PUMAs contain a minimum population of 400,000 and are composed of a PUMA or a group of contiguous PUMAs delineated on the 5-percent state-level PUMS files. Super-PUMAs are a new geographic entity for Census 2000. Super-PUMAs and PUMAs also are defined for place of residence on April 1, 1995, and place of work." See: ICPSR Study No. 13511. Inter-university Consortium for Political and Social Research, Ann Arbor, MI: 2003. "Place of work PUMAs" are discussed in Daniel B. Gubits, "Commuting, Work Hours, and the Metropolitan Labor Supply Gradient." Baltimore, MD: Department of Economics, The Johns Hopkins University. 24 Nov 2004. gubits@jhu.edu.

    The Office of Management and Budget is the federal government's authorizing agency for

designating official statistical areas for federal statistical purpose, with staff work managed by the Geography Division of the U.S. Bureau of the Census. In defining PUMAs and Super-PUMAs, the Geography Division consulted with state data centers in each state and oversaw the work of the data centers (some of which may have farmed out the work to consultants) to ensure compliance with official OMB and Census Bureau rules. (Paul J. Mackun, Geography Division, U.S. Census Bureau, Personal Communication.)

"For Census 2000, the Census Bureau offered the State Data Centers (SDCs) in each state, the District of Columbia, and Puerto Rico the opportunity to delineate PUMAs within their state or statistically equivalent entity using Census Bureau criteria and guidelines [PDF]. Two states, Florida and Rhode Island, declined to participate in this voluntary program and the Census Bureau delineated the PUMAs in those states." See: http://www.census.gov/geo/puma/puma2000.html

62. ibid.

63. ibid.

64. PUMS files have been created from census returns from 1850 through 1990 by the Minnesota Population Center. See: the Integrated Public Use Microdata Series, IPUMS USA at http://www.ipums.org/usa.

65. A recent University of Minnesota study investigating the economic fortunes of Minnesota's foreign-born population asked: "How have they fared economically during the last ten years? How did they fare relative to other Minnesotans? (Less well) Did Sub-Saharan Africans fare better or worse than U.S.-born blacks? (Yes) Did Hispanics/Latinos born outside the U.S. do better or worse than those born in the U.S?" (Better) See: Dennis A. Ahlburg and Young Nam Song. "The New Minnesotans: How are they doing in Economic Terms? CURA Reporter 35:3 (Summer 2005), pp. 3-9. According to Census 2000, 82,000 international immigrants moved to Minnesota between 1995 and 2000. See: Martha McMurray. "Minnesota Migrants: A 2000 Public Use Microdata Sample Portrait." Population Notes OSD-04-116 (October 2004), Minnesota State Demographic Center, Department of Administration, State of Minnesota. 9pp.

66. See Minnesota Center for Survey Research, Annotated List and Index of Past Surveys and Data Files, 1982-1992. Minneapolis, Minnesota Center for Survey Research, 16 Nov 1992; and Annotated List and Index of Past Surveys and Data Files, 1982-1994, June 1994. MCSR survey data sets are public data and available on SPSS files. Additional data on commute distances and travel times are available from 1994 to 2000 from the statewide surveys sponsored by Mn/DOT. Additional surveys for later years had other sponsors. Although the 1994 to 2000 samples are not large, data for individual counties and groups of counties can be obtained, and data from several years could be combined to increase sample sizes and reducing sampling error. Counties could be aggregated according to the definitions of the study areas used in this study. Full exploitation of these data awaits further research.

67. Memo from Technical Advisory Panel member Perry Plank.

68. MCSR survey, op. cit.

69. The 2003 Minnesota Statewide Transportation Plan (August 2003, p. 6-41) notes that 15 percent of the interregional corridors (IRCs) were not meeting minimum speed targets in 2001. The 2003 plan notes that with "no major capacity improvements…, IRC performance is expected to decline by 69 percent by 2023" (pp. 6-40).

    For example, if level-of-service on rural 2-lane highways is lowered from A to C (on a scale of A to F) on a 20-mile commute, estimated travel time on such routes will increase by 6 minutes.

70. Mn/DOT working paper, 22 May 1997.

71. For a complete discussion with a Minnesota emphasis, prepared as a component of the Transportation and Regional Growth Study, see: John S. Adams, Julie L. Cidell, Laura J. Hansen, Hyun-joo Jung, Yeon-taek Ryu, and Barbara J. VanDrasek. Development Impact Fees for Minnesota? A Review of Principles and National Practices. Report #3 in the Series: Transportation and Regional Growth Study. CTS 99-04. Minnesota Department of Transportation, Center for Transportation Studies, University of Minnesota, and the Metropolitan Council. October 1999. 130 pp. A more recent and comprehensive national coverage of the topic with economic analysis, policy implications, and an extensive bibliography see: Vicki Bean. "Impact Fees and Housing Affordability." Cityscape: A Journal of Policy Development and Research (U.S. Department of Housing and Urban Development) 8:1, pp. 139-85. In 89 jurisdictions selected for study in California, the state where impact fees are most widely used, the average amount of fees imposed on a single-family house in 1999 was $19,552, with a range of $6,783 to $47,742.

72. See Wallace E. Oates, ed. Property Taxation and Local Government Finance. Cambridge, MA: Lincoln Institute for Land Policy, 2001; Helen F. Ladd and Wallace E. Oates, Eds. Local Government Tax and Land Use Policies in the United States: Understanding the Links. Northampton, MA: Edward Elgar, 1998; and Alan A. Altshuler and José A. Gomez-Ibáñez. Regulation for Revenue: The Political Economy of Land Use Exactions. Washington, DC: The Brookings Institution, 1993.

73. Laura Kalambokidis and Bob Patton. "Residential Development Impacts in Two Minnesota Regions. CURA Reporter 35:2 (Spring 2005), pp. 11-13. A wide range of questions on accessibility were addressed and discussed at a conference sponsored by the Center for Transportation Studies, 8-9 November 2004, at the University of Minnesota. The proceedings of the conference are available as: Access to Destinations: Rethinking the Transportation Future of Our Region. Proceedings. 8-9 November 2004. Minneapolis: Center for Transportation Studies, University of Minnesota, 35pp.

74. Sean Moore. "Regional Asset Indicators: Tapping the Surplus Skills in Rural America." The Main Street Economist: Feb 2005. Federal Reserve Bank of Kansas City. pp. 1-4.

75. "Economic Focus–It's the Taking Part That Counts: Are 5.1m Americans missing from the

unemployment figures?" The Economist, 30 July 2005, p. 70.

76. Ronald A. Wirtz. “A Rising Housing Tide.” Fedgazette 17:3 (May 2005). Federal Reserve Bank of Minneapolis. pp. 1-9; and “Home Sweet Manufactured Home.” Fedgazette 17:4 (July 2005), pp. 1-10.

77. Nancy Novack. “Agricultural Credit Conditions: Booming Farmland Values. The Main Street Economist: June 2005. Federal Reserve Bank of Kansas City. pp. 1-4.

78. Andrew Haeg. “Citizens Ponder the Future of Small-Town Minnesota.” Minnesota Journal 22:6, 28 June 2005. pp. 5-6.

79. Jason Henderson and Stephan Weiler. ”Rural America’s New Path to Workforce Skills.” The Main Street Economist: July 2005. Federal Reserve Bank of Kansas City, pp. 1-2; and Jason Henderson and Bridget Abraham. “Rural America’s Emerging Knowledge Economy.” The Main Street Economist: May 2005. Federal Reserve Bank of Kansas City, pp. 1-4.

80. Mark Drabenstott. ”New Policies for New Economic Engines.” In Building Rural Prosperity in Regions: The Road Less Traveled. The Main Street Economist: Commentary on the Rural Economy. 2004 Annual Report. Kansas City: Center for the Study of Rural America, Federal Reserve Bank of Kansas City, December 2004. p. 10.

81. Robert E. Lang and Dawn Dhavale. “America’s Megapolitan Areas.” Land Lines (Lincoln Institute of Land Policy) 17:3 (July2005): pp. 1-4.

82. ibid., p. 1.

83. Successful effort in this direction will depend on an improved understanding of the interdependent nature of evolving regional economies, and successful involvement of local and regional stakeholders in highway research, planning and program implementation. See a special issue of TR News 2004 (September-October 2004), Transportation Research Board or the National Academies, with a series of relevant articles: E. Dean Carlson, “Involving Local and Regional Stakeholders in Highway Research” (p. 3); Walter Diewald, “Highways and Byways to Stakeholder Involvement: Establishing A Network of Connections to Highway Research" (pp. 4-10); Ann M. Brach, “A Framework for Stakeholder Involvement: Managing Research with a Focus on Users" (pp. 11-16); Joe Conway, “Instituting Programs for Stakeholder Outreach: Federal Highway Administration Initiatives for Local-Level Involvement in Research and Technology” (pp. 17-21); and Sandra Rosenbloom, Michael M. Ryan and Walter Diewald, “Toward Local and Regional Involvement in Highway Research: Staking Out the Starting Point and the Road Ahead” (pp. 22-27).

APPENDIX A

Materials to accompany Chapter 3:
"Industrial and Occupational Structure of
Greater Minnesota's Labor Force, 1970-2000"

Appendix A-1: Explanatory Notes for Industry and Occupation Tables

Appendix A-2: Change in Industrial Structure for 26 Study Areas, 1970-2000

Appendix A-3: Change in Occupational Structure for 26 Study Areas, 1970-2000

Appendix A-1: Explanatory Notes for Industry and Occupation Tables

1. Occupation data are reported in the six summary occupation groups as defined by the Census Bureau for Census 2000 for Summary File 3. Occupation data from 1990 and 1980 were converted to the six summary categories according to formulae provided in Table 7 of the U.S. Census Bureau's Technical Paper # 65, *The Relationship Between the 1990 Census and Census 2000 Industry and Occupation Classification Systems* (Washington, D. C.: Government Printing Office, 2003). Occupation data from 1970 were similarly converted to 1980 categories using formulae provided in Table 5-B of the U.S. Census Bureau's Technical Paper 59, *The Relationship Between the 1970 and 1980 Industry and Occupation Classification Systems* (Washington, D. C.: Government Printing Office, 1989). According to the Census Bureau's website, occupation categories were "essentially the same" in the 1980 and 1990 censuses (see "Industry, Occupation, and Class of Worker" under "Subject Characteristics" in the Help section of "American FactFinder"). Thus, after being converted to 1980 categories, the 1970 occupation data were converted to the six summary occupation categories of Census 2000.

Data from 1990 (STF-3) and 2000 (SF-3) are available on the Census Bureau's website. Data from 1980 comes from the *1980 Census of Population* "General Social and Economic Characteristics," and data from 1970 was taken from the *1970 Census of Population* "General Social and Economic Characteristics." The conversion formulae, or "crosswalks" as they are also known, are based on large national samples—127,125 records in 1970 and 97,202 records in 1990—and therefore do not take into account regional variations. Despite the best effort to accurately portray change in employment by occupation in these study areas, the data presented in these tables should not be misconstrued as exact.

2. Industry data are reported in the thirteen major industry groups as defined by the Census Bureau for Census 2000 Summary File 3. Industry data from 1990 and 1980 were initially converted into twenty groups according to formulae provided in Table 6 of the U.S. Census Bureau's Technical Paper # 65, *The Relationship Between the 1990 Census and Census 2000 Industry and Occupation Classification Systems* (Washington, D. C.: Government Printing Office, 2003). The data were then aggregated into the thirteen summary groups. Industry data from 1970 were similarly converted to 1980 categories using formulae provided in Table 6-B of the U.S. Census Bureau's Technical Paper 59, *The Relationship Between the 1970 and 1980 Industry and Occupation Classification Systems* (Washington, D. C.: Government Printing Office, 1989). According to the Census Bureau's website, only "minor revisions" were made to the industry classification system between the 1980 and 1990 censuses (see "Industry, Occupation, and Class of Worker" under "Subject Characteristics" in the Help section of "American FactFinder"). Thus, after being converted to 1980 major industry groups, the 1970 industry data were converted to the thirteen major industry groups of Census 2000. The 1990 to 2000 conversion table, however, used data from seventeen 1990 major industry groups, while the 1970 to 1980 conversion table provided output into only fourteen major industry groups.

In order to render the data comparable, the following adjustments were made to Table 6-B of the U.S. Census Bureau's Technical Paper 59, *The Relationship Between the 1970 and 1980 Industry*

and Occupation Classification Systems. First, the 1970 and 1980 major industry group "Transportation, communications, and other public utilities" was split into two major industry groups: "Transportation" and "Communications and other public utilities." It was assumed that both major industry groups were exactly the same in 1970 and 1980, both because the parent major industry group did not change at all and because no note was made in the text of the document regarding major changes to either subgroup of the "Transportation, communications, and other public utilities" major industry group. Second, the 1970 and 1980 major industry group "Professional and related services" was split into three major industry groups: "Health services," "Education services," and "Other professional and related services." Consequently, the 0.2 percent of the 1970 major industry group "Business and repair services" that was distributed to the 1980 "Professional and related services" major industry group according to Table 6-B was split equally between the three new major industry group—i.e., each new industry group was allocated 0.07 percent of the records. The three new major industry groups were redistributed from 1970 to 1980 as follows. Of all the "Health services" records for a given place in 1970, 0.4 were distributed to the "Business and repair services" major industry group in 1980, 98.9 percent were distributed to the "Health services" major industry group, and 0.7 percent were distributed to the "Public administration" major industry group.

Of all the "Educational services" records for a given place in 1970, 0.4 were distributed to the "Business and repair services" major industry group in 1980, 98.9 percent were distributed to the "Educational services" major industry group, and 0.7 percent were distributed to the "Public administration" major industry group. Of all the "Other professional and related services" records for a given place in 1970, 0.4 were distributed to the "Business and repair services" major industry group in 1980, 98.9 percent were distributed to the "Other professional and related services" major industry group, and 0.7 percent were distributed to the "Public administration" major industry group. Finally, the 17.6 percent distribution of "Public administration" records for 1970 into the 1980 category "Transportation, communications, and other public utilities" was allocated to the new "Transportation" category, according to the first explanatory note under the heading "Revisions to the Industrial Classification" on page VIII of Technical Paper 59, *The Relationship Between the 1970 and 1980 Industry and Occupation Classification Systems*. Data from 1990 (STF-3) and 2000 (SF-3) are available on the Census Bureau's website. Data from 1980 comes from the *1980 Census of Population* "General Social and Economic Characteristics," and data from 1970 was taken from the *1970 Census of Population* "General Social and Economic Characteristics." The conversion formulae, or "crosswalks" as they are also known, are based on large national samples—127,125 records in 1970 and 48,784 records in 1990—and therefore do not take into account regional variations. Despite the best effort to accurately portray change in employment by industry in these study areas, the data presented in these tables should not be misconstrued as exact.

Appendix A-2: Change in Industrial Structure for 26 Selected Study Areas, 1970-2000

Albert Lea (Freeborn MN)					
Industry	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Agriculture, forestry, fishing and hunting, and mining	1380	1310	1006	827	-18
Construction	706	737	657	867	32
Manufacturing	3834	3993	3160	4173	32
Wholesale trade	583	773	544	472	-13
Retail trade	1915	1860	1971	1996	1
Transportation and warehousing, and utilities	460	629	678	665	-2
Information	427	469	381	186	-51
Finance, insurance, real estate, and rental and leasing	427	633	584	519	-11
Professional, scientific, mgmt, admin, and waste mgmt services	896	1040	1129	668	-41
Educational, health, and social services	1716	2362	2778	3377	22
Arts, entertainment, recreation, accommodation, and food service	1078	980	1086	1006	-7
Other services (except public administration)	489	478	505	739	46
Public administration	287	428	417	537	29
Total	14197	15694	14897	16032	8

Alexandria (Douglas MN, Grant MN, Pope MN, Todd MN)					
Industry	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Agriculture, forestry, fishing and hunting, and mining	4568	4357	3184	3051	-4
Construction	1197	1562	1465	2438	66
Manufacturing	2170	3402	4071	6848	68
Wholesale trade	638	1070	1146	1160	1
Retail trade	2762	3409	3663	4522	23
Transportation and warehousing, and utilities	958	1214	1251	1658	33
Information	483	610	687	876	27
Finance, insurance, real estate, and rental and leasing	567	927	1132	1428	26
Professional, scientific, mgmt, admin, and waste mgmt services	2184	2434	2663	1614	-39
Educational, health, and social services	3429	5484	5958	7590	27
Arts, entertainment, recreation, accommodation, and food service	1564	1902	2111	2223	5
Other services (except public administration)	744	909	1162	1653	42
Public administration	627	882	864	968	12
Total	21892	28161	29358	36029	23

Bemidji (Beltrami MN, Clearwater MN, Hubbard MN)					
Industry	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Agriculture, forestry, fishing and hunting, and mining	1462	1242	1150	1385	20
Construction	936	1287	1350	2391	77
Manufacturing	1272	1969	2180	3073	41
Wholesale trade	256	516	506	660	31
Retail trade	1976	2721	3268	3702	13
Transportation and warehousing, and utilities	768	934	965	1180	22
Information	316	402	485	553	14
Finance, insurance, real estate, and rental and leasing	355	606	866	1209	40
Professional, scientific, mgmt, admin, and waste mgmt services	1162	1198	1754	1350	-23
Educational, health, and social services	3586	5117	6239	8036	29
Arts, entertainment, recreation, accommodation, and food service	1102	1572	1903	3009	58
Other services (except public administration)	590	729	993	1474	48
Public administration	649	1273	1050	1641	56
Total	14430	19565	22709	29663	31

Appendix A-2 (continued)

Brainerd (Aitkin MN, Cass MN, Crow Wing MN)					
Industry	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Agriculture, forestry, fishing and hunting, and mining	1561	1287	1169	1104	-6
Construction	1387	1921	2316	3884	68
Manufacturing	2602	2986	3801	5373	41
Wholesale trade	538	676	875	1146	31
Retail trade	2611	3503	4316	5951	38
Transportation and warehousing, and utilities	1182	1433	1438	1704	18
Information	467	562	667	930	39
Finance, insurance, real estate, and rental and leasing	619	1269	1519	2288	51
Professional, scientific, mgmt, admin, and waste mgmt services	1261	1614	2074	2137	3
Educational, health, and social services	3551	5515	6558	9321	42
Arts, entertainment, recreation, accommodation, and food service	1530	2000	2605	5380	107
Other services (except public administration)	843	1061	1437	2281	59
Public administration	812	1262	1538	2113	37
Total	18964	25091	30312	43612	44

Detroit Lakes (Becker MN, Mahnomen MN)					
Industry	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Agriculture, forestry, fishing and hunting, and mining	1500	1505	1136	1172	3
Construction	766	876	913	1394	53
Manufacturing	832	1296	1551	1983	28
Wholesale trade	345	508	418	442	6
Retail trade	1162	1382	1620	1887	16
Transportation and warehousing, and utilities	492	774	814	989	22
Information	207	291	286	238	-17
Finance, insurance, real estate, and rental and leasing	224	470	559	623	12
Professional, scientific, mgmt, admin, and waste mgmt services	909	1076	1118	612	-45
Educational, health, and social services	1344	2390	2526	3506	39
Arts, entertainment, recreation, accommodation, and food service	688	812	981	1700	73
Other services (except public administration)	381	457	519	735	42
Public administration	347	666	581	751	29
Total	9199	12502	13022	16032	23

Duluth-Superior (Carlton MN, Lake MN, St. Louis MN, Bayfield WI, Douglas WI)					
Industry	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Agriculture, forestry, fishing and hunting, and mining	11606	13413	7074	6931	-2
Construction	6035	7696	6678	8842	32
Manufacturing	17350	15399	13538	12810	-5
Wholesale trade	4352	4306	4062	4266	5
Retail trade	12845	16334	17415	17517	1
Transportation and warehousing, and utilities	8772	8833	7374	9386	27
Information	3360	3620	3400	3539	4
Finance, insurance, real estate, and rental and leasing	3508	5694	5251	6619	26
Professional, scientific, mgmt, admin, and waste mgmt services	5228	6481	8494	7240	-15
Educational, health, and social services	19773	25476	28421	35310	24
Arts, entertainment, recreation, accommodation, and food service	7533	9138	10052	14796	47
Other services (except public administration)	3913	4226	5000	6858	37
Public administration	4536	7145	6216	6899	11
Total	108811	127761	122974	141013	15

Appendix A-2 (continued)

Fairmont (Martin MN)					
Industry	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Agriculture, forestry, fishing and hunting, and mining	1338	1225	950	1041	10
Construction	505	499	409	465	14
Manufacturing	1486	2340	2310	2173	-6
Wholesale trade	471	589	380	335	-12
Retail trade	1162	1499	1247	1306	5
Transportation and warehousing, and utilities	308	432	503	605	20
Information	257	313	243	165	-32
Finance, insurance, real estate, and rental and leasing	264	364	373	463	24
Professional, scientific, mgmt, admin, and waste mgmt services	776	825	880	428	-51
Educational, health, and social services	1067	1572	1698	2248	32
Arts, entertainment, recreation, accommodation, and food servic	683	807	708	691	-2
Other services (except public administration)	335	343	374	516	38
Public administration	171	247	300	321	7
Total	8823	11055	10375	10757	4

Fargo (Becker MN, Clay MN, Norman MN, Wilkin MN, Cass ND, Richland ND, Traill ND)					
Industry	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Agriculture, forestry, fishing and hunting, and mining	6734	6920	5542	5284	-5
Construction	3888	5437	5897	8780	49
Manufacturing	4327	8392	9461	13046	38
Wholesale trade	4399	5672	5721	5989	5
Retail trade	9478	12465	14511	17492	21
Transportation and warehousing, and utilities	4123	5397	5770	6461	12
Information	1710	2440	2517	2715	8
Finance, insurance, real estate, and rental and leasing	3298	5327	7217	9444	31
Professional, scientific, mgmt, admin, and waste mgmt services	5433	7031	9027	8514	-6
Educational, health, and social services	14340	21432	25849	31014	20
Arts, entertainment, recreation, accommodation, and food servic	5635	6996	8552	10733	26
Other services (except public administration)	3061	3610	4657	6149	32
Public administration	2676	3654	3544	3985	12
Total	69101	94772	108265	129606	20

Fergus Falls (Grant MN, Otter Tail MN, Wilkin MN)					
Industry	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Agriculture, forestry, fishing and hunting, and mining	4223	3930	3128	2949	-6
Construction	1135	1554	1535	2334	52
Manufacturing	1693	2738	3156	4591	45
Wholesale trade	643	789	1038	931	-10
Retail trade	2754	3278	3378	4333	28
Transportation and warehousing, and utilities	1085	2249	1404	1906	36
Information	587	734	839	695	-17
Finance, insurance, real estate, and rental and leasing	545	871	1078	1147	6
Professional, scientific, mgmt, admin, and waste mgmt services	2142	2450	2605	1521	-42
Educational, health, and social services	3918	5408	6020	7695	28
Arts, entertainment, recreation, accommodation, and food servic	1460	1770	1816	2106	16
Other services (except public administration)	649	859	962	1493	55
Public administration	644	704	954	1181	24
Total	21479	27335	27913	32882	18

Appendix A-2 (continued)

Grand Forks (Marshall MN, Norman MN, Polk MN, Red Lake MN, Grand Forks ND, Nelson ND, Steele ND, Traill ND, Walsh					
Industry	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Agriculture, forestry, fishing and hunting, and mining	7040	7378	5755	4891	-15
Construction	2515	3398	3312	4874	47
Manufacturing	3858	3634	4628	5772	25
Wholesale trade	2288	2905	2424	2244	-7
Retail trade	6381	8669	8977	8717	-3
Transportation and warehousing, and utilities	3103	3365	3073	3901	27
Information	1307	1599	1541	1262	-18
Finance, insurance, real estate, and rental and leasing	1596	2574	3299	3081	-7
Professional, scientific, mgmt, admin, and waste mgmt servicess	4427	5122	5843	3288	-44
Educational, health, and social services	10690	14367	16999	19617	15
Arts, entertainment, recreation, accommodation, and food service	3715	4573	5130	5680	11
Other services (except public administration)	2016	2011	2497	3615	45
Public administration	2065	2816	3300	3082	-7
Total	51002	62412	66778	70024	5

Grand Rapids (Itasca MN)					
Industry	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Agriculture, forestry, fishing and hunting, and mining	1945	1990	888	876	-1
Construction	622	935	912	1491	64
Manufacturing	1496	2104	2542	2608	3
Wholesale trade	221	318	374	509	36
Retail trade	1251	1825	2004	2412	20
Transportation and warehousing, and utilities	451	681	742	1251	69
Information	293	548	477	278	-42
Finance, insurance, real estate, and rental and leasing	266	477	590	743	26
Professional, scientific, mgmt, admin, and waste mgmt services	513	750	1074	1215	13
Educational, health, and social services	1875	2874	3146	4265	36
Arts, entertainment, recreation, accommodation, and food service	732	1008	1131	1731	53
Other services (except public administration)	370	539	625	986	58
Public administration	359	796	698	857	23
Total	10396	14845	15202	19222	26

Hibbing (Itasca MN, St. Louis MN)					
Industry	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Agriculture, forestry, fishing and hunting, and mining	11155	13510	6656	6241	-6
Construction	4799	5911	5319	7081	33
Manufacturing	12117	11104	10439	9950	-5
Wholesale trade	3467	3416	3084	3400	10
Retail trade	10336	13291	13811	14676	6
Transportation and warehousing, and utilities	5802	6267	5460	7365	35
Information	2614	3057	2768	2877	4
Finance, insurance, real estate, and rental and leasing	2990	4000	4219	5053	20
Professional, scientific, mgmt, admin, and waste mgmt services	4196	5330	7005	6117	-13
Educational, health, and social services	15727	20918	22962	28416	24
Arts, entertainment, recreation, accommodation, and food service	6168	7408	7968	11252	41
Other services (except public administration)	3297	3499	4104	5682	38
Public administration	3627	5657	4721	5207	10
Total	86295	103366	98516	113317	15

Appendix A-2 (continued)

International Falls (Koochiching MN)					
Industry	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Agriculture, forestry, fishing and hunting, and mining	122	152	168	286	71
Construction	211	347	1070	366	-66
Manufacturing	2095	1902	1457	1510	4
Wholesale trade	85	66	122	46	-62
Retail trade	576	870	894	828	-7
Transportation and warehousing, and utilities	265	273	334	307	-8
Information	287	245	250	107	-57
Finance, insurance, real estate, and rental and leasing	145	163	212	402	90
Professional, scientific, mgmt, admin, and waste mgmt services	211	257	360	199	-45
Educational, health, and social services	884	1194	1199	1359	13
Arts, entertainment, recreation, accommodation, and food service	374	503	529	461	-13
Other services (except public administration)	219	214	239	287	20
Public administration	201	332	325	331	2
Total	5674	6518	7159	6489	-9

Little Falls (Morrison MN, Todd MN)					
Industry	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Agriculture, forestry, fishing and hunting, and mining	3158	3413	2663	2537	-5
Construction	819	989	1138	1941	71
Manufacturing	2069	2943	3769	5423	44
Wholesale trade	326	638	795	669	-16
Retail trade	1652	1930	2208	2917	32
Transportation and warehousing, and utilities	716	891	991	1151	16
Information	346	426	508	437	-14
Finance, insurance, real estate, and rental and leasing	326	604	607	830	37
Professional, scientific, mgmt, admin, and waste mgmt services	1497	1792	2002	1234	-38
Educational, health, and social services	2612	3614	3977	5292	33
Arts, entertainment, recreation, accommodation, and food service	911	1026	1245	1641	32
Other services (except public administration)	426	533	713	1191	67
Public administration	547	900	964	1014	5
Total	15407	19697	21580	26277	22

Mankato (Blue Earth MN, Faribault MN, Le Sueur MN, Nicollet MN, Waseca MN, Watonwan MN)					
Industry	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Agriculture, forestry, fishing and hunting, and mining	6148	5940	4648	4496	-3
Construction	2937	3647	3472	5088	47
Manufacturing	10251	13930	16009	18448	15
Wholesale trade	2107	3395	2839	2565	-10
Retail trade	7147	8467	8639	9518	10
Transportation and warehousing, and utilities	2013	2470	2895	3431	19
Information	1510	1745	2156	1929	-11
Finance, insurance, real estate, and rental and leasing	1740	2624	2968	3402	15
Professional, scientific, mgmt, admin, and waste mgmt services	4074	4517	5479	4382	-20
Educational, health, and social services	10117	13284	16054	19772	23
Arts, entertainment, recreation, accommodation, and food service	3882	4511	4820	5473	14
Other services (except public administration)	1832	2014	2433	3868	59
Public administration	1332	1783	2100	2372	13
Total	55089	68327	74513	84744	14

Appendix A-2 (continued)

Marshall (Lincoln MN, Lyon MN, Murray MN, Redwood MN, Yellow Medicine MN)					
Industry	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Agriculture, forestry, fishing and hunting, and mining	5960	5314	4267	3574	-16
Construction	1489	1999	1611	2087	30
Manufacturing	2168	3750	3983	6282	58
Wholesale trade	946	1527	1522	1165	-23
Retail trade	3692	3808	3543	4080	15
Transportation and warehousing, and utilities	972	1183	1262	1727	37
Information	537	593	591	429	-27
Finance, insurance, real estate, and rental and leasing	770	1219	1360	1580	16
Professional, scientific, mgmt, admin, and waste mgmt services	2901	2964	3113	1275	-59
Educational, health, and social services	4253	5837	6369	7181	13
Arts, entertainment, recreation, accommodation, and food service	1972	2009	1984	2311	16
Other services (except public administration)	894	940	1039	1680	62
Public administration	791	975	841	1079	28
Total	27346	32117	31485	34450	9

Montevideo (Chippewa MN, Lac qui Parle MN, Yellow Medicine MN)					
Industry	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Agriculture, forestry, fishing and hunting, and mining	3151	2640	2084	1710	-18
Construction	708	956	737	1019	38
Manufacturing	1085	1925	1996	2600	30
Wholesale trade	602	786	537	506	-6
Retail trade	1714	1658	1565	1627	4
Transportation and warehousing, and utilities	631	628	604	824	36
Information	304	289	252	236	-6
Finance, insurance, real estate, and rental and leasing	488	610	698	680	-3
Professional, scientific, mgmt, admin, and waste mgmt services	1526	1471	1430	477	-67
Educational, health, and social services	2031	2971	2957	3472	17
Arts, entertainment, recreation, accommodation, and food service	915	877	827	825	0
Other services (except public administration)	432	454	448	866	93
Public administration	385	455	423	534	26
Total	13972	15721	14557	15376	6

New Ulm (Brown MN, Nicollet MN)					
Industry	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Agriculture, forestry, fishing and hunting, and mining	2341	2399	1940	1865	-4
Construction	987	1243	1164	1556	34
Manufacturing	3889	5415	6237	6806	9
Wholesale trade	650	1149	902	853	-5
Retail trade	2480	2942	3043	3038	0
Transportation and warehousing, and utilities	606	921	990	1291	30
Information	525	669	838	679	-19
Finance, insurance, real estate, and rental and leasing	663	896	1224	1176	-4
Professional, scientific, mgmt, admin, and waste mgmt services	1476	1698	1978	1692	-14
Educational, health, and social services	3752	5155	5908	7462	26
Arts, entertainment, recreation, accommodation, and food service	1377	1583	1645	1959	19
Other services (except public administration)	699	672	789	1336	69
Public administration	417	533	760	878	15
Total	19860	25276	27418	30591	12

Appendix A-2 (continued)

Owatonna (Dodge MN, Steele MN, Waseca MN)					
Industry	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Agriculture, forestry, fishing and hunting, and mining	3049	2691	2024	1848	-9
Construction	1125	1559	1438	2414	68
Manufacturing	5647	7905	8672	9520	10
Wholesale trade	661	1063	1405	1079	-23
Retail trade	2332	3117	3225	4212	31
Transportation and warehousing, and utilities	637	1095	1156	1325	15
Information	570	660	745	881	18
Finance, insurance, real estate, and rental and leasing	1069	1659	1852	2681	45
Professional, scientific, mgmt, admin, and waste mgmt services	1669	1836	2296	1533	-33
Educational, health, and social services	2748	4287	5653	7236	28
Arts, entertainment, recreation, accommodation, and food service	1336	1653	1834	1731	-6
Other services (except public administration)	727	755	988	1586	61
Public administration	506	606	641	1088	70
Total	22076	28885	31928	37134	16

Park Rapids (Becker MN, Hubbard MN, Wadena MN)					
Occupation	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Agriculture, forestry, fishing and hunting, and mining	1833	2017	1674	1759	5
Construction	1139	1331	1494	2413	62
Manufacturing	1280	2356	2656	3814	44
Wholesale trade	507	819	837	912	9
Retail trade	2011	2454	2983	3495	17
Transportation and warehousing, and utilities	920	1217	1259	1417	13
Information	361	477	490	420	-14
Finance, insurance, real estate, and rental and leasing	383	817	898	1168	30
Professional, scientific, mgmt, admin, and waste mgmt services	1254	1613	1855	1191	-36
Educational, health, and social services	2308	4344	4758	6353	34
Arts, entertainment, recreation, accommodation, and food service	1145	1424	1759	2297	31
Other services (except public administration)	610	770	927	1347	45
Public administration	624	824	885	1178	33
Total	14374	20465	22473	27764	24

Rochester (Dodge MN, Fillmore MN, Goodhue MN, Mower MN, Olmsted MN, Wabasha MN, Winona MN)					
Industry	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Agriculture, forestry, fishing and hunting, and mining	9608	9809	7839	7557	-4
Construction	5345	6410	6398	10211	60
Manufacturing	20393	25026	21389	31014	45
Wholesale trade	2682	4174	10875	4417	-59
Retail trade	11704	14403	16276	18377	13
Transportation and warehousing, and utilities	3776	4756	5486	6326	15
Information	2760	2982	3242	2837	-13
Finance, insurance, real estate, and rental and leasing	2899	4322	5614	6463	15
Professional, scientific, mgmt, admin, and waste mgmt services	7049	8339	10978	8935	-19
Educational, health, and social services	20582	29834	36598	47502	30
Arts, entertainment, recreation, accommodation, and food service	7128	8144	9586	11532	20
Other services (except public administration)	4129	4369	5549	7253	31
Public administration	2740	3529	3723	4725	27
Total	100795	126097	143552	167149	16

Appendix A-2 (continued)

Wadena (Todd MN, Wadena MN)					
Industry	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Agriculture, forestry, fishing and hunting, and mining	2229	2306	1775	1607	-9
Construction	534	678	656	1165	78
Manufacturing	1258	1906	2362	3633	54
Wholesale trade	294	548	693	564	-19
Retail trade	1440	1478	1581	1899	20
Transportation and warehousing, and utilities	671	721	744	822	11
Information	290	320	393	358	-9
Finance, insurance, real estate, and rental and leasing	205	444	431	567	32
Professional, scientific, mgmt, admin, and waste mgmt services	1056	1265	1331	647	-51
Educational, health, and social services	1677	2886	2882	3627	26
Arts, entertainment, recreation, accommodation, and food service	764	797	862	979	14
Other services (except public administration)	337	403	456	778	71
Public administration	317	408	530	503	-5
Total	11073	14162	14695	17149	17

Waseca (Waseca MN)					
Industry	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Agriculture, forestry, fishing and hunting, and mining	804	812	611	507	-17
Construction	261	377	342	585	71
Manufacturing	1873	2487	2613	2724	4
Wholesale trade	269	346	266	241	-9
Retail trade	683	846	885	1108	25
Transportation and warehousing, and utilities	178	315	344	393	14
Information	193	239	248	411	66
Finance, insurance, real estate, and rental and leasing	138	332	268	510	91
Professional, scientific, mgmt, admin, and waste mgmt services	436	480	658	391	-41
Educational, health, and social services	639	1165	1459	1711	17
Arts, entertainment, recreation, accommodation, and food service	372	442	487	363	-25
Other services (except public administration)	166	177	269	483	80
Public administration	140	188	177	334	88
Total	6152	8204	8627	9761	13

Willmar (Chippewa MN, Kandiyohi MN, Renville MN, Swift MN)					
Industry	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Agriculture, forestry, fishing and hunting, and mining	5037	4699	3760	3487	-7
Construction	1594	2148	1886	2622	39
Manufacturing	2899	4297	4765	6749	42
Wholesale trade	1312	1850	1526	1363	-11
Retail trade	3672	4022	4255	4996	17
Transportation and warehousing, and utilities	1393	1768	1578	2192	39
Information	704	803	818	812	-1
Finance, insurance, real estate, and rental and leasing	858	1339	1496	1702	14
Professional, scientific, mgmt, admin, and waste mgmt services	2732	3008	3392	1844	-46
Educational, health, and social services	4273	7087	7704	9276	20
Arts, entertainment, recreation, accommodation, and food service	1925	2137	2328	2387	3
Other services (except public administration)	874	1057	1265	2046	62
Public administration	790	991	980	1490	52
Total	28064	35206	35752	40966	15

Appendix A-2 (continued)

Winona (Winona MN, Buffalo WI)					
Industry	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Agriculture, forestry, fishing and hunting, and mining	2499	2702	2384	2319	-3
Construction	1235	1407	1308	1659	27
Manufacturing	4705	5198	7070	8017	13
Wholesale trade	644	1018	1205	1274	6
Retail trade	2472	2877	3637	3508	-4
Transportation and warehousing, and utilities	877	1132	1216	1507	24
Information	631	710	792	928	17
Finance, insurance, real estate, and rental and leasing	592	852	943	1242	32
Professional, scientific, mgmt, admin, and waste mgmt services	1636	2070	2239	1463	-35
Educational, health, and social services	4051	5453	5855	7107	21
Arts, entertainment, recreation, accommodation, and food servic	1433	1558	1996	2551	28
Other services (except public administration)	768	849	963	1493	55
Public administration	579	729	716	827	16
Total	22123	26556	30325	33895	12

Worthington (Osceola IA, Jackson MN, Murray MN, Nobles MN)					
Industry	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Agriculture, forestry, fishing and hunting, and mining	4522	4299	3226	2762	-14
Construction	898	1426	988	1417	43
Manufacturing	2125	2735	3189	4570	43
Wholesale trade	919	1625	1390	847	-39
Retail trade	2508	2627	2259	2749	22
Transportation and warehousing, and utilities	668	935	905	1269	40
Information	475	493	509	434	-15
Finance, insurance, real estate, and rental and leasing	578	692	867	1004	16
Professional, scientific, mgmt, admin, and waste mgmt services	2190	2373	2180	918	-58
Educational, health, and social services	2828	3564	3800	4558	20
Arts, entertainment, recreation, accommodation, and food servic	1356	1418	1246	1263	1
Other services (except public administration)	635	738	717	1330	85
Public administration	448	592	594	656	10
Total	20150	23517	21871	23777	9

* See Note 2 of the attached Explanatory Notes.

Appendix A-3: Change in Occupational Structure for 26 Study Areas, 1970-2000

Albert Lea (Freeborn MN)					
Occupation	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Management, professional, and related occupations	2937	3289	3579	4141	16
Service occupations	2484	2736	2897	2580	-11
Sales and office occupations	3081	3686	3510	3645	4
Farming, fishing, and forestry occupations	841	754	561	228	-59
Construction, extraction, and maintenance occupations	1486	1824	1365	1347	-1
Production, transportation, and material moving occupations	3360	3404	2986	4091	37
Total	14189	15694	14897	16032	8

Alexandria (Douglas MN, Grant MN, Pope MN, Todd MN)					
Occupation	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Management, professional, and related occupations	5235	7123	7143	10486	47
Service occupations	4689	5864	5927	5367	-9
Sales and office occupations	3977	5387	6632	8259	25
Farming, fishing, and forestry occupations	2637	2530	1733	811	-53
Construction, extraction, and maintenance occupations	1941	2721	2741	3535	29
Production, transportation, and material moving occupations	3403	4537	5182	7571	46
Total	21882	28161	29358	36029	23

Bemidji (Beltrami MN, Clearwater MN, Hubbard MN)					
Occupation	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Management, professional, and related occupations	3642	5421	6594	9406	43
Service occupations	3063	4022	4476	5322	19
Sales and office occupations	3129	4562	5578	6819	22
Farming, fishing, and forestry occupations	834	826	669	568	-15
Construction, extraction, and maintenance occupations	1363	1757	1898	3331	76
Production, transportation, and material moving occupations	2396	2978	3494	4217	21
Total	14427	19565	22709	29663	31

Brainerd (Aitkin MN, Cass MN, Crow Wing MN)					
Occupation	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Management, professional, and related occupations	4325	6342	7830	12426	59
Service occupations	3580	5016	5785	7857	36
Sales and office occupations	4010	5758	7692	11140	45
Farming, fishing, and forestry occupations	743	755	731	402	-45
Construction, extraction, and maintenance occupations	2244	2805	3061	5023	64
Production, transportation, and material moving occupations	4055	4414	5214	6764	30
Total	18956	25091	30312	43612	44

Detroit Lakes (Becker MN, Mahnomen MN)					
Occupation	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Management, professional, and related occupations	2242	3083	3256	4762	46
Service occupations	1775	2544	2525	2842	13
Sales and office occupations	1767	2605	2954	3481	18
Farming, fishing, and forestry occupations	873	878	628	383	-39
Construction, extraction, and maintenance occupations	869	1334	1352	1937	43
Production, transportation, and material moving occupations	1670	2058	2308	2627	14
Total	9196	12502	13022	16032	23

Appendix A-3 (continued)

Duluth-Superior (Carlton MN, Lake MN, St. Louis MN, Bayfield WI, Douglas WI)					
Occupation	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Management, professional, and related occupations	22895	31033	33718	41716	24
Service occupations	17683	22222	22647	25845	14
Sales and office occupations	24755	30078	32028	36126	13
Farming, fishing, and forestry occupations	1276	1129	1151	1067	-7
Construction, extraction, and maintenance occupations	15307	16401	12579	16526	31
Production, transportation, and material moving occupations	26828	25982	20851	19733	-5
Total	108743	126845	122974	141013	15

Fairmont (Martin MN)					
Occupation	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Management, professional, and related occupations	1907	2547	2608	3233	24
Service occupations	1630	1894	1948	1748	-10
Sales and office occupations	1892	2561	2259	2360	4
Farming, fishing, and forestry occupations	799	688	535	295	-45
Construction, extraction, and maintenance occupations	833	1087	951	873	-8
Production, transportation, and material moving occupations	1758	2277	2074	2248	8
Total	8819	11055	10375	10757	4

Fargo (Becker MN, Clay MN, Norman MN, Wilkin MN, Cass ND, Richland ND, Traill ND)					
Occupation	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Management, professional, and related occupations	17702	25830	31035	41664	34
Service occupations	13667	17816	20003	20499	2
Sales and office occupations	17677	24766	30503	36116	18
Farming, fishing, and forestry occupations	4024	3849	2809	1575	-44
Construction, extraction, and maintenance occupations	5771	8713	8646	12086	40
Production, transportation, and material moving occupations	10238	13791	15269	17666	16
Total	69079	94766	108265	129606	20

Fergus Falls (Grant MN, Otter Tail MN, Wilkin MN)					
Occupation	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Management, professional, and related occupations	5506	6628	7361	10383	41
Service occupations	4609	5409	5685	5124	-10
Sales and office occupations	3962	5324	6085	7468	23
Farming, fishing, and forestry occupations	2493	2252	1650	795	-52
Construction, extraction, and maintenance occupations	1798	2477	2548	3408	34
Production, transportation, and material moving occupations	3301	4245	4585	5704	24
Total	21670	26335	27913	32882	18

Grand Forks (Marshall MN, Norman MN, Polk MN, Red Lake MN, Grand Forks ND, Nelson ND, Steele ND, Traill ND, Walsh ND)					
Occupation	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Management, professional, and related occupations	13071	16763	19298	22007	14
Service occupations	10955	13303	13372	12808	-4
Sales and office occupations	10504	14293	16684	16677	0
Farming, fishing, and forestry occupations	4222	4182	2802	1530	-45
Construction, extraction, and maintenance occupations	4458	5569	5455	7581	39
Production, transportation, and material moving occupations	7775	8302	9167	9421	3
Total	50984	62412	66778	70024	5

Appendix A-3 (continued)

Grand Rapids (Itasca MN)					
Occupation	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Management, professional, and related occupations	2133	3469	3784	5043	33
Service occupations	1755	2729	2662	3073	15
Sales and office occupations	2052	3074	3654	4707	29
Farming, fishing, and forestry occupations	172	191	224	219	-2
Construction, extraction, and maintenance occupations	1557	2036	1694	2479	46
Production, transportation, and material moving occupations	2718	3345	3184	3701	16
Total	10388	14845	15202	19222	26

Hibbing (Itasca MN, St. Louis MN)					
Occupation	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Management, professional, and related occupations	18452	25850	27506	33703	23
Service occupations	13903	17576	17443	20209	16
Sales and office occupations	20023	24795	25846	29351	14
Farming, fishing, and forestry occupations	797	708	737	660	-10
Construction, extraction, and maintenance occupations	12250	13523	10327	13694	33
Production, transportation, and material moving occupations	20815	20916	16657	15700	-6
Total	86239	103366	98516	113317	15

International Falls (Koochiching MN)					
Occupation	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Management, professional, and related occupations	1072	1480	1601	1560	-3
Service occupations	800	1107	1161	1078	-7
Sales and office occupations	1157	1497	1560	1499	-4
Farming, fishing, and forestry occupations	94	136	125	130	4
Construction, extraction, and maintenance occupations	784	765	1060	721	-32
Production, transportation, and material moving occupations	1764	1534	1651	1501	-9
Total	5672	6518	7159	6489	-9

Little Falls (Morrison MN, Todd MN)					
Occupation	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Management, professional, and related occupations	3823	4816	4875	7202	48
Service occupations	3107	3960	4189	3822	-9
Sales and office occupations	2482	3414	4228	5339	26
Farming, fishing, and forestry occupations	1833	1984	1510	741	-51
Construction, extraction, and maintenance occupations	1529	1960	2244	2880	28
Production, transportation, and material moving occupations	2991	3564	4535	6293	39
Total	15764	19697	21580	26277	22

Mankato (Blue Earth MN, Faribault MN, Le Sueur MN, Nicollet MN, Waseca MN, Watonwan MN)					
Occupation	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Management, professional, and related occupations	12967	16928	19200	25506	33
Service occupations	9980	12276	12686	12549	-1
Sales and office occupations	12424	15832	18316	20787	13
Farming, fishing, and forestry occupations	3622	3356	2477	1049	-58
Construction, extraction, and maintenance occupations	5459	6456	7278	7402	2
Production, transportation, and material moving occupations	10598	13478	14556	17451	20
Total	55051	68327	74513	84744	14

Appendix A-3 (continued)

Marshall (Lincoln MN, Lyon MN, Murray MN, Redwood MN, Yellow Medicine MN)					
Occupation	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Management, professional, and related occupations	6747	7937	8168	10882	33
Service occupations	5729	6581	6276	5320	-15
Sales and office occupations	5344	6572	6860	7907	15
Farming, fishing, and forestry occupations	3529	3041	2339	624	-73
Construction, extraction, and maintenance occupations	2985	2878	2785	3319	19
Production, transportation, and material moving occupations	9292	5108	5056	6398	27
Total	33625	32117	31485	34450	9

Montevideo (Chippewa MN, Lac qui Parle MN, Yellow Medicine MN)					
Occupation	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Management, professional, and related occupations	3460	3959	3789	4935	30
Service occupations	2782	3220	2834	2344	-17
Sales and office occupations	2716	3089	2952	3252	10
Farming, fishing, and forestry occupations	1860	1491	1118	315	-72
Construction, extraction, and maintenance occupations	1091	1383	1400	1582	13
Production, transportation, and material moving occupations	2053	2580	2465	2948	20
Total	13962	15721	14557	15376	6

New Ulm (Brown MN, Nicollet MN)					
Occupation	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Management, professional, and related occupations	4416	6405	7526	9911	32
Service occupations	3888	4665	4505	4445	-1
Sales and office occupations	4152	5636	6497	7180	11
Farming, fishing, and forestry occupations	1379	1361	1055	437	-59
Construction, extraction, and maintenance occupations	2026	2222	2551	2416	-5
Production, transportation, and material moving occupations	3978	4987	5284	6202	17
Total	19838	25276	27418	30591	12

Owatonna (Dodge MN, Steele MN, Waseca MN)					
Occupation	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Management, professional, and related occupations	4830	6684	8023	10970	37
Service occupations	3903	4601	5070	4705	-7
Sales and office occupations	4776	6895	8076	9674	20
Farming, fishing, and forestry occupations	1764	1503	1110	525	-53
Construction, extraction, and maintenance occupations	2302	2954	3136	3555	13
Production, transportation, and material moving occupations	4490	6248	6513	7705	18
Total	22065	28885	31928	37134	16

Park Rapids (Becker MN, Hubbard MN, Wadena MN)					
Occupation	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Management, professional, and related occupations	3437	5206	5710	8209	44
Service occupations	2636	4052	4415	4501	2
Sales and office occupations	3008	4397	5277	6211	18
Farming, fishing, and forestry occupations	1064	1218	981	625	-36
Construction, extraction, and maintenance occupations	1466	2144	2201	3344	52
Production, transportation, and material moving occupations	2759	3449	3888	4874	25
Total	14369	20465	22473	27764	24

Appendix A-3 (continued)

Rochester (Dodge MN, Fillmore MN, Goodhue MN, Mower MN, Olmsted MN, Wabasha MN, Winona MN)					
Occupation	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Management, professional, and related occupations	26136	36277	44803	59810	33
Service occupations	19116	23066	26012	24808	-5
Sales and office occupations	21753	28596	34226	39237	15
Farming, fishing, and forestry occupations	5741	5545	4371	2221	-49
Construction, extraction, and maintenance occupations	9492	11337	11720	14386	23
Production, transportation, and material moving occupations	18513	20954	22421	26687	19
Total	100749	125775	143552	167149	16

Wadena (Todd MN, Wadena MN)					
Occupation	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Management, professional, and related occupations	2639	3732	3455	4539	31
Service occupations	2204	2774	2897	2563	-12
Sales and office occupations	1846	2520	2961	3475	17
Farming, fishing, and forestry occupations	1274	1360	1016	536	-47
Construction, extraction, and maintenance occupations	1097	1324	1420	1753	23
Production, transportation, and material moving occupations	2008	2452	2946	4283	45
Total	11068	14162	14695	17149	17

Waseca (Waseca MN)					
Occupation	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Management, professional, and related occupations	1328	1817	2072	2619	26
Service occupations	941	1340	1371	1210	-12
Sales and office occupations	1255	1732	1980	2434	23
Farming, fishing, and forestry occupations	471	455	327	136	-58
Construction, extraction, and maintenance occupations	715	838	928	963	4
Production, transportation, and material moving occupations	1439	2022	1948	2399	23
Total	6148	8204	8627	9761	13

Willmar (Chippewa MN, Kandiyohi MN, Renville MN, Swift MN)					
Occupation	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Management, professional, and related occupations	6844	8782	9507	12722	34
Service occupations	5676	6970	7001	6124	-13
Sales and office occupations	5464	7438	7994	9501	19
Farming, fishing, and forestry occupations	2956	2642	1960	804	-59
Construction, extraction, and maintenance occupations	2399	3397	3177	3903	23
Production, transportation, and material moving occupations	4667	5967	6113	7912	29
Total	28006	35196	35752	40966	15

Winona (Winona MN, Buffalo WI)					
Occupation	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Management, professional, and related occupations	4974	6336	7817	10167	30
Service occupations	4380	4870	5310	5133	-3
Sales and office occupations	4369	5700	6953	8139	17
Farming, fishing, and forestry occupations	1475	1584	1347	757	-44
Construction, extraction, and maintenance occupations	2246	2459	2821	2518	-11
Production, transportation, and material moving occupations	4667	5375	6078	7181	18
Total	22112	26324	30325	33895	12

Appendix A-3 (continued)

Worthington (Osceola IA, Jackson MN, Murray MN, Nobles MN)					
Occupation	**1970**	**1980**	**1990**	**2000**	**% Change 90-00**
Management, professional, and related occupations	4920	5549	5278	6822	29
Service occupations	4172	4749	4338	3734	-14
Sales and office occupations	3709	4446	4529	5251	16
Farming, fishing, and forestry occupations	2692	2482	1774	551	-69
Construction, extraction, and maintenance occupations	1459	2218	2066	2305	12
Production, transportation, and material moving occupations	3215	4072	3885	5114	32
Total	20167	23517	21871	23777	9

* See Note 1 of the attached Explanatory Notes.

APPENDIX B

NOTES ON THE AMERICAN COMMUNITY SURVEY

Materials to accompany
Chapter 4, "Travel Behavior in the Minnesota Countryside, 1970-2000"

APPENDIX B. AMERICAN COMMUNITY SURVEY

Census 2000 was the final occasion for the Census Bureau to collect detailed household and housing information using long-form questionnaires as part of the decennial census. This means that the Bureau will no longer collect such data from approximately one-of-six housing units beginning in 2010. In its place, the Bureau inaugurated the American Community Survey (ACS), from which roughly comparable long-form data are being gathered. The ACS is a continuous Census Bureau project that intends to survey annually a national sample of housing units that is somewhat smaller than the former one-in-six decennial sampling rate. The new sampling rate will be about 3 million housing units per year, covering about 2.5 percent of all households, and will survey 12.5 percent of all occupied and unoccupied housing units over any given five-year period.

The ACS got underway in January 2005, with an initial mailing of 250,000 questionnaires distributed. In each subsequent month an additional sample of 250,000 housing units is surveyed. Surveying of persons living in group quarters is planned to begin in January 2006. A permanent staff of survey professionals will monitor responses and do the follow-up when questionnaires are not returned. The Census Bureau believes that the use of professionals on a continuous basis will yield higher-quality responses than have been available from previous decennial long-form returns when temporary census workers staffed the effort.

Data tables for population and housing from the ACS are expected to be similar in content to Census 2000 Summary File 3 (SF3) tables. Yearly estimates will be available for geographic area summary levels for places with populations greater than 65,000 in 2006 and beyond. Annual ACS estimates for areas with populations between 20,000 and 65,000 will be three-year averages, and will become available in 2008. Small-area census tract and block group estimates will be five-year averages (calculated from 60 monthly samples) beginning in 2010. Land use and transportation planners will eventually have access to higher-quality and more timely data for their purposes, although many transportation planning agencies may not have the resources to recalibrate their models more frequently than on a decennial basis.

APPENDIX C

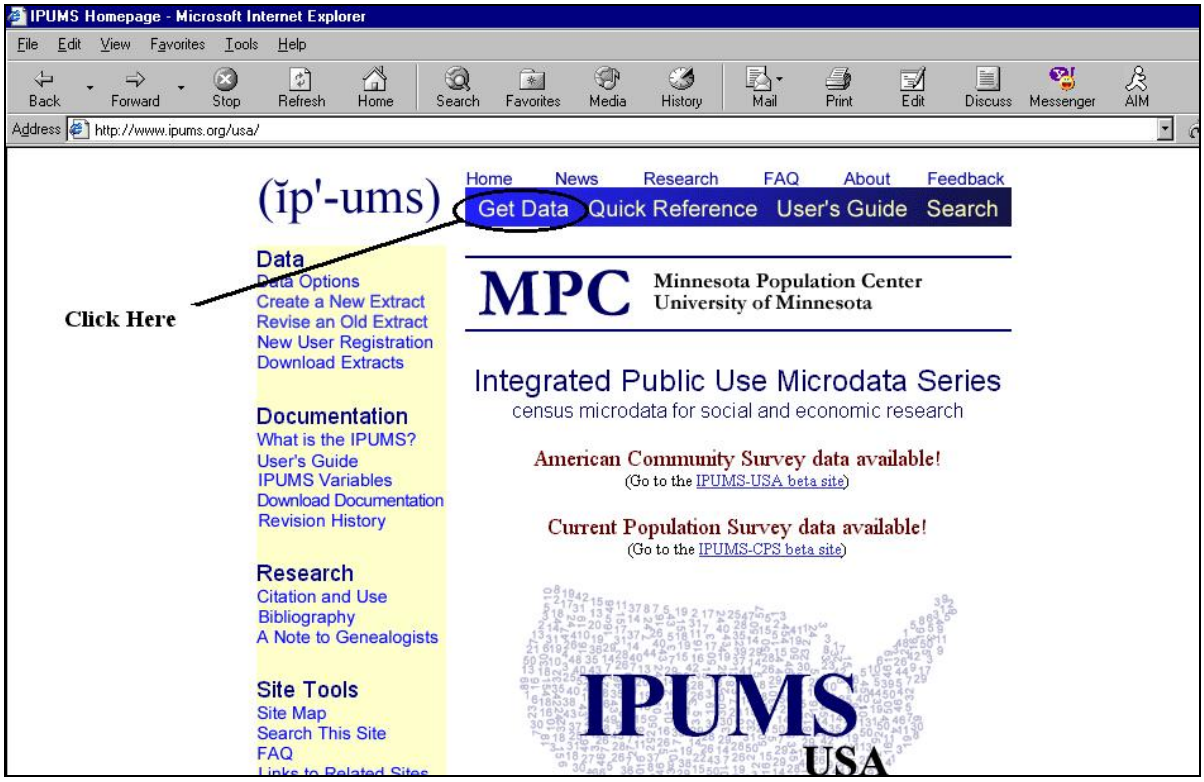
Creating Cross-Tabulations and Other Descriptive Statistics Using the Integrated Public Use Microdata Series (IPUMS) & Statistical Package for the Social Sciences (SPSS) Software

by Richard Nicholson, Undergraduate Research Assistant,
University of Minnesota, Twin Cities

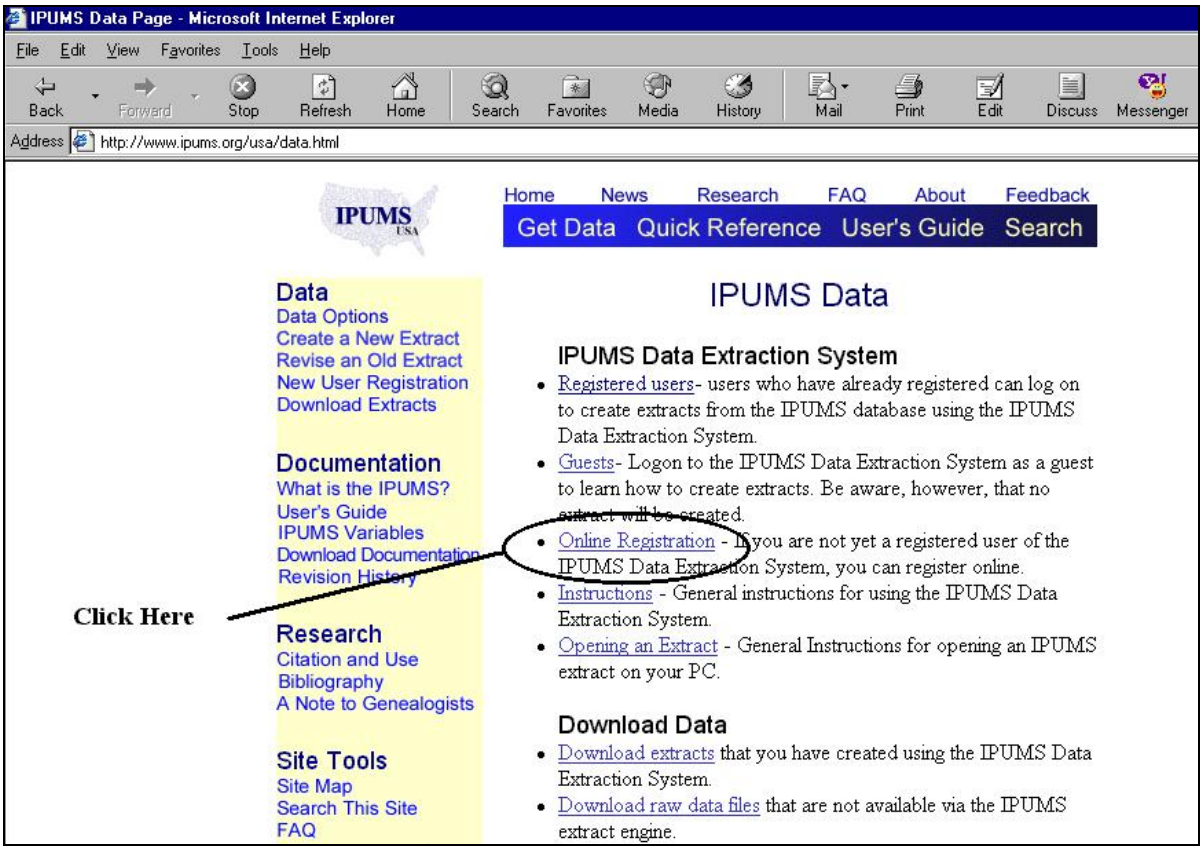
A. Creating a Data Extract on the IPUMS website:

1. Go to the IPUMS website: www.impums.umn.edu/usa

2. Click *Get Data* along the blue banner at the top of the web page.



3. If you have not yet registered to use this IPUMS data, you will need to do so by clicking on the link entitled: *Online Registration*. The website will guide you through the registration process. If you have already completed this process, go on to step 4.



4. Click *Get Data* along the blue banner at the top of the web page.

5. Next, click on *Registered Users*.

B. Navigating the Data Extract System:

The IPUMS-USA data extraction system allows researchers to fashion extracts of the data oriented to their own specific research needs and available computing resources. In practice, researchers never require all variables and all cases from a census year. Researchers can design sub samples incorporating a subset of variables and census years pertaining to the specific population(s) of interest to them.

The extract procedure involves a series of web pages, with the contents of each depending on selections made on the previous page. **The first page defines the general nature of the extract and is followed by a 4-step procedure to define the extract's specific characteristics.** On each page, you make the desired (and required) selections and click the gray bar to advance to the next screen:

Step 1 -- Sample Selection

In Step 1 of the extract procedure you define the general characteristics of your desired extract.

Choose the preferred file structure for your extract: **hierarchical** (household record followed by person records), **rectangular** ("flat" all household information attached to respective household members), or household records only. The system defaults to rectangular format, which is the overwhelming choice of researchers.

All data extracts will be compressed automatically.

The system produces only ASCII column-format data, **but it will generate SAS, SPSS, or Stata command files to facilitate reading the data into one of those statistical packages**. **The University of Minnesota has the SPSS software package available, so you will want to select that format.** The command files contain the column locations of variables, variable labels, and value labels for categorical variables.

The remaining selections affect what you see on the next screen (Step 2). You can choose to be presented with only the most commonly requested variables or all variables available in any of the samples selected. This listing of variables can be presented in alphabetic order or grouped thematically.

Finally, you select the particular census sample or combination of samples you want. If on the previous page you selected "regular" density and "all available samples" you will have more than one sample to choose from in some census years.

Step 2 -- Variable Selection

In Step 2, you select which variables you want to include in your extract. Only those variables available for the particular samples selected in Step 1 are displayed as options**. If you have selected multiple census samples, all variables occurring in any of the specified samples are displayed. Some variables have a second check box allowing you to select cases based on the value of the variable. In addition, clicking on a variable name will call up all relevant documentation.** You can also select entire groups of related variables by checking a single box at the bottom of each variable group.

On the right-hand side of variable selection page, there is a column for each census year selected on the previous (sample selection) page. Only columns for selected years are displayed, with the symbols showing the availability of each variable across years. **An "X" indicates that the variable is available for all individuals or households in the particular census year, an "S" means that the variable is only available for sample-line individuals in 1940 and 1950, and so on.**

Finally, using the check box near the top of the page allows you to include data quality flags in your extract. All flags corresponding to selected variables are presented on the next screen.

Step 3 -- Case and Data Quality Flag Selection

Step 3 provides for case selection. Only those variables chosen for case selection in Step 2 will appear on this page. Case selection will limit the extract to include only cases that contain the selected values for the listed variables. You have the option of selecting only those individuals with the selected characteristics or entire households containing any individual with the selected characteristics. There is also a choice of a logical "or" or "and" in applying the case selection criteria. The default choice is "and".

If you chose in Step 2 to include data quality flags, the flags corresponding to variables selected in Step 2 will appear on this page. Select the ones you wish to include in your extract.

Step 4 -- Extract Summary

In the final step, you review your selections on a summary screen. A series of gray bars near the bottom of the screen allow you to jump to specific pages in the extract process to edit selections on those screens.

When you are satisfied with your extract design, submit it for processing. The system will inform you via e-mail when the extract is completed and provide instructions for downloading the files. For each extract, you receive data, codebook, and command files.

NOTE: Modifying Previous Extracts

The IPUMS system allows you to modify previous extracts and resubmit them. Click *Revise an Old Extract* on the yellow menu bar on most pages or the *Get Data* link on the blue navigation bar. You can load an old extract request file with all of your previous selections already made and edit only those parts you wish to alter before resubmitting the request to create a new extract.

C. Downloading Your Data Abstract from the IPUMS website:

1. Once you've received email notification that your extract has been completed, return to the IPUMS website: www.ipums.umn.edu/usa.

2. Click on *Get Data* again and then click on *Download Extracts* under the *Download Data* heading.

3. The IPUMS system will ask for the email address you used to register. Enter it, and then click on the gray *Continue* button. The extract(s) that you have created should be available for download. In this case, you will want to download the *DATA* file and the *SPSS* file to a computer with SPSS software.

4. All *DATA* files are downloaded in a compressed format, which will need to be decompressed using a program such as *WinZip*.

5. In order to create an SPSS file, you will need to make a small change to the "*.sps*" file that appears once you've decompressed your *DATA* file. First, open the *".sps"* file in SPSS. You will then need to change the first line of the *".sps"* file to indicate location of the *".dat"* file on your computer. If your IPUMS files are called trent001.sps and trent001.dat, then the first line of the *".sps"* file will read:

data list file ='trent001.dat'/

If the ".dat" file is in your C drive, for instance, then you will need to change that line to:

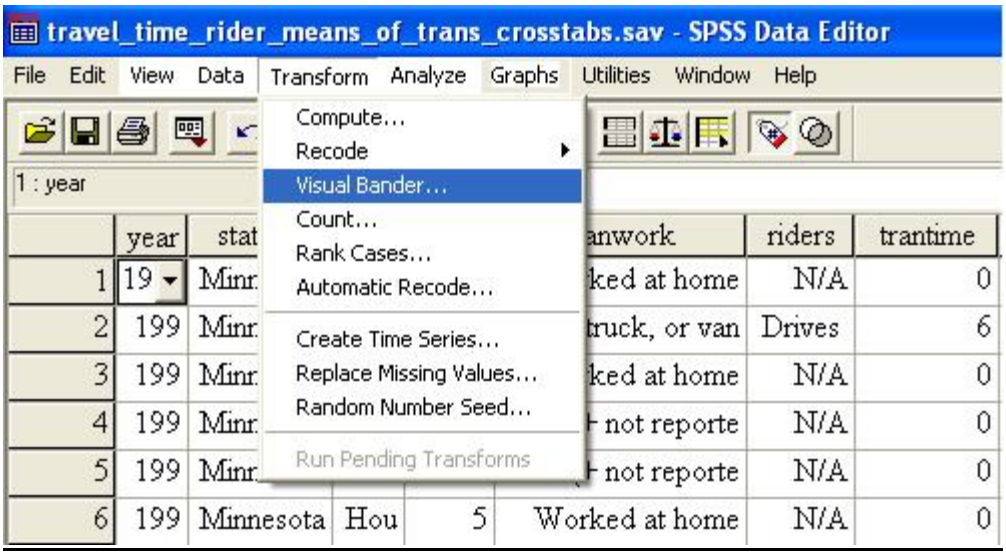
data list file ='C:\trent001.dat'/

6. After making this change, pull down the *"Run"* menu and select "*All*". SPSS will then read in your data.

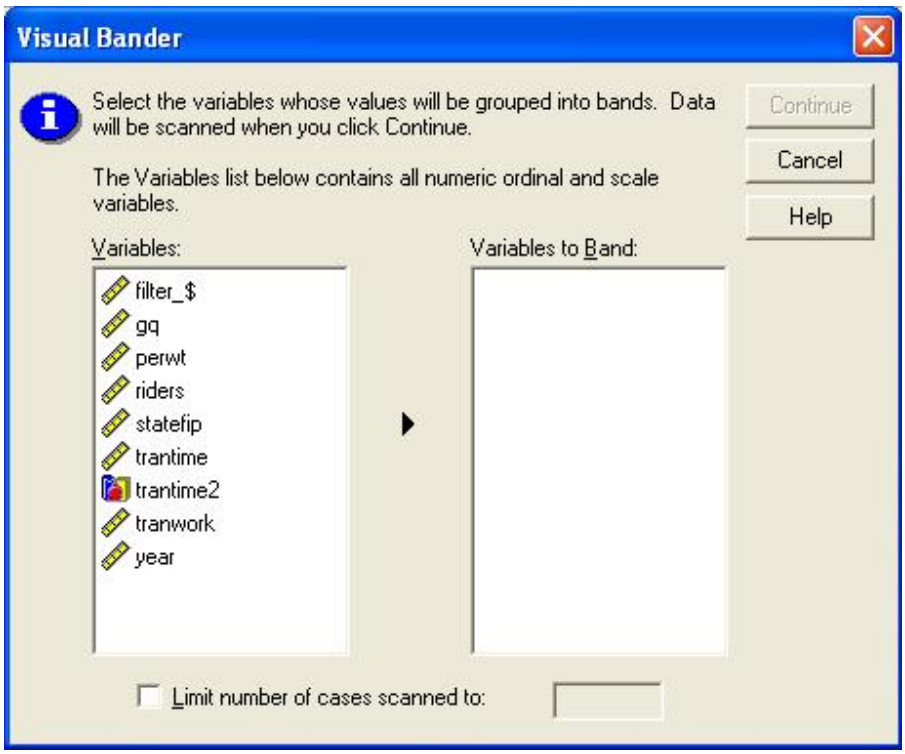
D. Working with Large Data Samples in SPSS:

Using PUMS data for an entire state will result in having thousands of data entries to work with. There are some tools within SPSS that will allow you to navigate, classify, and create statistics for large data samples without viewing every single entry:

1. **Using the Visual Bander:** the Visual Bander command allows you to reclassify data into smaller, more manageable groups. In order to use this feature, click on *Transform* (on the toolbar), and then on *Visual Bander*.

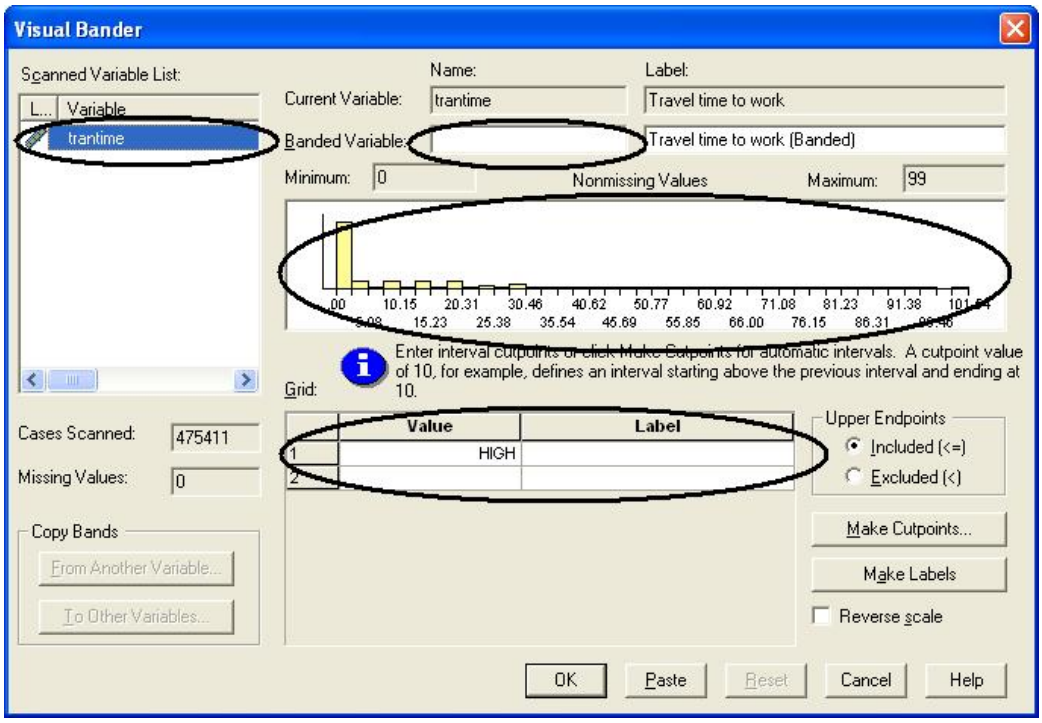


A menu will appear that asks you to select which variables you'd like to reclassify. Once you've chosen the variable you'd like to reclassify, click *Continue*.



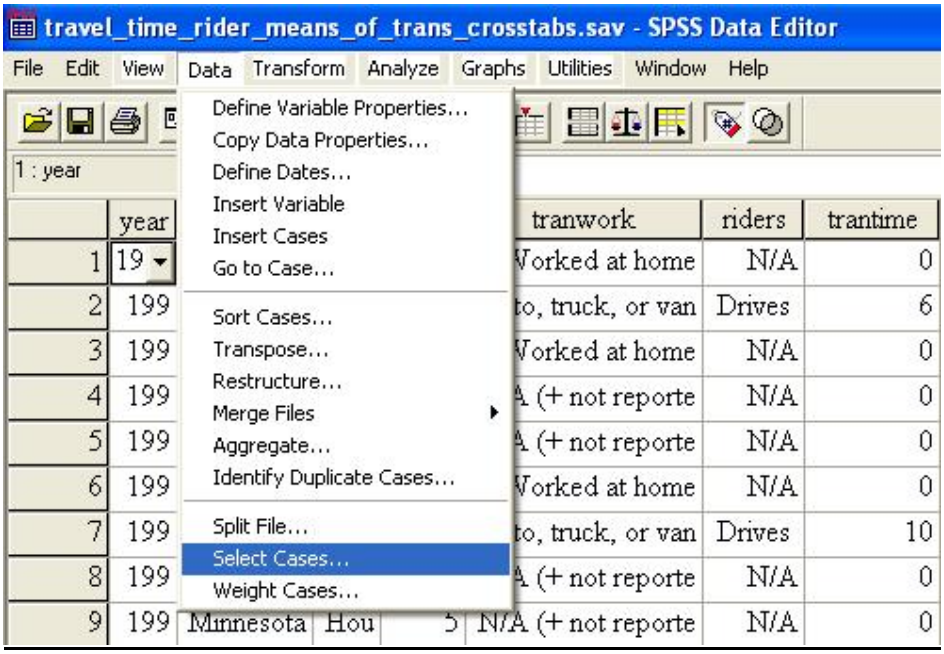
Another window will appear, and you will need to fill in some values in order to finish reclassifying the data. First, make sure your variable is selected on the left-hand side of

the window. Next, provide a name of your reclassified data in the *Banded Variable* field located near the top of the window. Finally, you can click along the small bar chart window to set the conditions of each class you want to create for you data. OR, you can fill in these conditions manually using the *Value* and *Label* fields.

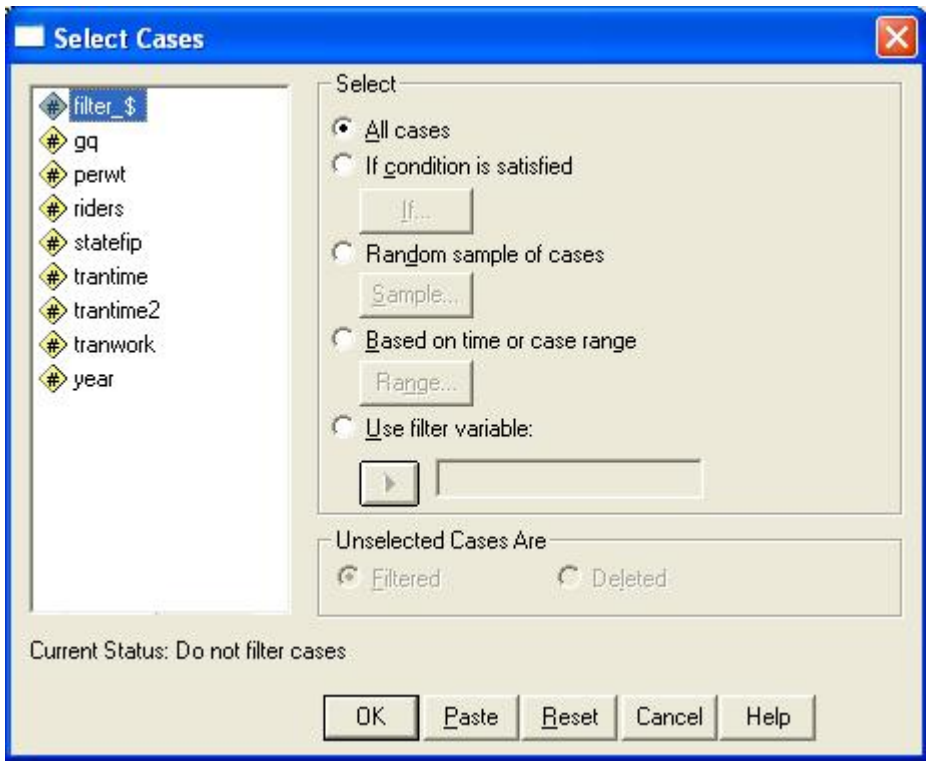


Once you are finished, click OK. The window will close, and your data spreadsheet should have a new variable, which you've already named. This is the label for all of your data reclassified!

2. **<u>Selecting Cases:</u>** Selecting Cases will allow you to isolate large numbers of cases based on a variable attribute. For example, one can select any case with a specific numerical value. In order to do this, click on *Data*, and then *Select Cases*…



Another window will appear, allowing you to set the condition under which you want your data classified. You can set a mathematical condition, or a variety of others. Once you've decided how you want to classify the data, click OK, and the variables that fit your condition will be used in any statistic you create, until you select other cases.



APPENDIX D

Materials to accompany Chapter 5, "Demographic and Economic Attributes of Workers in the Minnesota Countryside, 1990-2000: Illustrations Drawn from Public Use Microdata Samples"

Introductory Note:

Five Super-PUMAs (2000) coincide with and completely cover the 7-county Twin Cities area. Five additional Super-PUMAs (2000) containing 17 PUMAs coincide with and completely cover the state's remaining 80 counties of Greater Minnesota. Fourteen of those 17 PUMAs contain the 26 sample regional centers. The remaining three PUMAs are adjacent to the 7-county Twin Cities area. They are within the Twin Cities 25-county commuting field in 2000, and contain no sample regional centers.

Appendix D-1: Occupation by Age

D-1.1: 14 Greater Minnesota PUMAs (totaled)

D-1.2: 3 PUMAs adjacent to the 7-County Twin Cities Region (totaled)

D-1.3: All Minnesota PUMAs (totaled)

Appendix D-2: Industry by Hispanic Origin:

D-2.1: 14 Greater Minnesota PUMAs (totaled)

D-2.2: 3 PUMAs adjacent to the 7-County Twin Cities Region (totaled)

D-2.3: All Minnesota PUMAs (totaled)

Appendix D-1.1: Occupation by Age, 14 Greater Minnesota PUMAs (totaled)

	Age (Banded)											
Occupation (Banded)	**15-19**	**20-24**	**25-29**	**30-34**	**35-39**	**40-44**	**45-49**	**50-54**	**55-59**	**60-64**	**Total**	**% of Total**
Management	606	2,866	4,307	7,712	11,686	13,082	13,122	9,877	7,758	3,877	74,893	9.1
Business Operations Specialists	132	631	1,003	1,364	1,412	1,455	1,169	1,355	925	215	9,661	1.2
Financial Specialists	52	589	874	1,767	2,169	2,250	1,765	1,663	997	540	12,666	1.5
Computer and Mathematical	286	1,348	1,953	1,614	1,895	1,819	1,421	777	389	229	11,731	1.4
Architecture and Engineering	86	778	1,391	1,955	2,039	1,386	1,923	1,112	883	380	11,933	1.5
Life, Physical, and Social Science	92	496	756	752	883	939	765	715	371	81	5,850	0.7
Community and Social Service	140	1,592	1,597	1,369	2,013	2,807	2,683	1,911	1,408	626	16,146	2.0
Legal	0	268	334	444	376	706	499	505	363	215	3,710	0.5
Education, Training and Library	775	2,814	4,793	4,625	5,718	7,744	7,873	8,177	4,381	1,520	48,420	5.9
Art Design Entertainment Sports and Media	410	1,493	1,092	1,242	1,443	1,309	1,401	1,058	661	230	10,339	1.3
Healthcare Practitioners and Technical	353	2,627	4,543	5,474	6,971	8,503	7,888	5,632	2,900	1,124	46,015	5.6
Healthcare Support	2,326	3,613	2,853	2,585	2,448	3,078	2,273	2,165	1,674	1,110	24,125	2.9
Protective Service	753	1,411	1,508	1,441	1,574	1,081	1,329	868	558	225	10,748	1.3
Food Preparation and Serving	13,739	8,118	3,348	2,869	3,878	3,637	2,826	2,847	2,116	1,137	44,515	5.4
Building and Grounds Cleaning and Maintenance	2,517	2,747	1,773	1,747	3,411	3,576	3,446	2,942	2,699	1,368	26,226	3.2
Personal Care and Service	1,960	3,029	2,761	3,187	3,117	2,351	2,455	2,119	1,620	906	23,505	2.9
Sales	13,130	10,188	6,480	7,104	8,825	9,648	9,880	7,743	6,134	3,195	82,327	10.0
Office and Administrative Support	7,435	12,196	9,870	11,060	14,216	16,103	14,049	12,990	8,829	4,097	110,845	13.5
Farming, Fishing, and Forestry	2,826	1,761	1,333	984	1,340	1,370	909	868	705	425	12,521	1.5
Construction Trades	1,724	5,593	4,823	5,189	6,960	7,752	6,522	4,367	2,811	1,350	47,091	5.7
Extraction Workers	18	53	89	140	95	343	154	130	200	73	1,295	0.2
Installation, Maintenance, and Repair	1,015	3,327	3,266	4,564	5,454	5,714	4,956	3,358	2,675	1,048	35,377	4.3
Production	4,092	10,761	8,976	10,382	13,972	13,680	11,706	8,552	6,706	3,258	92,085	11.2
Transportation and Material Moving	4,927	6,284	5,358	5,430	6,983	8,323	7,181	5,970	4,405	2,707	57,568	7.0
Military Specific	5	59	0	58	18	63	9	9	0	0	221	0.0
Total	59,399	84,642	75,081	85,058	108,896	118,719	108,204	87,710	62,168	29,936	819,813	100.0
Percent of Total	7.2	10.3	9.2	10.4	13.3	14.5	13.2	10.7	7.6	3.7	100.0	

Source: U.S. Bureau of the Census, Public Use Microdata Samples, 2000.

Appendix D-1.2: Occupation by Age, 3 PUMAs (totaled)
Adjacent to 7-County Twin Cities Metropolitan Area: 00800, 00900, 02100

	Age (Banded)											
Occupation (Banded)	**15-19**	**20-24**	**25-29**	**30-34**	**35-39**	**40-44**	**45-49**	**50-54**	**55-59**	**60-64**	**Total**	**% of Total**
Management	170	891	1,614	2,583	4,048	4,091	3,542	3,158	1,834	1,150	23,081	8.4
Business Operations Specialists	0	464	632	592	724	781	636	522	367	99	4,817	1.8
Financial Specialists	13	507	709	791	738	829	566	442	348	72	5,015	1.8
Computer and Mathematical	108	645	622	790	792	718	513	206	94	26	4,514	1.7
Architecture and Engineering	23	232	473	849	664	693	561	337	168	72	4,072	1.5
Life, Physical, and Social Science	22	171	159	175	231	274	284	212	180	41	1,749	0.6
Community and Social Service	56	520	437	345	429	637	919	690	357	180	4,570	1.7
Legal	32	76	112	140	156	103	157	251	55	18	1,100	0.4
Education, Training and Library	280	1,326	1,191	1,576	1,907	2,212	2,455	2,600	1,470	557	15,574	5.7
Art Design Entertainment Sports and Media	196	433	176	455	354	419	407	215	121	201	2,977	1.1
Healthcare Practitioners and Technical	113	640	1,201	1,317	1,910	2,228	1,755	803	692	371	11,030	4.0
Healthcare Support	916	1,221	746	568	1,026	533	814	350	284	187	6,645	2.4
Protective Service	90	499	658	467	396	419	360	248	46	22	3,205	1.2
Food Preparation and Serving	4,898	2,441	804	734	764	854	510	419	333	243	12,000	4.4
Building and Grounds Cleaning and Maintenance	1,103	718	564	757	710	1,189	854	728	526	356	7,505	2.7
Personal Care and Service	832	946	1,359	1,476	1,061	698	523	454	333	293	7,975	2.9
Sales	5,433	3,279	2,010	3,049	2,755	3,306	2,808	2,169	1,688	938	27,435	10.0
Office and Administrative Support	4,058	6,113	3,818	5,276	5,215	5,912	5,251	3,633	2,305	1,260	42,841	15.7
Farming, Fishing, and Forestry	597	228	168	187	328	238	186	130	122	98	2,282	0.8
Construction Trades	717	2,617	2,556	2,763	3,134	2,623	1,963	1,482	851	462	19,168	7.0
Extraction Workers	32	23	0	31	14	13	18	13	0	0	144	0.1
Installation, Maintenance, and Repair	684	1,369	1,277	1,824	1,784	1,476	1,186	848	746	339	11,533	4.2
Production	1,341	3,477	3,849	4,265	5,411	5,757	4,094	3,138	2,578	1,083	34,993	12.8
Transportation and Material Moving	2,451	2,049	1,789	2,087	2,393	3,126	2,143	1,586	1,006	576	19,206	7.0
Military Specific	72	0	0	0	0	18	0	0	0	0	90	0.0
Total	24,237	30,885	26,924	33,097	36,944	39,147	32,505	24,634	16,504	8,644	273,521	100.0
Percent of Total	8.9	11.3	9.8	12.1	13.5	14.3	11.9	9.0	6.0	3.2	100.0	

Source: U.S. Bureau of the Census, Public Use Microdata Samples, 2000.

Appendix D-1.3: Occupation by Age, All Minnesota PUMAs (totaled)

	Age (Banded)											
Occupation (Banded)	**15-19**	**20-24**	**25-29**	**30-34**	**35-39**	**40-44**	**45-49**	**50-54**	**55-59**	**60-64**	**Total**	**% of Total**
Management	1,557	9,704	19,775	30,367	42,023	44,465	37,888	33,032	19,735	9,319	247,865	10.0
Business Operations Specialists	334	3,752	7,688	8,402	9,213	8,579	7,231	6,465	3,530	1,234	56,428	2.3
Financial Specialists	181	4,640	7,544	9,908	9,524	9,470	6,080	6,233	4,007	1,665	59,252	2.4
Computer and Mathematical	730	5,537	13,957	13,077	13,251	10,923	8,000	5,613	2,948	967	75,003	3.0
Architecture and Engineering	301	3,201	6,080	7,342	8,832	8,074	7,345	5,657	3,398	1,281	51,511	2.1
Life, Physical, and Social Science	169	1,765	3,362	3,726	3,244	3,849	3,139	2,540	1,646	595	24,035	1.0
Community and Social Service	388	3,548	4,998	4,587	5,086	6,701	6,503	5,279	3,340	1,480	41,910	1.7
Legal	55	1,197	3,421	3,324	3,491	4,172	3,864	3,071	1,637	608	24,840	1.0
Education, Training and Library	2,779	10,733	15,867	16,250	17,171	20,184	20,971	20,707	12,438	4,248	141,348	5.7
Art Design Entertainment Sports and Media	1,464	5,228	5,990	7,047	6,493	7,060	5,635	4,412	2,432	1,381	47,142	1.9
Healthcare Practitioners and Technical	864	6,587	12,777	15,838	17,649	21,597	20,433	14,700	8,015	3,270	121,730	4.9
Healthcare Support	4,704	7,729	6,905	6,387	6,315	6,786	5,418	4,225	3,253	1,772	53,494	2.2
Protective Service	1,794	3,305	4,085	4,303	3,990	3,176	3,513	2,430	1,153	678	28,427	1.1
Food Preparation and Serving	35,135	24,016	10,306	8,773	9,457	8,754	6,857	5,584	4,418	2,236	115,536	4.6
Building and Grounds Cleaning and Maintenance	6,344	6,830	5,557	5,713	8,411	10,042	8,112	6,205	5,759	3,078	66,051	2.7
Personal Care and Service	5,795	9,617	8,492	10,389	10,358	7,761	6,066	5,639	4,428	2,316	70,861	2.9
Sales	40,959	30,261	24,743	28,486	32,480	31,423	30,455	24,945	18,297	8,504	270,553	10.9
Office and Administrative Support	23,579	47,160	40,121	41,390	51,517	52,794	48,546	41,048	27,023	12,946	386,124	15.5
Farming, Fishing, and Forestry	3,713	2,237	1,727	1,287	2,002	1,890	1,174	1,108	982	563	16,683	0.7
Construction Trades	3,962	14,941	14,091	15,687	18,878	18,230	14,307	11,275	6,793	2,735	120,899	4.9
Extraction Workers	50	76	193	171	109	418	172	184	200	73	1,646	0.1
Installation, Maintenance, and Repair	3,607	8,703	9,660	11,547	14,178	14,827	11,880	8,263	6,087	2,661	91,413	3.7
Production	8,642	24,061	23,756	27,196	35,494	35,396	29,124	21,129	17,228	7,432	229,458	9.2
Transportation and Material Moving	13,361	17,235	13,553	15,519	17,791	19,983	16,931	12,783	9,682	5,697	142,535	5.7
Military Specific	95	138	31	146	79	81	9	27	0	0	606	0.0
Total	160,562	252,201	264,679	296,862	347,036	356,635	309,653	252,554	168,429	76,739	2,485,350	100.0
Percent of Total	6.5	10.1	10.6	11.9	14.0	14.3	12.5	10.2	6.8	3.1	100.0	

Source: U.S. Bureau of the Census, Public Use Microdata Samples, 2000.

Appendix D-2.1: Industry by Hispanic Origin, 14 Greater Minnesota PUMAs (totaled)

Industry (banded)	Not Hispanic	Mexican	Other Hispanic	Total Hispanic	Percent of Total Hispanics	Total
Agriculture, Forestry, Fishing and Hunting	40,660	387	244	631	5.0	41,291
Mining	5,607	14	0	14	0.1	5,621
Utilities	7,280	59	0	59	0.5	7,339
Construction	54,891	496	154	650	5.2	55,541
Manufacturing	135,340	4,110	1,143	5,253	41.7	140,593
Wholesale Trade	23,326	232	54	286	2.3	23,612
Retail Trade	96,922	751	234	985	7.8	97,907
Transportation and Warehousing	30,536	89	90	179	1.4	30,715
Information and Communications	16,707	50	42	92	0.7	16,799
Finance, Insurance, Real Estate, Rental and Leasing	34,052	273	85	358	2.8	34,410
Professional, Scientific, Management, Administrative, Waste	38,727	305	278	583	4.6	39,310
Educational, Health and Social Services	195,628	934	719	1,653	13.1	197,281
Arts, Entertainment, Recreation, Accommodation, Food Service	61,077	780	568	1,348	10.7	62,425
Other Services (Except Public Administration)	36,879	261	76	337	2.7	37,216
Public Administration	28,552	104	36	140	1.1	28,692
Armed Forces	1,034	0	27	27	0.2	1,061
Total	807,218	8,845	3,750	12,595	100.0	819,813
Percent of Total	98.5	1.1	0.5	1.5		100.0
Percent of Total Hispanic		70.2	29.8	100.0		

Source: U.S. Bureau of the Census, Public Use Microdata Samples, 2000.
"Total" equals "Not Hispanic" plus "Total Hispanic".

Appendix D-2.2: Workers by Ethnic Origin: 3 PUMAs (totaled) Adjacent to 7-County Twin Cities Metropolitan Area: 00800, 00900, 02100

Industry (banded)	Not Hispanic	Mexican	Other Hispanic	Total Hispanic	Percent of Total Hispanics	Total
Agriculture, Forestry, Fishing and Hunting	7,087	157	23	180	5.1	7,267
Mining	202	0	0	0	0.0	202
Utilities	3,339	27	0	27	0.8	3,366
Construction	23,604	147	36	183	5.2	23,787
Manufacturing	54,173	1,028	286	1,314	37.5	55,487
Wholesale Trade	10,004	233	0	233	6.7	10,237
Retail Trade	34,386	158	73	231	6.6	34,617
Transportation and Warehousing	9,942	56	62	118	3.4	10,060
Information and Communications	4,827	50	9	59	1.7	4,886
Finance, Insurance, Real Estate, Rental and Leasing	14,139	0	57	57	1.6	14,196
Professional, Scientific, Management, Administrative, Waste	16,331	317	41	358	10.2	16,689
Educational, Health and Social Services	57,539	170	237	407	11.6	57,946
Arts, Entertainment, Recreation, Accommodation, Food Service	15,487	185	40	225	6.4	15,712
Other Services (Except Public Administration)	10,915	67	18	85	2.4	11,000
Public Administration	7,796	0	23	23	0.7	7,819
Armed Forces	250	0	0	0	0.0	250
Total	270,021	2,595	905	3,500	100.0	273,521
Percent of Total	98.7	0.9	.3	1.3		100.0
Percent of Total Hispanic		74.1	25.9	100.0		

Source: U.S. Bureau of the Census, Public Use Microdata Samples, 2000.
"Total" equals "Not Hispanic" plus "Total Hispanic".

Appendix D-2.3: Industry by Hispanic Origin, All Minnesota PUMAs (totaled)

Industry (banded)	Not Hispanic	Mexican	Other Hispanic	Total Hispanic	Percent of Total Hispanic	Total
Agriculture, Forestry, Fishing and Hunting	51,608	792	388	1,364	2.0	52,788
Mining	6,335	26	0	1,767	0.0	6,361
Utilities	18,409	163	90	1,614	0.4	18,662
Construction	149,946	3,017	766	1,955	6.5	153,729
Manufacturing	393,710	10,307	4,083	752	24.6	408,100
Wholesale Trade	88,454	1,373	483	1,369	3.2	90,310
Retail Trade	286,650	4,007	1,673	444	9.7	292,330
Transportation and Warehousing	106,902	781	864	4,625	2.8	108,547
Information and Communications	63,268	645	428	1,242	1.8	64,341
Finance, Insurance, Real Estate, Rental and Leasing	178,517	1,622	665	5,474	3.9	180,804
Professional, Scientific, Management, Administrative, Waste	209,361	4,816	1,827	2,585	11.3	216,004
Educational, Health and Social Services	514,918	3,455	3,860	1,441	12.5	522,233
Arts, Entertainment, Recreation, Accommodation, Food Service	168,170	6,444	3,006	2,869	16.1	177,620
Other Services (Except Public Administration)	107,161	1,345	729	1,747	3.5	109,235
Public Administration	80,775	469	352	3,187	1.4	81,596
Armed Forces	2,590	52	48	7,104	0.2	2,690
Total	2,426,774	39,314	19,262	11,060	100.0	2,485,350
Percent of Total	97.6	1.6	0.3	984		100.0
Percent of Total Hispanic		67.1	32.9	100.0		

Source: U.S. Bureau of the Census, Public Use Microdata Samples, 2000.
"Total" equals "Not Hispanic" plus "Total Hispanic".

APPENDIX E

Materials to accompany Chapter 6, "Worker and Household Characteristics and Commuting in the Minnesota Countryside, 2000: Illustrations from Public Use Microdata Samples"

Appendix E-1.1. Workers Classified by Personal Income vs. Travel Time to Work in 2000, 14 Greater Minnesota PUMAs (totaled)

	Travel Time to Work (banded*)								
Income (banded*)	**Š 10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-59**	**60+**	**Total**	**% of Total**
<= 10,000	108,047	39,524	15,286	3,054	3,631	114	5,485	175,141	21.4
10,001 - 20,000	98,255	47,702	22,046	5,566	5,699	312	7,345	186,925	22.8
20,001 - 30,000	85,196	47,370	23,767	6,467	6,594	251	7,769	177,414	21.6
30,001 - 40,000	54,908	32,899	15,505	4,557	5,269	390	6,872	120,400	14.7
40,001 - 50,000	34,937	18,331	8,146	2,476	2,765	251	4,455	71,361	8.7
50,001 - 60,000	16,615	8,769	4,062	1,172	1,245	199	2,404	34,466	4.2
60,001 - 70,000	8,903	3,966	2,282	442	597	82	1,421	17,693	2.2
70,001 - 80,000	5,672	2,225	987	222	352	18	525	10,001	1.2
80,001 - 90,,000	2,945	1,477	573	175	303	0	400	5,873	0.7
90,001 - 99,999	2,016	642	318	68	135	0	222	3,401	0.4
100,000+	10,659	3,942	1,275	355	224	32	651	17,138	2.1
Total	428,153	206,847	94,247	24,554	26,814	1,649	37,549	819,813	100.0
Percent of Total	52.2	25.2	11.5	3.0	3.3	0.2	4.6	100.0	

Data source: U.S. Bureau of the Census. Public Use Microdata Samples, 2000. * PUMS files present data using more classes than the number used here; classes have been combined for ease of interpretation.

"Expected"** Number of Workers Classified by Personal Income vs. Travel Time to Work in 2000, 14 Greater Minnesota PUMAs (totaled)

	Travel Time to Work (banded)								
Income (banded)	**Š 10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-59**	**60+**	**Total**	**% of Total**
<= 10,000	91,469	44,190	20,134	5,246	5,728	352	8,022	175,141	21.4
10,001 - 20,000	97,623	47,163	21,489	5,599	6,114	376	8,562	186,925	22.8
20,001 - 30,000	92,656	44,763	20,396	5,314	5,803	357	8,126	177,414	21.6
30,001 - 40,000	62,880	30,378	13,841	3,606	3,938	242	5,515	120,400	14.7
40,001 - 50,000	37,269	18,005	8,204	2,137	2,334	144	3,268	71,361	8.7
50,001 - 60,000	18,000	8,696	3,962	1,032	1,127	69	1,579	34,466	4.2
60,001 - 70,000	9,240	4,464	2,034	530	579	36	810	17,693	2.2
70,001 - 80,000	5,223	2,523	1,150	300	327	20	458	10,001	1.2
80,001 - 90,000	3,067	1,482	675	176	192	12	269	5,873	0.7
90,001 - 99,999	1,776	858	391	102	111	7	156	3,401	0.4
100,000+	8,950	4,324	1,970	513	561	34	785	17,138	2.1
Total	428,153	206,847	94,247	24,554	26,814	1,649	37,549	819,813	100.0
Percent of Total	52.2	25.2	11.5	3.0	3.3	0.2	4.6	100.0	

Appendix E-1.2. Number of Workers Classified by Personal Income vs. Travel Time to Work in 2000, 3 PUMAs (totaled) Adjacent to 7-County Twin Cities Metropolitan Area: 00800, 00900, 02100

	Travel Time to Work (banded*)								
Income (banded*)	**Š 10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-59**	**60+**	**Total**	**% of Total**
<= 10,000	31,985	11,457	4,684	1,297	1,957	246	1,681	53,307	19.5
10,001 - 20,000	21,781	14,044	6,847	2,434	3,041	130	2,407	50,684	18.5
20,001 - 30,000	20,240	15,431	8,542	3,868	4,852	289	4,652	57,874	21.2
30,001 - 40,000	12,660	10,023	6,722	4,004	5,483	464	4,523	43,879	16.0
40,001 - 50,000	8,458	5,383	5,124	2,794	3,220	379	3,150	28,508	10.4
50,001 - 60,000	4,430	3,002	2,312	1,294	2,067	259	2,289	15,653	5.7
60,001 - 70,000	2,067	1,045	981	647	897	180	1,233	7,050	2.6
70,001 - 80,000	1,164	1,057	799	149	599	63	754	4,585	1.7
80,001 - 90,000	847	619	407	216	397	9	462	2,957	1.1
90,001 - 99,999	674	256	203	253	150	22	112	1,670	0.6
100,000+	3,446	1,282	836	326	705	49	710	7,354	2.7
Total	107,752	63,599	37,457	17,282	23,368	2,090	21,973	273,521	100.0
Percent of Total	39.4	23.3	13.7	6.3	8.5	0.8	8.0	100.0	

Data source: U.S. Bureau of the Census. Public Use Microdata Samples, 2000. * PUMS files present data using more classes than the number used here; classes have been combined for ease of interpretation.

"Expected"** Number of Workers Classified by Personal Income vs. Travel Time to Work in 2000, 3 PUMAs (totaled) Adjacent to 7-County Twin Cities Metropolitan Area: 00800, 00900, 02100

	Travel Time to Work (banded)								
Income (banded)	**Š 10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-59**	**60+**	**Total**	**% of Total**
<= 10,000	21,000	12,395	7,300	3,368	4,554	407	4,282	53,307	19.5
10,001 - 20,000	19,967	11,785	6,941	3,202	4,330	387	4,072	50,684	18.5
20,001 - 30,000	22,799	13,457	7,925	3,657	4,944	442	4,649	57,874	21.2
30,001 - 40,000	17,286	10,203	6,009	2,772	3,749	335	3,525	43,879	16.0
40,001 - 50,000	11,231	6,629	3,904	1,801	2,436	218	2,290	28,508	10.4
50,001 - 60,000	6,166	3,640	2,144	989	1,337	120	1,257	15,653	5.7
60,001 - 70,000	2,777	1,639	965	445	602	54	566	7,050	2.6
70,001 - 80,000	1,806	1,066	628	290	392	35	368	4,585	1.7
80,001 - 90,000	1,165	688	405	187	253	23	238	2,957	1.1
90,001 - 99,999	658	388	229	106	143	13	134	1,670	0.6
100,000+	2,897	1,710	1,007	465	628	56	591	7,354	2.7
Total	107,752	63,599	37,457	17,282	23,368	2,090	21,973	273,521	100.0
Percent of Total	39.4	23.3	13.7	6.3	8.5	0.8	8.0	100.0	

Appendix E-1.3. Workers Classified by Personal Income vs. Travel Time to Work in 2000, All Minnesota PUMAs (totaled)

	Travel Time to Work (banded*)								
Income (banded*)	**Š 10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-59**	**60+**	**Total**	**% of Total**
<= 10,000	234,092	111,591	47,667	10,885	12,220	523	12,538	429,516	17.3
10,001 - 20,000	188,815	132,307	65,535	17,168	16,742	730	16,186	437,483	17.6
20,001 - 30,000	175,875	159,865	88,965	25,886	24,800	841	21,187	497,419	20.0
30,001 - 40,000	124,438	125,788	80,593	25,698	24,827	1,420	19,805	402,569	16.2
40,001 - 50,000	77,611	79,787	53,118	19,242	17,578	1,252	12,899	261,487	10.5
50,001 - 60,000	42,915	47,529	32,834	11,348	11,088	674	8,406	154,794	6.2
60,001 - 70,000	23,702	25,291	20,040	7,218	6,178	411	5,027	87,867	3.5
70,001 - 80,000	15,798	17,591	12,317	3,838	3,456	329	2,664	55,993	2.3
80,001 - 90,000	10,199	10,637	7,422	2,815	2,236	95	1,617	35,021	1.4
90,001 - 99,999	5,723	6,297	4,304	2,201	1,362	71	943	20,901	0.8
100,000+	32,125	32,795	21,788	7,371	4,556	202	3,463	102,300	4.1
Total	931,293	749,478	434,583	133,670	125,043	6,548	104,735	2,485,350	100.0
Percent of Total	37.5	30.2	17.5	5.4	5.0	0.3	4.2	100.0	

Data source: U.S. Bureau of the Census. Public Use Microdata Samples, 2000. * PUMS files present data using more classes than the number used here; classes have been combined for ease of interpretation.

"Expected"** Number of Workers Classified by Personal Income vs. Travel Time to Work in 2000, All Minnesota PUMAs (totaled)

	Travel Time to Work (banded)								
Income (banded)	**Š 10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-59**	**60+**	**Total**	**% of Total**
<= 10,000	160,945	129,524	75,104	23,101	21,610	1,132	18,100	429,516	17.3
10,001 - 20,000	163,931	131,927	76,497	23,529	22,011	1,153	18,436	437,483	17.6
20,001 - 30,000	187,262	150,703	87,385	26,878	25,143	1,317	21,060	497,419	20.0
30,001 - 40,000	150,848	121,398	70,392	21,651	20,254	1,061	16,965	402,569	16.2
40,001 - 50,000	97,983	78,854	45,723	14,064	13,156	689	11,019	261,487	10.5
50,001 - 60,000	58,003	46,679	27,067	8,325	7,788	408	6,523	154,794	6.2
60,001 - 70,000	32,925	26,497	15,364	4,726	4,421	231	3,703	87,867	3.5
70,001 - 80,000	20,981	16,885	9,791	3,011	2,817	148	2,360	55,993	2.3
80,001 - 90,000	13,123	10,561	6,124	1,884	1,762	92	1,476	35,021	1.4
90,001 - 99,999	7,832	6,303	3,655	1,124	1,052	55	,881	20,901	0.8
100,000+	38,333	30,849	17,888	5,502	5,147	270	4,311	102,300	4.1
Total	931,293	749,478	434,583	133,670	125,043	6,548	104,735	2,485,350	100.0
Percent of Total	37.5	30.2	17.5	5.4	5.0	0.3	4.2	100.0	

Appendix E-2.1. Educational Attainment of Workers vs. Travel Time to Work in 2000, 14 Greater Minnesota PUMAs (totaled)

	Travel Time to Work (banded*)								
Educational Attainment	**Š 10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-60**	**61+**	**Total**	**% of Total**
No school completed	1,027	655	427	109	45	59	112	2,434	0.3
1st-4th grade	440	76	125	9	85	17	117	869	0.1
5th-8th grade	4,159	1,393	869	289	259	22	476	7,467	0.9
9th grade	6,767	2,527	1,230	173	215	22	432	11,366	1.4
10th grade	13,621	5,831	2,413	641	503	9	1,045	24,063	2.9
11th grade	14,810	6,592	2,753	594	617	58	1,060	26,484	3.2
12th grade, no diploma	8,737	3,983	1,971	429	610	7	804	16,541	2.0
High school graduate, or GED	122,508	63,869	30,079	7,051	8,448	348	13,227	245,530	29.9
Some college, no degree	122,017	59,077	25,960	6,991	8,150	516	9,606	232,317	28.3
Assoc degree, occupat prog'm	42,168	20,795	11,423	3,086	2,868	153	4,134	84,627	10.3
Bachelors degree	65,856	30,951	12,459	4,132	3,781	333	4,725	122,237	14.9
Masters degree	16,367	6,642	3,146	805	806	23	1,344	29,133	3.6
Professional degree	7,259	2,876	1,067	187	369	32	220	12,010	1.5
Doctorate degree	2,417	1,580	325	58	58	50	247	4,735	0.6
Total	428,153	206,847	94,247	24,554	26,814	1,649	37,549	819,813	100.0
Percent of total	52.2	25.2	11.5	3.0	3.3	0.2	4.6	100.0	

Data source: U.S. Bureau of the Census. Public Use Microdata Samples, 2000. * PUMS files present data using more classes than the number used here; classes have been combined for ease of interpretation.

"Expected" Number of Workers by Educational Attainment vs. Travel Time to Work in 2000, 14 Greater Minnesota PUMAs (totaled)

	Travel Time to Work (banded)								
Educational Attainment	**Š 10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-60**	**61+**	**Total**	**% of Total**
No school completed	1,271	614	280	73	80	5	111	2,434	0.3
1st-4th grade	454	219	100	26	28	2	40	869	0.1
5th-8th grade	3,900	1,884	858	224	244	15	342	7,467	0.9
9th grade	5,936	2,868	1,307	340	372	23	521	11,366	1.4
10th grade	12,567	6,071	2,766	721	787	48	1,102	24,063	2.9
11th grade	13,831	6,682	3,045	793	866	53	1,213	26,484	3.2
12th grade, no diploma	8,639	4,173	1,902	495	541	33	758	16,541	2.0
High school graduate, or GED	128,230	61,950	28,227	7,354	8,031	494	11,246	245,530	29.9
Some college, no degree	121,329	58,616	26,708	6,958	7,598	467	10,641	232,317	28.3
Assoc degree, occupat prog'm	44,197	21,352	9,729	2,535	2,768	170	3,876	84,627	10.3
Bachelors degree	63,839	30,842	14,053	3,661	3,998	246	5,599	122,237	14.9
Masters degree	15,215	7,351	3,349	873	953	59	1,334	29,133	3.6
Professional degree	6,272	3,030	1,381	360	393	24	550	12,010	1.5
Doctorate degree	2,473	1,195	544	142	155	10	217	4,735	0.6
Total	428,153	206,847	94,247	24,554	26,814	1,649	37,549	819,813	100.0
Percent of total	52.2	25.2	11.5	3.0	3.3	0.2	4.6	100.0	

Appendix E-2.2. Educational Attainment of Workers vs. Travel Time to Work in 2000, 3 PUMAs (totaled) Adjacent to 7-County Twin Cities Metropolitan Area: 00800, 00900, 02100

	Travel Time to Work (banded*)								
Educational Attainment	**Š 10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-60**	**61+**	**Total**	**% of Total**
No school completed	253	247	121	0	26	0	59	706	0.3
1st-4th grade	104	0	0	0	40	0	77	221	0.1
5th-8th grade	615	429	170	58	151	40	59	1,522	0.6
9th grade	2,424	942	442	133	127	140	236	4,444	1.6
10th grade	4,793	1,896	941	131	464	31	517	8,773	3.2
11th grade	4,648	2,231	989	308	528	19	449	9,172	3.4
12th grade, no diploma	2,242	1,778	706	308	530	55	439	6,058	2.2
High school graduate, or GED	31,487	20,338	12,612	6,071	6,921	413	7,209	85,051	31.1
Some college, no degree	32,915	18,799	11,124	5,490	7,307	644	6,323	82,602	30.2
Assoc degree, occupat prog'm	7,132	5,704	3,440	1,716	2,582	292	2,250	23,116	8.5
Bachelors degree	15,298	7,852	4,822	2,388	3,423	353	3,391	37,527	13.7
Masters degree	3,685	1,932	1,520	432	972	85	649	9,275	3.4
Professional degree	1,306	907	396	149	188	18	122	3,086	1.1
Doctorate degree	850	544	174	98	109	0	193	1,968	0.7
Total	107,752	63,599	37,457	17,282	23,368	2,090	21,973	273,521	100.0
Percent of total	39.4	23.3	13.7	6.3	8.5	0.8	8.0	100.0	

Data source: U.S. Bureau of the Census. Public Use Microdata Samples, 2000. * PUMS files present data using more classes than the number used here; classes have been combined for ease of interpretation.

"Expected" Number of Workers by Educational Attainment vs. Travel Time to Work in 2000, 3 PUMAs (totaled) Adjacent to 7-County Twin Cities Metropolitan Area: 00800, 00900, 02100

	Travel Time to Work (banded)								
Educational Attainment	**Š 10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-60**	**61+**	**Total**	**% of Total**
No school completed	278	164	97	45	60	5	57	706	0.3
1st-4th grade	87	51	30	14	19	2	18	221	0.1
5th-8th grade	600	354	208	96	130	12	122	1,522	0.6
9th grade	1,751	1,033	609	281	380	34	357	4,444	1.6
10th grade	3,456	2,040	1,201	554	750	67	705	8,773	3.2
11th grade	3,613	2,133	1,256	580	784	70	737	9,172	3.4
12th grade, no diploma	2,387	1,409	830	383	518	46	487	6,058	2.2
High school graduate, or GED	33,505	19,776	11,647	5,374	7,266	650	6,832	85,051	31.1
Some college, no degree	32,541	19,207	11,312	5,219	7,057	631	6,636	82,602	30.2
Assoc degree, occupat prog'm	9,106	5,375	3,166	1,461	1,975	177	1,857	23,116	8.5
Bachelors degree	14,784	8,726	5,139	2,371	3,206	287	3,015	37,527	13.7
Masters degree	3,654	2,157	1,270	586	792	71	745	9,275	3.4
Professional degree	1,216	718	423	195	264	24	248	3,086	1.1
Doctorate degree	775	458	270	124	168	15	158	1,968	0.7
Total	107,752	63,599	37,457	17,282	23,368	2,090	21,973	273,521	100.0
Percent of total	39.4	23.3	13.7	6.3	8.5	0.8	8.0	100.0	

Appendix E-2.3. Educational Attainment of Workers vs. Travel Time to Work in 2000, All Minnesota PUMAs (totaled)

(Number of Workers)	Travel Time to Work (banded*)								
Educational Attainment	**Š 10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-59**	**60+**	**Total**	**% of Total**
No school completed	2,936	3,329	2,062	391	264	59	582	9,623	0.4
1st-4th grade	952	659	534	53	257	17	217	2,689	0.1
5th-8th grade	6,826	5,372	3,547	888	996	62	1,165	18,856	0.8
9th grade	15,506	7,392	3,606	831	1,044	162	1,250	29,791	1.2
10th grade	32,314	15,293	6,593	1,702	1,664	40	2,424	60,030	2.4
11th grade	34,868	19,118	6,940	1,818	2,399	212	2,556	67,911	2.7
12th grade, no diploma	20,556	14,126	9,080	2,012	2,730	80	2,443	51,027	2.1
High school graduate, or GED	239,656	183,818	104,977	28,949	31,312	1,115	30,602	620,429	25.0
Some college, no degree	264,471	200,039	116,162	35,493	34,799	1,819	28,354	681,137	27.4
Assoc degree, occupat prog'm	78,255	65,713	41,063	13,298	12,970	806	10,423	222,528	9.0
Bachelors degree	165,609	164,737	99,464	36,364	26,966	1,478	18,284	512,902	20.6
Masters degree	45,066	44,407	27,265	7,930	6,727	454	4,395	136,244	5.5
Professional degree	17,132	17,492	9,822	2,644	2,231	122	1,096	50,539	2.0
Doctorate degree	7,146	7,983	3,468	1,297	684	122	944	21,644	0.9
Total	931,293	749,478	434,583	133,670	125,043	6,548	104,735	2,485,350	100.0
Percent of total	37.5	30.2	17.5	5.4	5.0	0.3	4.2	100.0	

Data source: U.S. Bureau of the Census. Public Use Microdata Samples, 2000. * PUMS files present data using more classes than the number used here; classes have been combined for ease of interpretation.

"Expected" Number of Workers by Educational Attainment vs. Travel Time to Work in 2000, All Minnesota PUMAs (totaled)

(Expected Number of Workers)	Travel Time to Work (banded)								
Educational Attainment	**Š 10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-59**	**60+**	**Total**	**% of Total**
No school completed	3,606	2,902	1,683	518	484	25	406	9,623	0.4
5th-8th grade	1,008	811	470	145	135	7	113	2,689	0.1
9th grade	7,066	5,686	3,297	1,014	949	50	795	18,856	0.8
10th grade	11,163	8,984	5,209	1,602	1,499	78	1,255	29,791	1.2
11th grade	22,494	18,103	10,497	3,229	3,020	158	2,530	60,030	2.4
12th grade, no diploma	25,447	20,479	11,875	3,652	3,417	179	2,862	67,911	2.7
High school graduate, or GED	19,120	15,388	8,922	2,744	2,567	134	2,150	51,027	2.1
Some college, no degree	232,483	187,096	108,487	33,369	31,215	1,635	26,145	620,429	25.0
Assoc degree, occupat prog'm	255,231	205,403	119,102	36,634	34,269	1,795	28,704	681,137	27.4
Bachelors degree	83,384	67,105	38,911	11,968	11,196	586	9,378	222,528	9.0
Masters degree	192,191	154,670	89,685	27,585	25,805	1,351	21,614	512,902	20.6
Professional degree	51,052	41,086	23,823	7,328	6,855	359	5,741	136,244	5.5
Doctorate degree	18,938	15,240	8,837	2,718	2,543	133	2,130	50,539	2.0
Total	8,110	6,527	3,785	1,164	1,089	57	912	21,644	0.9
Percent of total	931,293	749,478	434,583	133,670	125,043	6,548	104,735	2,485,350	100.0

APPENDIX F

Materials to accompany Chapter 7, "Regional Economic Vitality and Travel Behavior in the Minnesota Countryside, 1990-2000: Insights from Public Use Microdata Samples"

Appendix F-1.1. Occupation vs. Travel Time to Work in 2000, 14 Greater Minnesota PUMAs (totaled)

	Travel Time to Work (banded)								
Occupation (banded)	**Š 10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-59**	**60+**	**Total**	**% of Total**
Management	49,733	13,504	6,117	1,465	1,507	135	2,432	74,893	9.1
Business Operations Specialists	4,590	2,451	1,363	307	367	63	520	9,661	1.2
Financial Specialists	6,625	3,226	1,545	401	336	41	492	12,666	1.5
Computer and Mathematical	6,116	2,750	1,301	246	580	36	702	11,731	1.4
Architecture and Engineering	5,803	3,284	1,568	373	328	50	527	11,933	1.5
Life, Physical, and Social Science	2,653	1,868	653	204	194	23	255	5,850	0.7
Community and Social Services	8,588	3,999	1,955	404	417	94	689	16,146	2.0
Legal Occupations	2,339	704	237	86	131	0	213	3,710	0.5
Education, Training, and Library	26,972	12,690	4,693	1,354	1,374	87	1,250	48,420	5.9
Arts, Design, Entertainment, Sports, and Media	6,297	2,044	981	249	258	13	497	10,339	1.3
Healthcare Practitioners and Technical	20,367	14,166	6,509	1,775	1,668	112	1,418	46,015	5.6
Healthcare Support	11,890	7,075	3,343	657	540	22	598	24,125	2.9
Protective Service	5,975	2,349	1,108	356	374	27	559	10,748	1.3
Food Preparation and Serving	27,528	10,615	3,564	935	712	84	1,077	44,515	5.4
Building and Grounds Cleaning and Maintenance	13,638	6,989	3,107	594	673	31	1,194	26,226	3.2
Personal Care and Service	16,036	4,388	1,436	412	494	9	730	23,505	2.9
Sales	47,196	19,634	8,164	2,036	1,969	67	3,261	82,327	10.0
Office and Administrative Support	57,465	30,513	12,487	3,196	3,603	165	3,416	110,845	13.5
Farming, Fishing, and Forestry	6,960	2,815	1,402	356	325	26	637	12,521	1.5
Construction	17,287	11,823	6,926	1,756	3,069	167	6,063	47,091	5.7
Extraction	337	483	185	72	150	0	68	1,295	0.2
Installation, Maintenance, and Repair Workers	16,040	9,620	4,969	1,264	1,511	90	1,883	35,377	4.3
Production	41,402	25,417	12,699	3,996	4,079	128	4,364	92,085	11.2
Transportation and Material Moving	26,243	14,346	7,890	2,051	2,155	179	4,704	57,568	7.0
Military Specific	73	94	45	9	0	0	0	221	0.0
Total	428,153	206,847	94,247	24,554	26,814	1,649	37,549	819,813	100.0
Percent of Total	52.2	25.2	11.5	3.0	3.3	0.2	4.6	100.0	

Data source: U.S. Bureau of the Census. Public Use Microdata Samples, 2000

Appendix F-1.2. Occupation vs. Travel Time to Work in 2000, 3 PUMAs (totaled) Adjacent to 7-County Twin Cities Metropolitan Area: 00800, 00900, 02100

	Travel Time to Work (banded)								
Occupation (banded)	**Š 10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-59**	**60+**	**Total**	**% of Total**
Management	10,729	4,053	2,781	1,311	2,148	171	1,888	23,081	8.4
Business Operations Specialists	1,468	1,111	684	394	598	44	518	4,817	1.8
Financial Specialists	1,324	939	848	492	721	77	614	5,015	1.8
Computer and Mathematical	1,074	549	606	504	592	265	924	4,514	1.7
Architecture and Engineering	708	966	752	439	622	63	522	4,072	1.5
Life, Physical, and Social Science	621	457	198	103	136	0	234	1,749	0.6
Community and Social Services	2,043	1,000	647	117	319	31	413	4,570	1.7
Legal Occupations	344	346	54	58	193	0	105	1,100	0.4
Education, Training, and Library	7,777	3,781	2,057	630	788	55	486	15,574	5.7
Arts, Design, Entertainment, Sports, and Media	1,280	830	362	123	158	76	148	2,977	1.1
Healthcare Practitioners and Technical	3,969	3,126	1,480	810	824	69	752	11,030	4.0
Healthcare Support	2,851	1,803	806	290	589	9	297	6,645	2.4
Protective Service	1,247	825	307	268	360	0	198	3,205	1.2
Food Preparation and Serving	7,284	2,620	1,041	329	345	18	363	12,000	4.4
Building and Grounds Cleaning and Maintenance	3,090	2,016	1,080	378	528	18	395	7,505	2.7
Personal Care and Service	5,438	1,100	653	408	281	0	95	7,975	2.9
Sales	12,938	6,831	2,897	1,476	1,680	104	1,509	27,435	10.0
Office and Administrative Support	17,194	10,786	5,457	2,722	3,369	176	3,137	42,841	15.7
Farming, Fishing, and Forestry	1,346	460	245	45	63	0	123	2,282	0.8
Construction	4,132	3,550	3,330	1,450	2,588	328	3,790	19,168	7.0
Extraction	67	22	27	0	14	0	14	144	0.1
Installation, Maintenance, and Repair Workers	3,468	2,402	1,971	983	1,247	162	1,300	11,533	4.2
Production	10,572	9,075	6,376	2,796	3,535	194	2,445	34,993	12.8
Transportation and Material Moving	6,788	4,879	2,798	1,138	1,670	230	1,703	19,206	7.0
Military Specific	0	72	0	18	0	0	0	90	0.0
Total	107,752	63,599	37,457	17,282	23,368	2,090	21,973	273,521	100.0
Percent of Total	39.4	23.3	13.7	6.3	8.5	0.8	8.0	100.0	

Data source: U.S. Bureau of the Census. Public Use Microdata Samples, 2000.

Appendix F-1.3. Occupation vs. Travel Time to Work in 2000, All Minnesota PUMAs (totaled)

	Travel Time to Work (banded)								
Occupation (banded)	**Š 10**	**11-20**	**21-30**	**31-40**	**41-50**	**51-59**	**60+**	**Total**	**% of Total**
Management	97,580	67,795	45,194	15,193	12,970	722	8,411	247,865	10.0
Business Operations Specialists	16,308	16,873	13,102	4,010	3,562	274	2,299	56,428	2.3
Financial Specialists	15,569	19,183	13,561	4,640	3,685	252	2,362	59,252	2.4
Computer and Mathematical	18,781	22,228	16,957	6,619	6,466	377	3,575	75,003	3.0
Architecture and Engineering	12,963	17,035	10,944	4,618	3,371	321	2,259	51,511	2.1
Life, Physical, and Social Science	7,037	8,215	4,512	2,203	691	131	1,246	24,035	1.0
Community and Social Services	17,412	13,089	6,585	1,508	1,551	163	1,602	41,910	1.7
Legal Occupations	6,469	8,881	5,052	1,883	1,688	32	835	24,840	1.0
Education, Training, and Library	61,015	46,227	20,855	5,747	4,391	275	2,838	141,348	5.7
Arts, Design, Entertainment, Sports, and Media	18,393	14,871	8,286	2,093	1,904	143	1,452	47,142	1.9
Healthcare Practitioners and Technical	38,222	42,111	24,949	6,555	5,829	253	3,811	121,730	4.9
Healthcare Support	22,756	16,762	8,614	1,733	1,880	31	1,718	53,494	2.2
Protective Service	11,757	8,033	4,545	1,462	1,356	27	1,247	28,427	1.1
Food Preparation and Serving	62,807	33,176	11,211	2,821	2,549	241	2,731	115,536	4.6
Building and Grounds Cleaning and Maintenance	27,089	20,132	11,060	2,174	2,747	112	2,737	66,051	2.7
Personal Care and Service	42,698	15,278	7,051	1,694	2,108	99	1,933	70,861	2.9
Sales	116,186	78,764	40,233	14,450	11,135	302	9,483	270,553	10.9
Office and Administrative Support	139,622	124,114	67,058	20,583	18,987	666	15,094	386,124	15.5
Farming, Fishing, and Forestry	8,975	3,805	2,015	528	507	53	800	16,683	0.7
Construction	31,880	30,542	25,604	7,758	10,989	598	13,528	120,899	4.9
Extraction	508	505	212	72	267	0	82	1,646	0.1
Installation, Maintenance, and Repair Workers	29,542	27,203	18,136	5,280	6,031	489	4,732	91,413	3.7
Production	75,555	71,786	44,143	13,174	13,885	426	10,489	229,458	9.2
Transportation and Material Moving	52,052	42,634	24,561	6,845	6,472	561	9,410	142,535	5.7
Military Specific	117	236	143	27	22	0	61	606	0.0
Total	931,293	749,478	434,583	133,670	125,043	6,548	104,735	2,485,350	100.0
Percent of Total	37.5	30.2	17.5	5.4	5.0	0.3	4.2	100.0	

Data source: U.S. Bureau of the Census. Public Use Microdata Samples

Appendix F-2.1–Means of Transportation to Work vs. Travel Time to Work in 2000, 14 Greater Minnesota PUMAs (totaled)

Means of Travel to Work	Travel Time to Work (minutes)								
	< 10	11-20	21-30	31-40	41-50	51-60	60+	Total	% of Total
N/A (& not reported in 1960)	12,720	0	0	0	0	0	0	12,720	1.6
Auto, truck, van	335,409	198,870	90,955	24,161	25,687	1,538	35,687	712,307	86.9
Motorcycle	223	59	59	13	17	0	5	376	0.0
Bus or trolley bus	1,976	2,353	1,458	141	725	43	912	7,608	0.9
Streetcar, trolley car	32	14	14	0	9	0	0	69	0.0
Subway or elevated	59	9	0	0	0	0	17	85	0.0
Railroad	27	0	0	0	0	0	0	27	0.0
Taxicab	385	122	0	0	0	0	0	507	0.1
Bicycle	1,364	357	243	23	54	0	50	2,091	0.3
Walked only	30,818	4,187	1,146	144	205	68	269	36,837	4.5
Other	1,948	876	372	72	117	0	609	3,994	0.5
Worked at home	43,192	0	0	0	0	0	0	43,192	5.3
Total	428,153	206,847	94,247	24,554	26,814	1,649	37,549	819,813	100.0
Percent of total	52.2	25.2	11.5	3.0	3.3	0.2	4.6	100.0	

Source: Bureau of the Census, Public Use Microdata Sample files, 2000.

Appendix F-2.2–Means of Transportation to Work vs. Travel Time to Work in 2000, 3 PUMAs (totaled) Adjacent to 7-County Twin Cities Metropolitan Area: 00800, 00900, 02100

Means of Travel to Work	Travel Time to Work (minutes)								
	< 10	11-20	21-30	31-40	41-50	51-60	60+	Total	% of Total
N/A (& not reported in 1960)	4,324	0	0	0	0	0	0	4,324	1.6
Auto, truck, van	80,131	61,808	36,710	17,147	23,171	2,090	21,416	242,473	88.6
Motorcycle	4	68	16	0	0	0	0	88	0.0
Bus or trolley bus	522	400	420	108	161	0	280	1,891	0.7
Subway or elevated	14	0	0	0	0	0	0	14	0.0
Taxicab	68	22	0	0	0	0	0	90	0.0
Ferryboat	0	0	9	0	18	0	0	27	0.0
Bicycle	495	252	103	0	0	0	0	850	0.3
Walked only	8,576	699	135	0	0	0	82	9,492	3.5
Other	498	350	64	27	18	0	195	1,152	0.4
Worked at home	13,120	0	0	0	0	0	0	13,120	4.8
Total	107,752	63,599	37,457	17,282	23,368	2,090	21,973	273,521	100.0
Percent of total	39.4	23.3	13.7	6.3	8.5	0.8	8.0	100.0	

Source: Bureau of the Census, Public Use Microdata Sample files, 2000.

Appendix F-2.3–Means of Transportation to Work vs. Travel Time to Work in 2000, All Minnesota PUMAs (totaled)

Means of Travel to Work	Travel Time to Work (minutes)								
	< 10	11-20	21-30	31-40	41-50	51-60	60+	Total	% of Total
N/A (& not reported in 1960)	38,820	0	0	0	0	0	0	38,820	1.6
Auto, truck, van	709,679	711,453	408,734	123,231	112,705	6,046	90,270	2,162,118	87.0
Motorcycle	468	411	213	13	85	0	32	1,222	0.0
Bus or trolley bus	5,922	18,424	19,651	9,172	11,254	434	10,774	75,631	3.0
Streetcar or trolley car	77	14	14	10	79	0	0	194	0.0
Subway or elevated	73	9	50	0	0	0	80	212	0.0
Railroad	27	0	27	0	0	0	0	54	0.0
Taxicab	929	385	63	86	50	0	23	1,536	0.1
Ferryboat	61	0	98	0	18	0	0	177	0.0
Bicycle	4,355	2,940	1,230	312	105	0	247	9,189	0.4
Walked only	62,814	12,979	3,117	495	532	68	645	80,650	3.2
Other	4,052	2,863	1,386	351	215	0	2,664	11,531	0.5
Worked at home	104,016	0	0	0	0	0	0	104,016	4.2
Total	931,293	749,478	434,583	133,670	125,043	6,548	104,735	2,485,350	931,293
Percent of total	37.5	30.2	17.5	5.4	5.0	0.3	4.2	100.0	37.5

Source: Bureau of the Census, Public Use Microdata Sample files, 2000.

Appendix F-3.1–Vehicle Occupancy by Travel Time to Work, 2000, 14 Greater Minnesota PUMAs (totaled)

	Travel Time to Work (minutes)								
	< 10	**11-20**	**21-30**	**31-40**	**41-50**	**51-59**	**60+**	**Total**	**Percent of Total**
Not Applicable	92,744	7,977	3,292	393	1,127	111	1,862	107,506	13.1
Drives Alone	302,431	173,999	75,773	19,900	20,014	1,125	27,939	621,181	75.8
2 People	26,887	19,680	12,152	3,153	4,126	270	5,272	71,540	8.7
3	4,060	3,547	1,962	675	937	112	1,512	12,805	1.6
4	1,240	1,100	466	348	351	31	505	4,041	0.5
5	488	416	473	85	152	0	293	1,907	0.2
7+ (1980)	303	128	129	0	107	0	166	833	0.1
Total	428,153	206,847	94,247	24,554	26,814	1,649	37,549	819,813	100.0
Percent of total	52.2	25.2	11.5	3.0	3.3	0.2	4.6	100.0	

Source: Bureau of the Census, Public Use Microdata Sample files, 2000.

Appendix F-3.2–Vehicle Occupancy by Travel Time to Work, 2000, 3 PUMAs (totaled) Adjacent to 7-County Twin Cities Metropolitan Area: 00800, 00900, 02100

	Travel Time to Work (minutes)								
	< 10	**11-20**	**21-30**	**31-40**	**41-50**	**51-59**	**60+**	**Total**	**Percent of Total**
Not Applicable	27,621	1,791	747	135	197	0	557	31,048	11.4
Drives Alone	72,462	55,596	31,664	14,611	19,193	1,550	17,341	212,417	77.7
2 People	6,719	4,820	4,069	1,887	3,165	508	3,173	24,341	8.9
3	592	707	750	469	523	32	517	3,590	1.3
4	208	508	128	59	122	0	218	1,243	0.5
5	93	64	86	121	53	0	90	507	0.2
7+ (1980)	57	113	13	0	115	0	77	375	0.1
Total	107,752	63,599	37,457	17,282	23,368	2,090	21,973	273,521	100.0
Percent of total	39.4	23.3	13.7	6.3	8.5	0.8	8.0	100.0	

Source: Bureau of the Census, Public Use Microdata Sample files, 2000.

Appendix F-3.3–Vehicle Occupancy by Travel Time to Work, 2000, All Minnesota PUMAs (totaled)

	Travel Time to Work (minutes)								
	< 10	**11-20**	**21-30**	**31-40**	**41-50**	**51-59**	**60+**	**Total**	**Percent of Total**
Not Applicable	221,614	38,025	25,849	10,439	12,338	502	14,465	323,232	13.0
Drives Alone	638,841	634,339	356,002	108,031	93,207	4,733	72,675	1,907,828	76.8
2 People	59,110	63,645	43,518	12,268	14,676	935	12,537	206,689	8.3
3	8,043	8,780	5,814	1,791	2,748	297	2,556	30,029	1.2
4	2,224	3,071	1,580	592	1,090	40	1,138	9,735	0.4
5	967	1,101	962	277	486	41	627	4,461	0.2
7+ (1980)	494	517	858	272	498	0	737	3,376	0.1
Total	931,293	749,478	434,583	133,670	125,043	6,548	104,735	2,485,350	100.0
Percent of total	37.5	30.2	17.5	5.4	5.0	0.3	4.2	100.0	

Source: Bureau of the Census, Public Use Microdata Sample files, 2000.