The Economic Impact
of the Senior Population
on a State's Economy:
The Case of North Dakota

RICHARD RATHGE
January 2007

North Dakota
**STATE
DATA
CENTER**

FOREWORD

A growing challenge for policy makers is how to best position North Dakota for the surge of elderly resulting from the graying of the baby boom whose leading edge just turned 60 in 2006. Population projections indicate that the proportion of seniors (i.e., ages 65 and over) in the state will jump from its current level of 15 percent to an estimated 23 percent by 2020. One of the most pronounced impacts of these shifting population dynamics will be on the state's economy. This study uses simulation modeling to offer decision makers insight into the potential consequences of the rapidly growing elderly population. It contrasts the state's actual income earnings profile in the year 2000 with what is projected for the years 2015 and 2020, given the assumption that the age-specific distribution of type of earnings remains constant. In short, it illustrates what the state's income profile would have looked like if the projected age distribution for 2015 and 2020 replaced what existed in 2000. This simulation highlights the significant challenges that the state will face in terms of potential negative impacts such as labor force shortages and tax implications as a result of dramatic reductions in wage earners.

ACKNOWLEDGMENTS

Author
Richard Rathge

Contributors
Karen Olson
Ramona Danielson
Rajat Upadhyay

NORTH DAKOTA STATE DATA CENTER
North Dakota State University
IACC Building, Room 424
Fargo, ND 58105

January 2007
http://www.ndsu.edu/sdc

TABLE OF CONTENTS

EXECUTIVE SUMMARY

This study addresses the changing age profile of North Dakota and the consequences it poses over the next 15 years. In particular, it focuses on the rapidly growing elderly population in the state and its impact on income generation. This is accomplished by using an economic simulation model to develop scenarios of income generation in North Dakota based on historical patterns. In brief, the model was designed to answer the question, "What will the distribution of income over the next 10 to 15 years look like if the current pattern of age-specific earnings continues into the future unchanged?" The goal of this research is to offer decision makers insight into how the state's shifting age distribution will alter the type of income that is generated and its corresponding consequences. It is hoped that these results will spur debate and motivate policy makers to be proactive in finding innovative solutions that will mitigate the negative impacts that are forecast.

FINDINGS

Population Dynamics

- North Dakota's overall population has remained relatively stable over the past 75 years fluctuating between 680,845 in 1930 and 636,667 in 2005.

- Consolidation of the state's population has shifted the population base to the state's 15 urban centers. In 2000, 53 percent of the state's population were living in urban cities compared to 17 percent in 1930.

- The baby boom, the large cohort of people born between 1946 and 1964, has created a sizeable bulge in the state's age distribution, currently representing nearly one-third of the state's population. The leading edge of this bulge turned 60 in 2006.

- Nearly a half century of sustained out-migration of young adults from North Dakota has significantly reduced the proportion of persons ages 20 to 34, especially in North Dakota's rural counties.

- In 2005, 20 percent of rural county residents in North Dakota were ages 65 and older compared to 13 percent in urban counties.

- By 2020, one-half of the state's baby boomers will have reached age 65, ballooning the proportion of seniors in North Dakota to 23 percent or nearly 150,000 seniors.

- Between 2000 and 2020, the prime working-age population in North Dakota (i.e., ages 35 to 54) is expected to decline from 183,435 to 146,717. This means that there will be more seniors ages 65 age and older in the state by 2020 than those of prime working age.

Income Generation

- In 2000, North Dakota residents generated a total of $11.5 billion in income according to the U.S. Census Bureau. The distributional breakdown is as follows: 1) wage & salaries = 70.3 percent, 2) self employment = 9.1 percent, 3) interest = 7.7 percent, 4) social security = 7.2 percent, 5) supplemental security = 0.4 percent, 6) public assistance = 0.2 percent, 7) retirement = 2.7 percent, and 8) other = 2.3 percent.

- In 2000, 92 percent of North Dakota residents ages 15 and older received some form of income and nearly two-thirds earned a wage or salary.

- The proportion of wage and salary earners declines markedly with age. In 2000, the age-specific distribution of wage and salary earners in North Dakota was as follows: a) ages 15 to 24 = 75.7 percent, b) ages 25 to 34 = 86.0 percent, c) ages 35 to 54 = 82.3 percent, d) ages 55 to 64 = 65.4 percent, e) ages 65 and older = 15.3 percent.

- The age-specific distribution of income generation in the state has remained relatively stable over the past three decades. However, the proportion of wage and salary earners increased modestly among those ages 15 to 64 and declined among those ages 65 and older.

- In 2000, seniors contributed $1.9 billion in income or 17 percent of all income generated in North Dakota. However, only $236 million was earned from wage and salaries while $726 million was gained through social security and another $202 million through retirement (e.g., pensions).

Economic Simulation

- Demographic projections indicate that there will be 58,882 fewer income earners below age 55 in 2020 relative to 2000 in North Dakota. A loss of this magnitude in 2000 would translate into a corresponding loss of $1.5 billion in earnings, of which 83 percent would be from wage and salaries.

- Approximately 72 percent of North Dakota's adjusted gross income reported on 2004 federal tax returns was from wages and salaries. Therefore, a sizeable reduction in wage and salary earners will result in a correspondingly sizeable reduction in tax revenues.

- In contrast, projections indicate there will be 53,280 more income earners ages 65 and older in 2020 relative to 2000 in North Dakota. A gain of this magnitude in 2000 translates into a corresponding gain of $1.1 billion in earnings. However, only $163 million would be from wage and salaries.

- North Dakota seniors ages 65 and older paid approximately 15 percent of the state's $252,596,051 total tax liability in 2005, and represented 15 percent of the state's tax filers.

- The economic simulation model indicates an actual increase in total earnings of nearly $570 million as a result of the age shifting that will occur between 2000 and 2020 in North Dakota. However, this gain is a result of a dramatic increase in income from social security and retirement earnings and a parallel loss in wage and salary income. This transition is likely to have significant tax consequences.

INTRODUCTION

An evaluation of the role elderly can play in economic development is extremely important given the current and future demographic context of the U.S. as a whole and rural areas in particular. Current estimates suggest that 50 million residents, or 17 percent of the U.S. population, are at least 60 years of age (U.S. Census Bureau, 2006a). More importantly, the leading edge of the baby-boom generation, those born between 1946 and 1964, turned age 60 in 2006. This has led forecasters to predict a doubling of the senior population by 2050 (U.S. Census Bureau, 2004) when 109 million residents, or 26 percent of the U.S. population, will be at least 60 years of age. This trend is particularly relevant to rural areas of the Great Plains because they encompass a relatively higher concentration of seniors. In fact, nearly half of the nonmetropolitan counties defined as "elderly counties" by the Economic Research Service (i.e., those that have at least 20 percent of their resident population ages 65 and older) are in the Great Plains (Reeder and Calhoun, 2002).

The greatest challenge for rural communities, especially in the Great Plains, is the ability to diversify their economy. Historically, most nonmetropolitan counties in the Great Plains have been dependent on agriculture. As technology and international markets transform agriculture, the need to redirect attention to alternative economic development strategies intensifies. In 1979, 710 nonmetropolitan counties were economically dependent on farming (Parker, 2005). Currently, that number has fallen to 403. In addition, the concentration of elderly in farm dependent counties is disproportionately high. Nearly two-thirds of the nonmetropolitan elderly counties are farm dependent (Reeder and Calhoun, 2002). It is important to explore, therefore, how economic development strategies can take advantage of elderly populations. This is especially true given the forecast for dramatic increases in rural elderly.

North Dakota has the highest concentration of both farm dependent counties and elderly in the Great Plains. This combination makes it a unique test site to explore the consequences of a rapidly graying population and to examine what implications this demographic trend may hold for economic development. This investigation will begin by first reviewing the state's population dynamics, including historical population shifts, consolidation issues, and projected future changes. Second, a review of the state's income dynamics will be offered, including types of income, profiles of income generation by age cohort, and context to explain why the state is facing an impending labor crisis due largely to its growing elderly population. Third, the development of an economic simulation model will be explained, followed by an exploration of the results of the model for North Dakota showing the income dynamics that will likely occur in the near future as a result of the population shifts that are forecast. Finally, the implications of these changes will be discussed along with recommended strategies for policy makers.

POPULATION DYNAMICS

Historical Shifts in North Dakota's Population

North Dakota's population has remained relatively stable since its initial growth period ended in 1930 (see Figure 1). The state actually reached its population peak of 680,845 residents in 1930. During the next four decades, the residential base gradually declined largely as a result of transformations in agriculture. Technological advances increased the size of farming operations while driving mid-size farm families out of production. The number of farms in the state was cut in half while the average acreage operated by farmers more than doubled. Many farm families were forced to seek employment opportunities in the state's larger cities. The loss of farm families triggered similar movement among others living in the rural areas whose livelihood depended on the neighboring farm sector. This downward spiral created an escalating consolidation of North Dakota's population into its urban centers (see Figure 2).

Figure 1. Population in North Dakota: 1870 to 2005
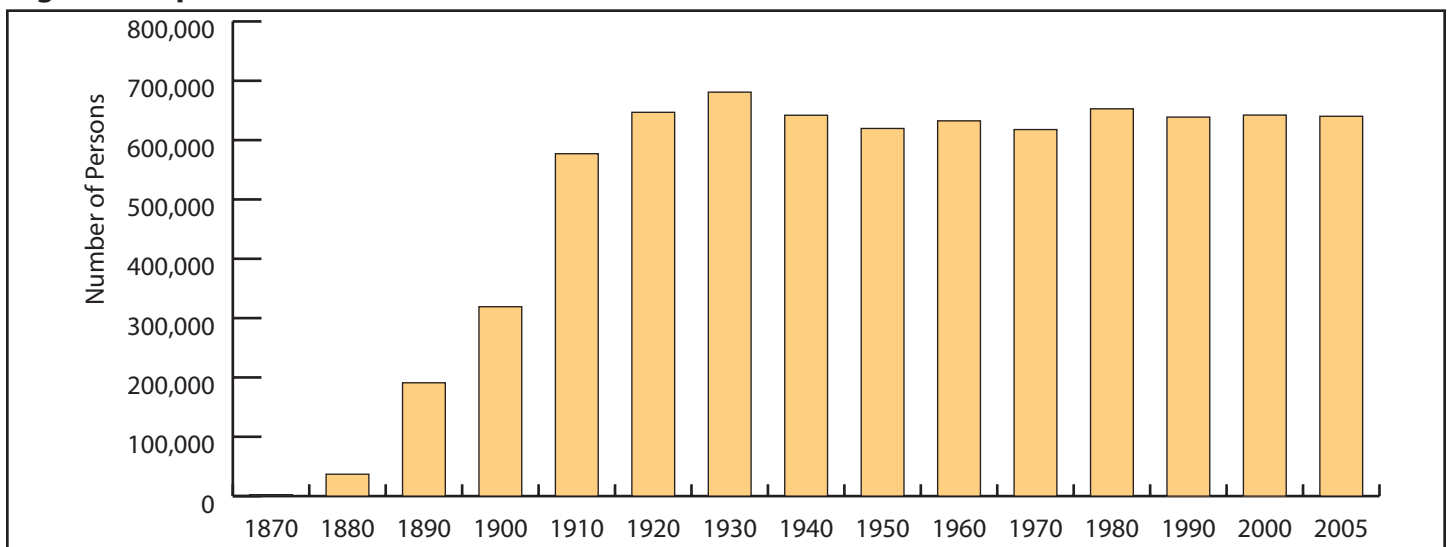
Source: U.S. Census Bureau, 2003; U.S. Census Bureau, 2006b.

Figure 2. Urban and Rural Population Distribution in North Dakota: 1900 to 2005
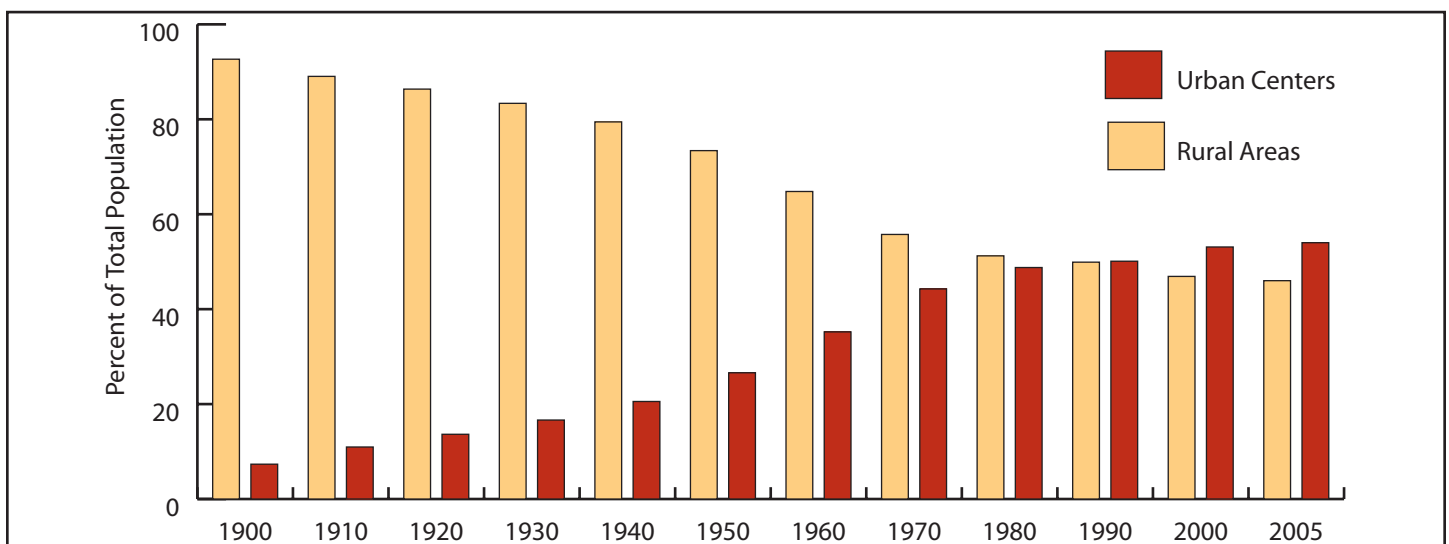
Note: Urban centers are defined as incorporated places with 2,500 persons or more. The remainder of the state's population is considered rural.
Source: U.S. Census Bureau, 1924; U.S. Census Bureau, 1952; U.S. Census Bureau, 1973; U.S. Census Bureau, 2003; and U.S. Census Bureau, 2006c.

What is particularly noteworthy about this urbanization trend is the fact that in 1990 there were 17 urban centers (i.e., incorporated places with at least 2,500 residents) which comprised 50 percent of the state's population. In 2000, the number of urban centers declined to 15 cities, yet comprised 53 percent of the state's population. Population projections indicate that by the year 2020, 56 percent of the state's population will reside in urban areas, assuming that these urban centers will continue to capture the same proportion of their respective county population as in 2000 (see Rathge, et al., 2002a; U.S. Census Bureau, 2003).

Implications of Consolidation

The consolidation of North Dakota's population has important implications. One of the most pronounced consequences is the economic and demographic divide that it creates in the state. Demographically, the profile of urban North Dakota is very different from rural North Dakota. The differences are often masked by aggregate statewide statistics. This is best illustrated by the seemingly stable population portrayed in Figure 1. During the past 60 years, the statewide population fluctuated by fewer than 35,000 residents or 6 percent. However, hidden behind these statewide statistics is the fact that growth in the urban areas of the state is offsetting dramatic rural population losses (see Figure 2). This exchange of population, which began in the early 1940s, still continues as illustrated in Figure 3. The latest population estimates from 2000 to 2005 show that 47 of the state's 53 counties lost residents. Nonetheless, the overall state population loss was less than 1 percent or 5,527 people. The population in Cass and Burleigh counties, two of the state's four metropolitan counties, grew by 12,283 residents between 2000 and 2005 helping offset the overall statewide decline.

Figure 3. Population Change in North Dakota by County: Census 2000 to July 1, 2005 Estimate

Source: U.S. Census Bureau, 2006b.

The Economic Impact of the Senior Population on a State's Economy: The Case of North Dakota
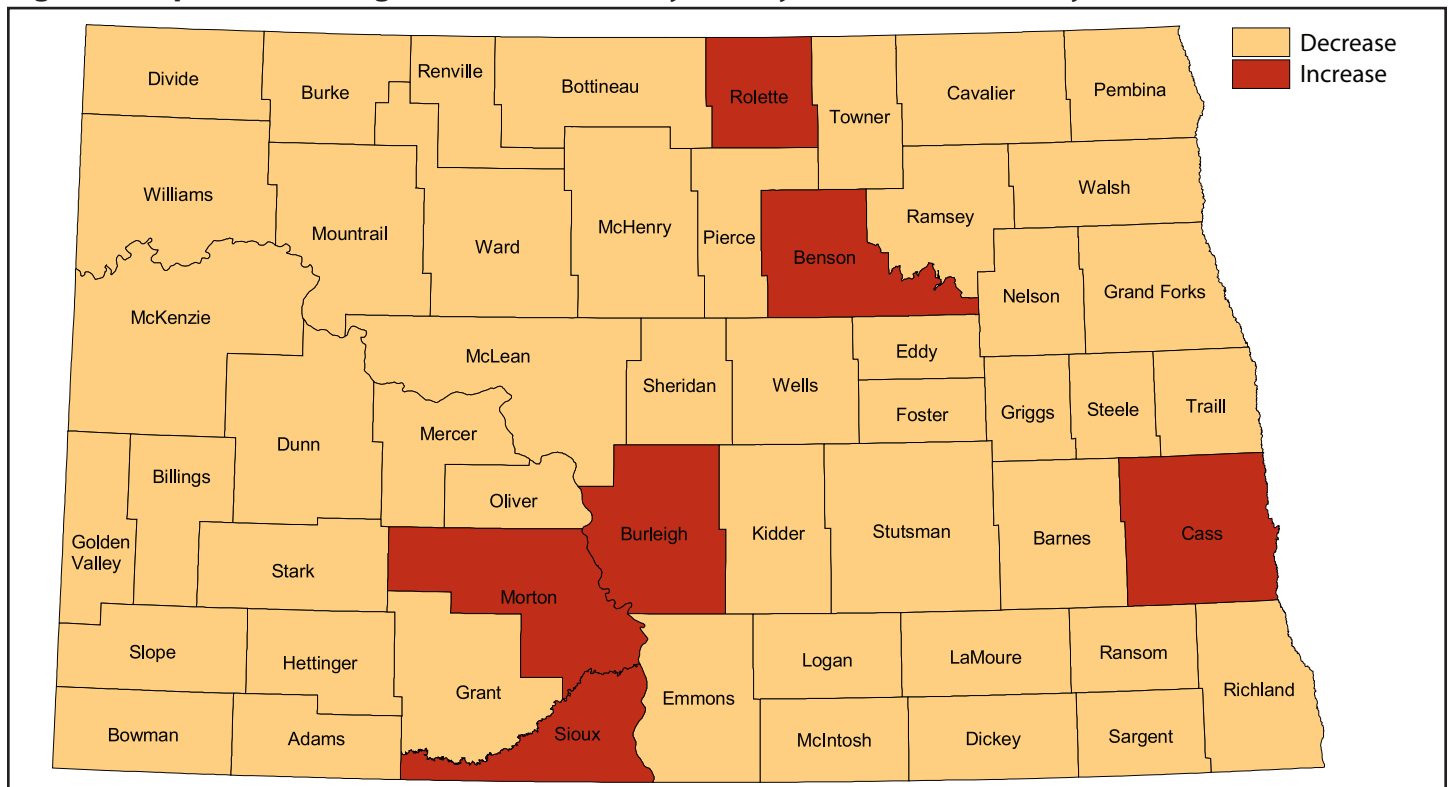
Age differentials between urban and rural areas of the state are sizeable. This is largely due to the age-selective nature of migration. The most mobile residents in the state tend to be young adults between the ages of 20 and 34. This population is doubly important because they also represent the age group who are in their prime child bearing years. Loss of residents in this age group typically means parallel losses in the number of children. This situation is illustrated in the age pyramids shown in Figure 4 which contrast the state's urban counties (i.e., counties with an incorporated place of at least 2,500 residents) and rural counties.

Figure 4. Urban and Rural County Population Distribution, by Age Cohort, in North Dakota: 2000
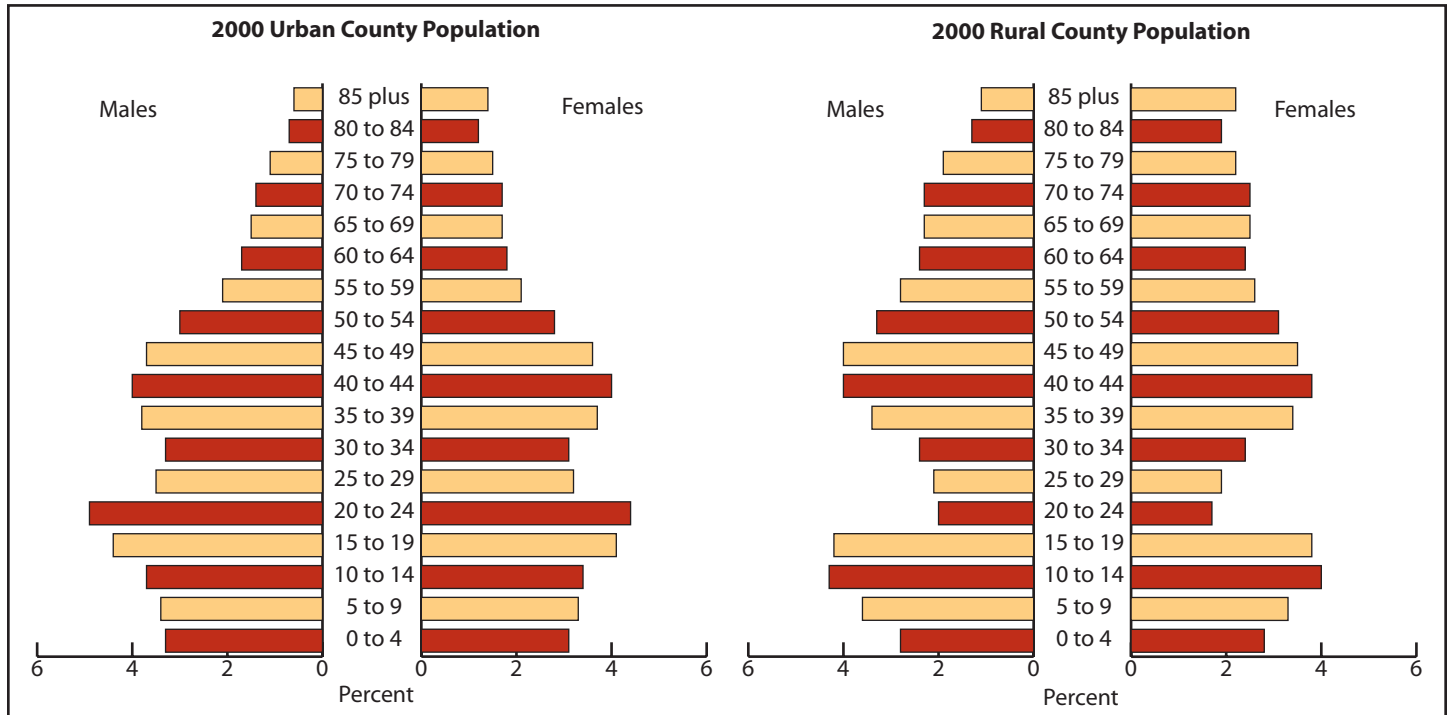
Note: Urban counties are defined as those counties containing an incorporated place with 2,500 persons or more. Counties without a community of 2,500 persons or more are considered rural.
Source: U.S. Census Bureau, 2003.

The combined age profile of residents living in the state's 14 urban counties differs markedly from that of those living in the state's 39 rural counties. What is most noticeable when comparing the two pyramids is the large indentation in the rural age pyramid corresponding to the age groups from 20 to 34. The data are displayed in proportions. Therefore, combining the three bars representing residents ages 20 to 34 reveals that 13 percent of the state's rural population were in this age group in the year 2000. In contrast, young adults ages 20 to 34 represented nearly twice that proportion in the state's urban counties. The pyramids also reveal a significantly higher proportion of seniors in the rural counties relative to those in the urban counties. In fact, 20 percent of rural county residents are ages 65 and older relative to 13 percent in urban counties. As the baby-boom population ages, these proportions will increase sharply for both urban and rural counties.

Projected Future Changes in North Dakota's Population

North Dakota's future population will shift in some important ways. In addition to the consolidation issues noted previously, the state's population will age significantly with the graying of the baby-boom generation. The baby boom is the large cohort of people born between 1946 and 1964. This was a very

prosperous period following World War II when the number of babies born increased rapidly. Nationally, the total fertility rate for women jumped from 2.19 in 1940 to 3.58 in 1957, the peak of the boom (Weeks, 1992). The total fertility rate is a measure of the number of children a woman will conceive, on average, in her lifetime. This means that, on average, women were having twice as many children during this period relative to the war years and that four children in a family was fairly typical. The baby boom ended abruptly in the mid 1960s and was followed by a baby-bust period in which fertility rates dropped to prewar levels.

The unique demographic age bulge created by the baby boom has important future implications for the state's economy and labor force. One-third of the state's total population are baby boomers and the leading edge of this critical age cohort is nearing retirement age (i.e., age 65). By the year 2020, one-half of the baby boomers will have reached age 65 and the impact on North Dakota's age distribution will be enormous. Figure 5 illustrates the change that is expected. In 2000, only two counties in the state had at least 28 percent of their population base comprised of seniors ages 65 and older. Population forecasts

Figure 5. Population Ages 65 and Older as a Percent of Total Population in North Dakota by County: 2000 and 2020

Source: Rathge, et al., 2002b.

     The Economic Impact of the Senior Population on a State's Economy: The Case of North Dakota
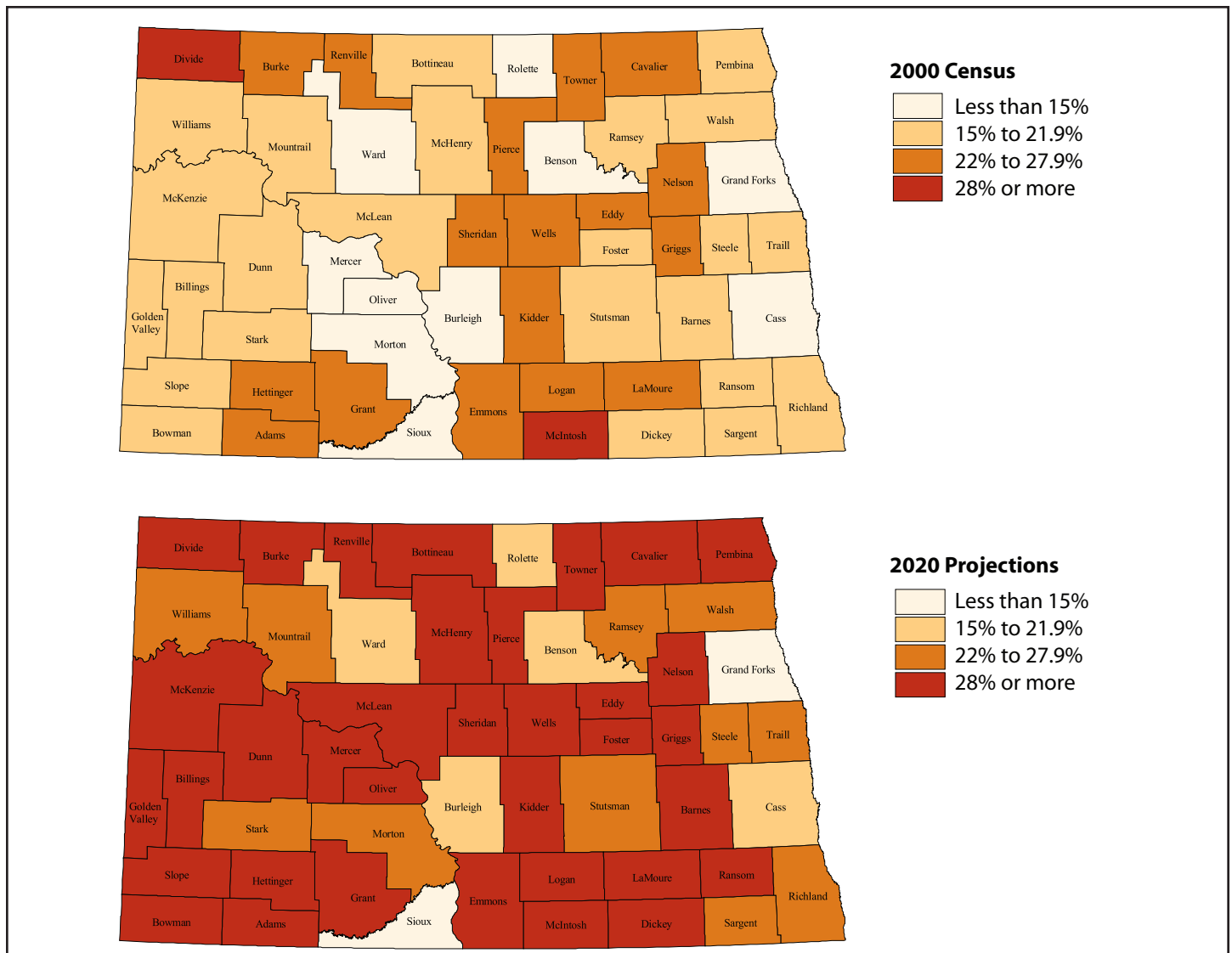
indicate that by 2020 this will jump to 35 of 53 counties with an additional 11 counties having at least 22 percent of their population ages 65 and older.

The considerable shift in the state's elderly population will occur rapidly and therefore has the capability to be unanticipated. For example, as illustrated in Figure 6, the change in the state's population ages 65 and older was relatively gradual between 1990 and 2000. In 1990, there were 91,055 residents ages 65 and older in the state. That total increased to 94,478 residents by 2000 or a growth of 4 percent from 1990. However, with the graying of the baby-boom cohort, the projected growth rate among the elderly (i.e., ages 65 and older) will accelerate. If these projections are correct, in the 10-year period between 2000 and 2010, the growth rate among elderly is forecast to quadruple what occurred in the previous 10 years. The expansion of elderly between 2010 and 2020 will be nine times as large as what occurred between 1990 and 2000. This means that the number of seniors in the state will reach nearly 150,000 residents by 2020.

Figure 6. Population by Age Cohort, in North Dakota: 1980, 1990, 2000, 2005, 2010, 2015, and 2020
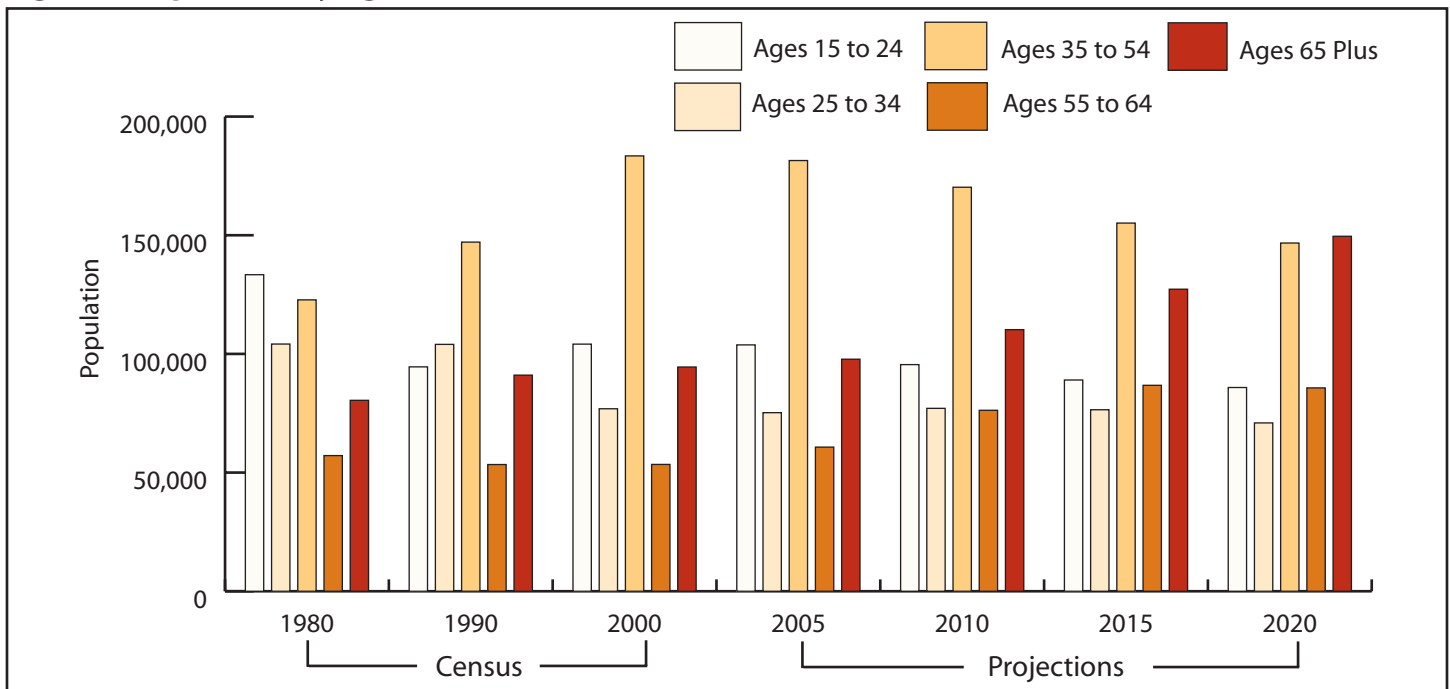
Source: Rathge, et al., 2002b

A similarly dramatic jump is expected among those ages 55 to 64, often known as the pre-retirement cohort (see Figure 6). In 2000, 53,433 residents of the state were between the ages of 55 and 64. It is anticipated that the number of pre-retirees will reach 86,767 by the year 2015, an increase of 63 percent. This cohort should begin to decline after 2015 as the trailing edge of the baby boom passes through the age bracket. The transition effects of the baby boom also will be felt among the prime working-age population ages 35 to 54. As noted in Figure 6, this population has grown substantially since 1980. Between 1980 and 2000, the prime working-age population grew 49 percent, from 122,774 people to 183,435 people. However, it is expected that without changes to current migration patterns, this population will decline as the baby-boom cohort ages. Population projections indicate that by the year 2020 the number of North Dakotans in their prime working age will drop below 150,000. This means that the senior population (i.e., ages 65

and older) will surpass those in the prime working ages (i.e., ages 35 to 54) by 2020. This presents serious ramifications for the state's labor force. In addition, the reduction in the number of residents who typically earn a wage or salary has strong implications for income generation within North Dakota.

A final age category that is important to explore is the entry labor force or those ages 25 to 34. The trend in this age cohort is displayed in Figure 6. Although this is a relatively small cohort, the consequences of changes in this age group for the state are significant. These individuals form the key group of residents who regenerate the work pool and the overall population base through childbearing. The trailing edge of the baby boom moved through their early-30s between 1990 and 2000. This resulted in a loss of roughly one-fourth of the entry labor pool over that time period. The 25 to 34 age cohort is not expected to expand over the next 15 years; rather, it is expected to remain relatively stable at approximately 75,000 people.

Summary

The census population numbers from 1980, 1990, and 2000, as well as the projections of persons ages 15 and older for 2005, 2010, 2015, and 2020, by age cohort are provided in Table 1. As described earlier, the projected changes in age groups are compelling. The number of seniors (i.e., ages 65 and older) is expected to jump from 94,478 people in 2000 to 149,566 people by the year 2020. In contrast, those in the prime working years (i.e., ages 35 to 54) are expected to decline from 183,435 residents in 2000 to 146,717 residents by the year 2020.

Table 1. Total Population, by Age Cohort, in North Dakota: 1980, 1990, 2000, 2005, 2010, 2015, and 2020

Year	Total	Total Persons											
		Ages 15 and Older											
		Total	Ages 15 to 64					Ages 65 and Older					
			15 to 24	25 to 34	35 to 54	55 to 64	Total	65 to 69	70 to 74	75 to 79	80 to 84	85 plus	Total
Census	--Persons--												
1980	652,717	497,906	133,370	104,157	122,774	57,160	417,461	25,930	21,217	15,301	9,857	8,140	80,445
1990	638,800	490,103	94,541	104,015	147,104	53,388	399,048	24,950	22,591	18,990	13,284	11,240	91,055
2000	642,200	512,354	104,121	76,887	183,435	53,433	417,876	23,142	22,759	19,085	14,766	14,726	94,478
Projections													
2005	640,200	519,016	103,800	75,239	181,477	60,729	421,245	22,780	21,451	20,938	17,313	15,289	97,771
2010	645,325	529,259	95,491	77,063	170,231	76,245	419,030	26,433	22,942	21,380	20,647	18,827	110,229
2015	648,972	534,641	89,006	76,474	155,131	86,767	407,378	34,106	26,579	22,876	21,042	22,660	127,263
2020	651,291	538,732	85,842	70,924	146,717	85,683	389,166	42,015	34,293	26,493	22,507	24,258	149,566
	--Percent Change--												
1980 to 1990	-2.1	-1.6	-29.1	-0.1	19.8	-6.6	-4.4	-3.8	6.5	24.1	34.8	38.1	13.2
1990 to 2000	0.5	4.5	10.1	-26.1	24.7	0.1	4.7	-7.2	0.7	0.5	11.2	31.0	3.8
2000 to 2005	-0.3	1.3	-0.3	-2.1	-1.1	13.7	0.8	-1.6	-5.7	9.7	17.3	3.8	3.5
2005 to 2010	0.8	2.0	-8.0	2.4	-6.2	25.6	-0.5	16.0	7.0	2.1	19.3	23.1	12.7
2010 to 2015	0.6	1.0	-6.8	-0.8	-8.9	13.8	-2.8	29.0	15.9	7.0	1.9	20.4	15.5
2015 to 2020	0.4	0.8	-3.6	-7.3	-5.4	-1.3	-4.5	23.2	29.0	15.8	7.0	7.1	17.5

Note: Census 2000 population numbers in this table differ slightly from 2000 population numbers in Table 4 due to different source data sets. The Census 2000 population numbers in Table 1 were obtained from Summary File 1, a 100% count of the population. These 100% count numbers were used in the population projection calculations presented in Table 1. The 2000 population numbers in Table 4 were obtained from the Public Use Microdata Sample, a 1% sample of the entire population. These numbers were used in the simulation modeling process for this report.
Source: Rathge, et al., 2002b.

NORTH DAKOTA'S INCOME PROFILE

Types of Income

The appreciable shifts in the state's population base will have a corresponding impact on income generation. A historical portrait of the effect population dynamics have on the state's income base can be found using census data. The U.S. Census Bureau collects information on the distribution of income generated within the state. Eight types of income are reported in the census and include a) wage and salary income, b) self-employment income, c) interest, dividends, and rental income, d) social security income, e) supplemental security income (e.g., guaranteed income for the needy, aged, blind, and disabled), f) public assistance income (e.g., general assistance and Temporary Assistance to Needy Families-TANF), g) retirement income, and h) all other income (e.g., unemployment, veterans payments, alimony and child support, and military family allotments).

North Dakota's distribution of income is displayed in Figure 7 by type of income for the year 2000. Of the $11.5 billion of income generated in the state in 2000, 70 percent or $8 billion was earned through wage and salary income. An additional 9 percent or $1 billion was generated through self employment while interest and social security each represented approximately 7 percent of total income ($883 million and $830 million, respectively). Retirement income accounted for nearly 3 percent or $306 million while the remaining categories of income accounted for 3 percent of total income.

Figure 7. Total Income Distribution, by Income Type, in North Dakota: 2000
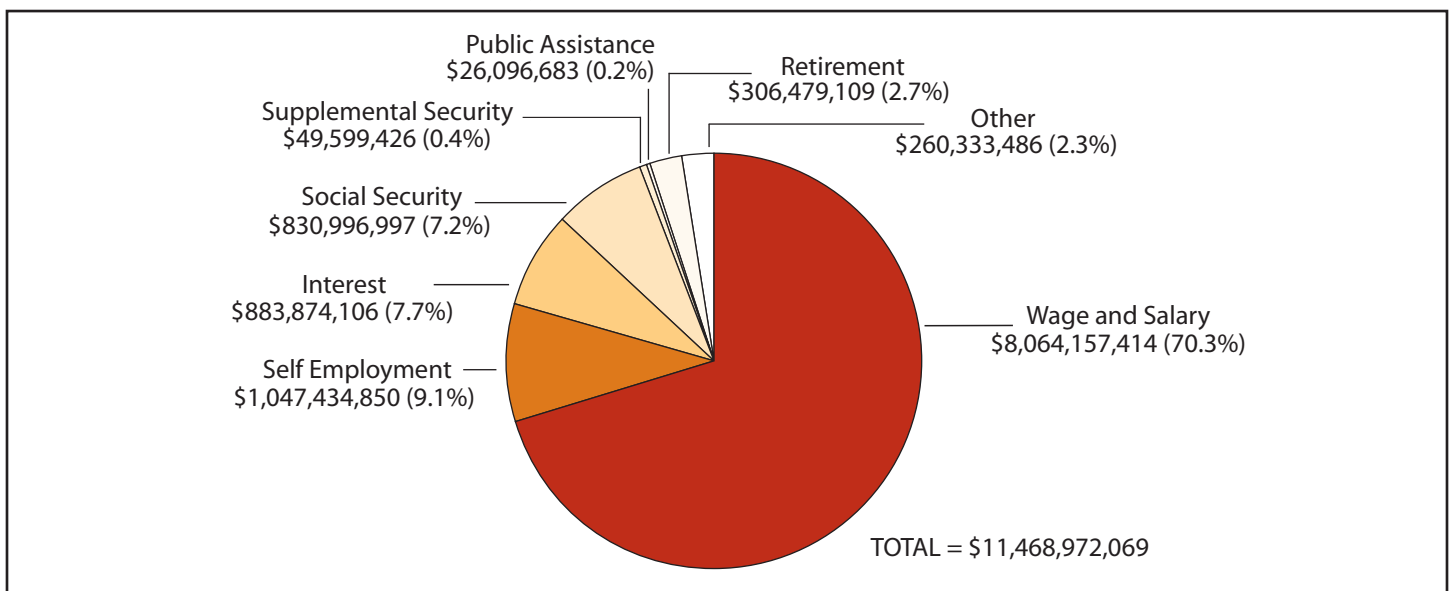
Public Assistance
$26,096,683 (0.2%)

Retirement
$306,479,109 (2.7%)

Supplemental Security
$49,599,426 (0.4%)

Other
$260,333,486 (2.3%)

Social Security
$830,996,997 (7.2%)

Interest
$883,874,106 (7.7%)

Wage and Salary
$8,064,157,414 (70.3%)

Self Employment
$1,047,434,850 (9.1%)

TOTAL = $11,468,972,069

Source: Calculated by the North Dakota State Data Center using data from the U.S. Census Bureau, Census 2000 1% PUMS file.

Profiles of Income Generation by Age Cohort: 1990 to 2000

The consequences of population age-shifts on the state's economy can be determined using census data. U.S. Census Bureau Public Use Microdata Sample (PUMS) files are unaggregated databases that allow users to tailor analyses instead of being limited to published data in standardized tables. However, these files require a large population base (i.e., 100,000 people) to avoid issues related to confidentiality. This is not

Table 2. Profile of Earners and Income, by Income Type, by Age Cohort, in North Dakota: 1990 and 2000

Earners by Age Cohort and by Income Type	1990				2000				Percent Change in Average 2000 Inflation Adjusted Income: 1990 to 2000
	Earners		Income		Earners		Income		
	Number	Percent of Total Population in Respective Age Cohort	Total (millions of dollars)	Average Per Earner (2000 inflation adjusted dollars)	Number	Percent of Total Population in Respective Age Cohort	Total (millions of dollars)	Average Per Earner (dollars)	
Ages 15 and older									
Total	440,165	90.0	$7,239.3	$21,669	469,396	91.5	$11,469.0	$24,433	12.8
Wage and Salary	311,475	63.7	$4,879.5	$20,640	346,317	67.5	$8,064.2	$23,285	12.8
Self Employment	74,875	15.3	$916.8	$16,133	51,523	10.0	$1,047.4	$20,329	26.0
Interest	139,460	28.5	$602.3	$5,690	137,569	26.8	$883.9	$6,425	12.9
Social Security	99,960	20.4	$543.2	$7,159	101,804	19.8	$831.0	$8,163	14.0
Retirement	22,715	5.0	$167.1	$9,046	27,499	5.4	$306.5	$11,145	23.2
Ages 15 to 24									
Total	77,275	81.2	$472.1	$8,049	85,614	80.3	$866.0	$10,115	25.7
Wage and Salary	69,325	72.8	$408.6	$7,765	80,681	75.7	$804.8	$9,975	28.5
Self Employment	4,445	4.7	$19.0	$5,643	2,125	2.0	$15.7	$7,407	31.3
Interest	14,615	15.4	$20.4	$1,837	11,206	10.5	$18.7	$1,667	-9.3
Social Security	1,940	2.0	$5.5	$3,709	1,320	0.2	$8.2	$6,202	67.2
Ages 25 to 34									
Total	96,400	93.5	$1,635.4	$22,351	72,647	95.1	$1,779.5	$24,496	9.6
Wage and Salary	86,450	83.9	$1,408.3	$21,463	65,725	86.0	$1,547.8	$23,549	9.7
Self Employment	14,630	14.2	$148.7	$13,392	7,866	10.3	$143.5	$18,241	36.2
Interest	21,510	20.9	$37.1	$2,274	12,981	17.0	$26.4	$2,031	-10.7
Social Security	1,270	1.2	$4.7	$4,914	870	1.1	$4.3	$4,988	1.5
Ages 35 to 54									
Total	133,135	90.8	$2,982.3	$29,513	175,521	94.4	$5,633.9	$32,098	8.8
Wage and Salary	109,730	74.8	$2,300.6	$27,623	152,897	82.3	$4,572.6	$29,906	8.3
Self Employment	32,605	22.2	$473.2	$19,121	26,853	14.4	$651.1	$24,246	26.8
Interest	41,315	28.2	$123.8	$3,946	51,370	27.6	$225.9	$4,397	11.4
Social Security	3,830	2.6	$19.9	$6,864	4,617	2.5	$26.0	$5,629	-18.0
Retirement	3,465	2.4	$23.6	$8,989	3,981	2.1	$54.5	$13,694	52.3
Ages 55 to 64									
Total	45,175	86.2	$955.5	$27,866	45,053	90.4	$1,300.6	$28,868	3.6
Wage and Salary	28,035	53.5	$562.7	$26,445	32,581	65.4	$903.4	$27,727	4.8
Self Employment	11,955	22.8	$176.6	$19,459	8,111	16.3	$146.8	$18,101	-7.0
Interest	18,285	34.9	$99.9	$7,198	17,218	34.5	$100.1	$5,813	-19.2
Social Security	11,395	21.8	$56.7	$6,551	9,364	18.8	$66.1	$7,060	7.8
Retirement	4,895	9.3	$44.6	$11,993	4,894	9.8	$47.0	$9,610	-19.9
Ages 65 and older									
Total	88,180	96.1	$1,194.0	$17,840	90,561	96.1	$1,888.9	$20,858	16.9
Wage and Salary	17,935	19.6	$199.3	$14,642	14,433	15.3	$235.6	$16,326	11.5
Self Employment	11,240	12.3	$99.3	$11,642	6,568	7.0	$90.3	$13,749	18.1
Interest	43,735	47.7	$321.1	$9,674	44,794	47.5	$512.9	$11,450	18.4
Social Security	81,525	88.9	$456.4	$7,375	85,633	90.9	$726.4	$8,482	15.0
Retirement	14,355	15.7	$91.5	$8,399	17,964	19.1	$201.7	$11,227	33.7

Source: Calculated by the North Dakota State Data Center using data from the U.S. Census Bureau, 1990 and 2000 Census 1% PUMS files.

a problem when dealing with statewide data. The 1 percent PUMS files were used to determine the number of earners for each type of income and age group, by the corresponding aggregate total income they generated for the years 1990 and 2000 (see Table 2). The five key age cohorts used are: Young Adults (i.e., ages 15 to 24), Entry Labor Force (i.e., ages 25 to 34), Prime Labor Force (i.e., ages 35 to 54), Pre-Retirement (i.e., ages 55 to 64), and Retirement (i.e., ages 65 and older). Attention was focused on the main sources of income: wage and salary, self-employment, interest, social security, and retirement. Thus, supplemental income, public assistance, and the residual "other income" types were excluded from analyses. In order to provide a comparison between the two decades, the average per-earner income values for 1990 were inflated to their 2000 values using the Consumer Price Index.

The distribution of earners by type of income varies by age cohort as noted in Table 2. In general, more than 90 percent of North Dakotans ages 15 and older received an income in both 1990 and 2000. The types of income received remained relatively stable between 1990 and 2000. The major exceptions were self-employment and interest income. The proportion of residents who received self-employment income declined between 1990 and 2000 for every age cohort. Similarly, the proportion of residents who earned interest income also declined between the two time periods for each age cohort.

A brief profile of income generation by age cohort in North Dakota follows. For each age cohort, population, earners, types of income, and the amount that each age cohort contributes to the state's total income are outlined.

Young Adults (ages 15 to 24)
    Population: The young adult population (i.e., ages 15 to 24) in North Dakota increased by 10 percent between 1990 and 2000 (see Table 1). This represented a growth of 9,580 residents. Total Earners: However, there was a modest dip in the proportion of young adults who received an income, declining from 81 percent in 1990 to 80 percent in 2000 (see Table 2). Types of Income: The loss in earners was largely due to declines among those who received self-employment or interest income. The proportion of young adults who received self-employment income dropped from 5 percent in 1990 to 2 percent in 2000 or 2,320 earners. However, the average annual income received by self-employed young adults increased by 31 percent after adjusting for inflation, growing from $5,643 in 1990 to $7,407 in 2000. The proportion of young adults who earned interest income declined from 15 percent in 1990 to 11 percent in 2000 or 3,409 earners. In addition to the loss of interest earners among young adults, the average amount of interest income received by young adults declined 9 percent over the decade after adjusting for inflation. In 2000, the average amount of interest income generated by those ages 15 to 24 was $1,667 or $18.7 million in total. Wage and salary income was by far the largest category of income generated by young adults accounting for 93 percent of the total earnings of this age cohort in 2000. Contribution to Total Income in State: This age group contributed $866 million to the state's total income base in 2000 (7.6 percent).

Entry Labor Force (ages 25 to 34)
    Population: The number of residents between the ages of 25 and 34, commonly viewed as the entry labor force age cohort, dropped precipitously during the 1990s. A combination of the movement of the

trailing edge of the baby boom through this age cohort along with sustained out-migration resulted in a loss of 27,128 residents in this age category over the decade (see Table 1). Total Earners: Approximately 95 percent of residents in this age group received an income in 2000 averaging $24,496 (see Table 2). Types of Income: The proportion earning a wage or salary rose slightly to 86 percent in 2000, up from 84 percent in 1990. Modest declines over the decade were found in the proportion of residents in this age cohort who received self-employment income (from 14 percent to 10 percent) and who earned interest income (from 21 percent to 17 percent). Contribution to Total Income in State: This age group generated $1.8 billion in income in 2000 (15.7 percent).

Prime Labor Force (ages 35 to 54)

Population: The main labor force age cohort in North Dakota, those between the prime working ages of 35 and 54, grew by 25 percent between 1990 and 2000 (see Table 1). This was largely a result of the movement of the bulk of the baby-boom generation into this age cohort during the decade. The gain of 36,331 people in this age group had an important positive consequence on the state's income. Total Earners: As noted in Table 2, 94 percent of residents in this age group received income in 2000, up from 91 percent in 1990. The rise in both residents in this age group along with a greater proportion who are earning an income expanded the number of earners in this cohort by 42,386 residents during the decade. Types of Income: The proportion earning a wage or salary jumped from 75 percent in 1990 to 82 percent in 2000. However, there was a sharp drop in the proportion who received self-employment income, declining from 22 percent in 1990 to 14 percent in 2000. The proportion earning interest income, social security income, and retirement income was relatively unchanged. Contribution to Total Income in State: The contribution of this age group to the state's total income base was $5.6 billion in 2000 (49.9 percent).

Pre-Retirement (ages 55 to 64)

Population: The pre-retirement age cohort, those between the ages of 55 and 64, may also include those in early retirement. This age cohort remained relatively stable between 1990 and 2000 (see Table 1). In fact, there was less than a 1 percent growth in this age cohort during the decade. However, there were some notable changes in the proportion of pre-retirees who earned income. Total Earners: Overall, 90 percent of this age group earned an income in 2000 compared to 86 percent in 1990 (see Table 2). Types of Income: The greatest increase was among those receiving a wage or salary, expanding from 54 percent in 1990 to 65 percent in 2000. In contrast, the proportion of pre-retirees who received self-employment income dropped from 23 percent to 16 percent over the decade. The proportion earning interest or retirement income was relatively unchanged while those drawing social security declined modestly. The counterbalance between gains in wage and salary income and losses in self-employment income resulted in very little change in the amount of income generation for this age cohort between 1990 and 2000. Contribution to Total Income in State: This age group contributed $1.3 billion to the state's total income base in 2000 (11.3 percent).

Retirement (ages 65 and older)

Population: Similar to the pre-retirees, very little demographic shifting among the retirees occurred in North Dakota between 1990 and 2000. The population gain in this age group was 4 percent or 3,423 people (see Table 1). Total Earners: The proportion who earned an income remained stable at 96 percent

(see Table 2). Types of Income: However, the proportion who had wage or salary income declined from 20 percent in 1990 to 15 percent in 2000. Similarly, those who received self-employment income dropped from 12 percent to 7 percent. Interest earners remained stable at 48 percent while those receiving social security increased from 89 percent to 91 percent and the proportion earning retirement income increased from 16 percent to 19 percent between 1990 and 2000. These relatively modest changes had limited impact on income generation in North Dakota over the decade. Contribution to Total Income in State: This age group contributed $1.9 billion to the state's total income base in 2000 (16.6 percent).

Overview of Age Cohort Changes Between 1990 and 2000

An overview of the changes in the number of income earners by age cohort is best illustrated in Figure 8. The demographic shifts between 1990 and 2000 are fourfold. First, the impact of the baby-boom echo is apparent in the expansion of wage and salary earners in the youngest age cohort (i.e., ages 15 to 24). Declines in other income earners among those in this age cohort reflect both a relatively small number of earners and a downward shift in the proportion receiving these forms of income (i.e., self employment, interest, or social security).

Second, the movement of the trailing edge of the baby boom out of the 25 to 34 age cohort is very apparent and appears as a significant loss for all income types. It is important to note that even though the proportion of wage and salary earners increased among those ages 25 to 34 between 1990 and 2000, the actual number of wage and salary earners declined sharply. Steep declines also were found in the other three broad income types (i.e., self employment, interest, and social security).

Third, movement of the bulk of baby boomers into the prime labor force age cohort (i.e., ages 35 to 54) sharply increased the number of wage and salary earners. With the exception of self-employment income, the number of earners of other income types also increased among those ages 35 to 54.

Figure 8. Percent Change in Earners, by Income Type, by Age Cohort, in North Dakota: 1990 to 2000
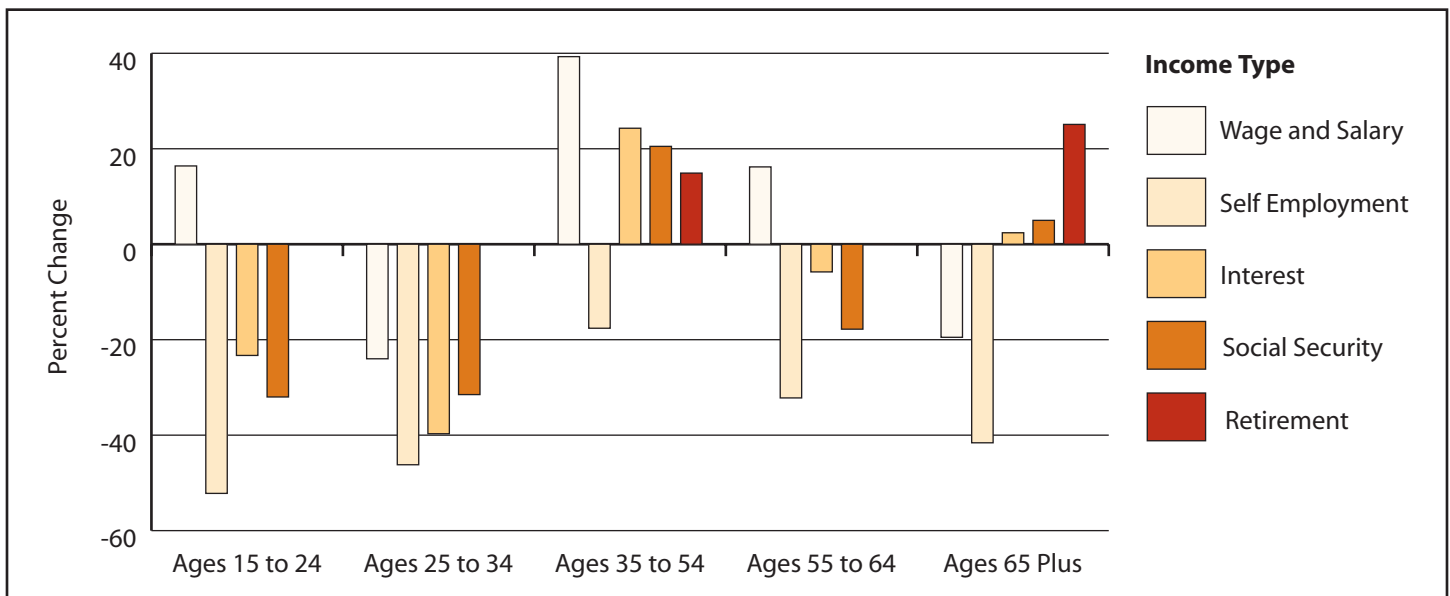
Source: Calculated by the North Dakota State Data Center using data from the U.S. Census Bureau, 1990 and 2000 Census 1% PUMS files.

Finally, the pre-retirement and retirement age cohorts had mixed changes. The leading edge of the baby boom impacted the pre-retirees by increasing the number of wage and salary earners between 1990 and 2000. Among retirees, the loss of wage and salary earners reflects a growing trend of reduced employment in the retirement years. In addition, the marked increase in retirement income among retirees reflects the contribution of pension programs and individual retirement accounts that have become more available and popular.

Economic Impact of Age Shifts: Example of the Baby Boomers

The economic impact of the movement of baby boomers through the entry labor force and prime labor force age cohorts is significant. This impact can be illustrated by contrasting the income profile of these age cohorts in 2000 with what existed in 1990. For example, there were 23,753 fewer entry labor force earners (i.e., ages 25 to 34) in 2000 relative to 1990. In contrast, there were 42,386 more prime labor force earners (i.e., ages 35 to 54) in 2000 relative to 1990. While some of this change is due to migration and the shifting labor force, most of this change is a result of the aging baby boomers.

Regardless of the cause of change in the number of earners, one can estimate the economic consequences of these changes by applying the respective average per-earner income to these changes, adjusting for inflation, and adjusting for relative changes in earnings. For example, the average income received per earner in 1990 for earners ages 25 to 34 was $22,351 after adjusting for inflation. By applying this average amount to the 23,753 fewer earners and inflating by the relative change in per-earner average income over the 10-year period (i.e., 9.6 percent average increase), the results indicate a decline of $582 million. This means that the changing size of the entry labor force age cohort (i.e., ages 25 to 34) produced a net loss of $582 million in income; $506 million of that amount would have been derived from wage and salary income. In contrast, using the same approach for earners ages 35 to 54, one finds a significant net gain in income. By applying the average earnings in 1990 of $29,513 (adjusted for inflation) to the increase in earners over the decade (i.e., 42,386 earners) and adjusting for the changes in average earnings over the decade (i.e., 8.8 percent average increase), the results indicate a net gain of $1.4 billion in income. This means that the changing size of the prime labor force age cohort (i.e., ages 35 to 54) produced a net gain of $1.4 billion in income. The net difference between the changes in income for these two age cohorts is $779 million.

This means that the difference in these two age cohorts in North Dakota in 2000 relative to what existed in 1990 produced a net increase in income generation of nearly $800 million when inflation and shifts in earnings are held constant. This illustration of the shifting labor force and its impact on income generation between 1990 and 2000 offers some insight into the economic impact the baby boom poses for the future and the reason one needs to be concerned as this huge labor pool moves toward retirement.

Distribution of Income by Income Type and Age Cohort: 1980, 1990, and 2000

A review of Table 3 indicates that the distribution of income generation by age is fairly stable over time. In general, the proportion of wage and salary earners increased modestly over time among those ages 15 to 64 and declined steadily among seniors ages 65 and older. The proportion of residents ages 15

to 64 who drew a wage or salary increased from 68 percent in 1980 to 79 percent by 2000. In contrast, the proportion of seniors ages 65 and older earning a wage or salary dropped from 21 percent to 15 percent during that time period. Notable differences exist within these two broad age groups, however.

Table 3. Earners as a Percent of Total Population, by Income Type, by Age Cohort, in North Dakota: 1980, 1990, and 2000

Total Population and Earners by Income Type	Percent of Total Population by Earner Age Cohorts											
	15 to 24			25 to 34			35 to 54			55 to 64		
	1980	1990	2000	1980	1990	2000	1980	1990	2000	1980	1990	2000
Total Population	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Total Earners with:	81.3	81.2	80.3	86.4	93.5	95.1	81.8	90.8	94.4	83.4	86.2	90.4
Wage and Salary Income	73.1	72.8	75.7	76.1	83.9	86.0	64.4	74.8	82.3	49.7	53.5	65.4
Self Employment Income	4.8	4.7	2.0	14.4	14.2	10.3	21.5	22.2	14.4	26.7	22.8	16.3
Interest Income	14.5	15.4	10.5	22.1	20.9	17.0	26.1	28.2	27.6	36.9	34.9	34.5
Social Security Income	3.5	2.0	1.2	1.0	1.2	1.1	2.6	2.6	2.5	19.2	21.8	18.8
Supplemental Security Income	0.0	0.0	0.4	0.0	0.0	0.4	0.0	0.0	1.4	0.0	0.0	3.2
Public Assistance Income	1.4	2.0	0.9	1.8	4.3	2.1	1.9	2.8	1.3	2.3	3.6	2.3
Retirement Income	0.0	0.6	0.2	0.0	1.0	0.5	0.0	2.4	2.1	0.0	9.3	9.8
Other Earners	8.3	5.8	4.1	8.5	6.5	10.3	6.6	5.4	7.9	10.6	3.7	5.8
	65 to 69			70 to 74			75 to 79			80 to 84		
	1980	1990	2000	1980	1990	2000	1980	1990	2000	1980	1990	2000
Total Population	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Total Earners with:	95.2	96.2	96.4	95.3	96.4	95.4	93.3	96.4	95.8	91.7	96.8	96.4
Wage and Salary Income	30.2	30.1	28.2	22.4	21.0	15.7	15.6	15.0	17.0	13.2	13.3	3.3
Self Employment Income	18.5	17.1	13.4	15.0	15.0	6.5	8.9	11.0	5.0	5.5	7.2	5.2
Interest Income	44.6	43.2	43.8	47.4	49.0	48.5	44.3	51.0	57.9	46.5	48.9	42.5
Social Security Income	81.2	86.2	88.9	86.9	89.8	92.0	85.1	90.7	89.5	80.5	91.7	95.0
Supplemental Security Income	0.0	0.0	2.9	0.0	0.0	3.2	0.0	0.0	1.8	0.0	0.0	2.0
Public Assistance Income	4.4	3.5	3.2	5.3	5.3	2.1	6.7	5.4	1.8	6.9	4.5	1.9
Retirement Income	0.0	18.8	21.6	0.0	18.7	24.1	0.0	13.4	17.6	0.0	10.8	15.1
Other Earners	14.1	3.0	10.8	14.2	3.5	10.1	12.5	4.2	13.6	16.0	2.7	8.9
	15 and older			15 to 64			65 and older			85 and older		
	1980	1990	2000	1980	1990	2000	1980	1990	2000	1980	1990	2000
Total Population	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Total Earners with:	84.7	90.0	91.5	83.0	88.6	90.5	93.8	96.1	96.1	88.4	94.1	97.1
Wage and Salary Income	60.6	63.7	67.5	68.1	73.9	79.3	21.1	19.6	15.3	8.1	6.7	3.8
Self Employment Income	14.7	15.3	10.0	15.1	16.0	10.7	12.9	12.3	7.0	5.0	3.2	2.1
Interest Income	26.4	28.5	26.8	22.9	24.1	22.2	44.6	47.7	47.5	35.0	48.4	41.4
Social Security Income	17.4	20.4	19.8	4.8	4.6	3.9	83.4	88.9	90.9	81.1	86.8	90.2
Supplemental Security Income	0.0	0.0	1.6	0.0	0.0	1.2	0.0	0.0	3.3	0.0	0.0	8.1
Public Assistance Income	2.4	3.4	1.7	1.7	3.1	1.5	5.7	4.6	2.6	7.8	4.1	4.5
Retirement Income	0.0	5.0	5.4	0.0	2.5	2.3	0.0	15.7	19.1	0.0	11.5	13.1
Other Earners	9.0	5.2	7.9	8.2	5.6	7.1	13.6	3.3	11.2	8.8	3.0	12.7

Source: Calculated by the North Dakota State Data Center using data from the U.S. Census Bureau, 1980, 1990, and 2000 Census 1% PUMS files.

Wage and salary earners increased the greatest among the prime working-age population (i.e., ages 35 to 54) expanding from 64 percent in 1980 to 82 percent in 2000, or 18 percentage points. The proportional increase was less dramatic among the pre-retiree age cohort (i.e., ages 55 to 64) moving from 50 percent to 65 percent, or 15 percentage points. Less than a 10 percentage point change occurred among the younger age cohorts between 1980 and 2000.

Wage and salary earners among seniors remained relatively stable within each age cohort. The proportion of seniors ages 65 to 69 who were wage and salary workers declined 2 percentage points between 1980 and 2000, dipping from 30 percent to 28 percent. A slightly higher proportional drop of 7 percentage points was found among those ages 70 to 74, while the percentage of wage and salary workers in the 75 to 79 age cohort actually increased from 16 percent in 1980 to 17 percent in 2000. It is worthy to note that 8 percent of seniors ages 85 and older were wage and salary workers in 1980; the proportion declined to 4 percent in 2000.

A general decline was found among self-employment income earners across all age cohorts. The greatest drop was among pre-retirees whose proportion fell by 11 percentage points, dropping from 27 percent in 1980 to 16 percent in 2000. Much of this decline reflects the losses among farmers and business owners who relied on farming operations. In contrast, retirement earners grew in proportion across all elderly categories. By 2000, 19 percent of all seniors were earning income from retirement benefits (13 percent of those ages 85 and older).

Focusing specifically on the year 2000, Tables 3 and 4 indicate that more than 90 percent of the population in each age cohort, with the exception of those ages 15 to 24, received income. This means that in 2000, North Dakota had 469,396 income earners of which 90,561, or 19 percent, were seniors ages

Table 4. Total Population and Total Earners, by Income Type, by Age Cohort, in North Dakota: 2000

Total Population and Earners by Income Type	Persons Ages 15 and Older											
		Ages 15 to 64					Ages 65 and Older					
	Total	15 to 24	25 to 34	35 to 54	55 to 64	Total	65 to 69	70 to 74	75 to 79	80 to 84	85 plus	Total
Total Populaton	512,975	106,618	76,420	185,871	49,851	418,760	22,402	22,549	21,158	14,743	13,363	94,215
Total Earners with:	469,396	85,614	72,647	175,521	45,053	378,835	21,590	21,520	20,269	14,212	12,970	90,561
Wage and Salary Income	346,317	80,681	65,725	152,897	32,581	331,884	6,310	3,542	3,592	481	508	14,433
Self Employment Income	51,523	2,125	7,866	26,853	8,111	44,955	2,994	1,470	1,062	762	280	6,568
Interest Income	137,569	11,206	12,981	51,370	17,218	92,775	9,816	10,926	12,259	6,265	5,528	44,794
Social Security Income	101,804	1,320	870	4,617	9,364	16,171	19,911	20,740	18,926	14,003	12,053	85,633
Supplemental Security Income	8,156	455	294	2,675	1,597	5,021	659	722	379	298	1,077	3,135
Public Assistance Income	8,513	932	1,600	2,395	1,164	6,091	711	464	375	273	599	2,422
Retirement Income	27,499	253	407	3,981	4,894	9,535	4,842	5,424	3,717	2,233	1,748	17,964
Other Income	40,311	4,332	7,900	14,632	2,875	29,739	2,414	2,275	2,873	1,319	1,691	10,572

Source: Calculated by the North Dakota State Data Center using data from the U.S. Census Bureau, 2000 Census 1% PUMS file.

The Economic Impact of the Senior Population on a State's Economy: The Case of North Dakota

65 and older. It is noteworthy that within the senior population, 15 percent were wage and salary earners. In fact, 28 percent of younger seniors (i.e., ages 65 to 69) were wage and salary earners. The proportion drops off dramatically by age 80 when fewer than 4 percent received a wage or salary. Seniors receiving social security was almost universal with approximately 90 percent of seniors participating in each elderly age cohort. In contrast, 19 percent of all seniors ages 65 and older reported retirement earnings with the highest proportion coming from the younger elderly age cohorts. This likely reflects the fact that pension programs and individual retirement accounts are much more common in recent times relative to the period prior to World War II. This means that older seniors will be more reliant on social security than their younger counterparts who have other income sources to tap.

Aggregate Income

Table 5 shows total aggregate income by type of income and age of earner. Nearly $11.5 billion in income was generated in North Dakota in 2000. Seniors contributed $1.9 billion or 17 percent of all income earned in the state in 2000. It is notable that more than $400 million or 4 percent of total income was generated by seniors in each of the first three senior age categories (i.e., ages 65 to 69, 70 to 74, and 75 to 79). The proportion of total income generated by older seniors (i.e., ages 80 to 84 and 85 plus) drops markedly. It is of interest to note that 58 percent of all interest earnings, or $513 million, was generated by seniors. The

Table 5. Total Aggregate Income, by Income Type, by Age Cohort, in North Dakota: 2000

Income Type	Total	Earners Ages 15 and Older										
		Ages 15 to 64					Ages 65 and Older					
		15 to 24	25 to 34	35 to 54	55 to 64	Total	65 to 69	70 to 74	75 to 79	80 to 84	85 plus	Total
---------------------------- Aggregate Income in Millions of Dollars ($1,000,000) ----------------------------												
Total Aggregate Income	$11,468.9	$866.0	$1,779.5	$5,633.9	$1,300.6	$9,580.1	$530.9	$447.4	$436.7	$263.8	$210.2	$1,888.9
Wage and Salary	$8,064.2	$804.8	$1,547.8	$4,572.6	$903.4	$7,828.5	$134.1	$37.1	$45.2	$4.3	$15.0	$235.6
Self Employment	$1,047.4	$15.7	$143.5	$651.1	$146.8	$957.1	$46.8	$19.6	$16.6	$6.3	$985.0	$90.3
Interest	$883.9	$18.7	$26.4	$225.9	$100.1	$371.0	$87.0	$137.3	$144.4	$92.9	$51.2	$512.9
Social Security	$831.0	$8.2	$4.3	$26.0	$66.1	$104.6	$175.0	$170.7	$158.7	$118.1	$104.1	$726.4
Supplemental Security	$49.6	$1.8	$1.7	$12.8	$10.4	$26.8	$5.4	$4.1	$3.9	$3.6	$5.8	$22.8
Public Assistance	$26.1	$1.2	$2.8	$8.3	$3.5	$15.8	$1.1	$1.5	$708.0	$341.0	$6.7	$10.3
Retirement	$306.5	$569.0	$2.7	$54.5	$47.0	$104.8	$60.2	$58.0	$43.2	$25.2	$15.1	$201.7
Other Income	$260.3	$15.0	$50.4	$82.7	$23.3	$171.4	$21.2	$19.2	$24.1	$13.1	$11.4	$88.9
---------------------------- Income Type as a Percentage of Total Aggregate Income by Earner Age Cohort ----------------------------												
Total Aggregate Income	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Wage and Salary	70.3	92.9	87.0	81.2	69.5	81.7	25.3	8.3	10.3	1.6	7.1	12.5
Self Employment	9.1	1.8	8.1	11.6	11.3	10.0	8.8	4.4	3.8	2.4	0.5	4.8
Interest	7.7	2.2	1.5	4.0	7.7	3.9	16.4	30.7	33.1	35.2	24.4	27.2
Social Security	7.2	0.9	0.2	0.5	5.1	1.1	33.0	38.1	36.3	44.8	49.5	38.5
Supplemental Security	0.4	0.2	0.1	0.2	0.8	0.3	1.0	0.9	0.9	1.3	2.8	1.2
Public Assistance	0.2	0.1	0.2	0.1	0.3	0.2	0.2	0.3	0.2	0.1	3.2	0.5
Retirement	2.7	0.1	0.2	1.0	3.6	1.1	11.3	13.0	9.9	9.6	7.2	10.7
Other Income	2.3	1.7	2.8	1.5	1.8	1.8	4.0	4.3	5.5	4.9	5.4	4.7

Source: Calculated by the North Dakota State Data Center using data from the U.S. Census Bureau, 2000 Census 1% PUMS file.

distribution of income received by seniors in each age category is very telling. As a total group, seniors ages 65 and older rely most heavily on social security (39 percent) followed by interest income (27 percent) and then wage and salary income (13 percent). However, the income received by seniors varies greatly by age. For example, younger seniors (i.e., ages 65 to 69) receive 25 percent of their income from wages and salaries compared to 7 percent for those ages 85 and older. Similarly, the younger seniors rely less heavily on social security and interest income than older seniors.

ECONOMIC SIMULATION MODEL

Projecting Future Income Distribution

The consequences of the shifting dynamics of population will be significant in the next decade. As noted in the previous discussion, the size of the baby-boom cohort and those of the baby-bust period that followed have created ripples in both the labor force and income generated by earners. What makes the upcoming decade so important is the fact that the baby boomers will be leaving the workforce in large numbers as they age into retirement. The consequences of this important age shift on various income earnings, such as wages and salaries, are considerable. This will have important implications for a range of fiscal issues including tax revenues, expenditure patterns, and venture capital accumulation. For example, data from the Internal Revenue Service indicates that 72 percent of North Dakota's total adjusted gross income (AGI) for the 2004 tax year came from wages and salaries. In contrast, less than 10 percent came from interest, retirement, pensions, or social security (IRS, 2006a). Since North Dakota tax collections are based on AGI, a reduction in wage and salary earners will have a corresponding reduction in tax revenues. Seniors ages 65 and older paid about 15 percent of the state's $252,596,051 total tax liability in 2005 and represented 15 percent of the state's tax filers (IRS, 2006b). Equally important will be the shifts in transfer payments, such as social security or retirement earnings, that pose important concerns when considering the stability of such income (Belt, 1999).

In an attempt to address these issues, the North Dakota State Data Center developed a model to forecast North Dakota's income generation by type of income. The goal of this modeling strategy was to develop scenarios of income generation based on historical patterns. In brief, the model was designed to answer the question, "What will the distribution of income over the next 10 to 15 years look like if the current pattern of age-specific earnings continues into the future unchanged?"

Model Development, Data Sources, and Assumptions

The model was developed in six stages using North Dakota data from the U.S. Census Bureau. The stages included: 1) classifying residents ages 15 and older by age and by type of income earned; 2) determining the number of earners, by age, for each of the eight types of incomes; 3) establishing a point estimate for each income range; 4) generating aggregate income by each age category for each type of income; 5) deriving a point estimate for income generation for each age cohort; and 6) projecting income earnings by applying the per earner income estimate to age-specific population projections for North Dakota. A more detailed description of each stage follows.

Stage 1

Data were obtained from the 1 percent Public Use Microdata Sample (PUMS) files for North Dakota from the 1980, 1990, and 2000 censuses. The initial step was to organize the data by classifying all residents ages 15 and older into specific age cohorts and examining the possible types of income. The PUMS files allowed these data to be organized by eight different types of income (i.e., wage and salary, self-employment, interest, social security, supplemental security, public assistance, retirement, and other). A limitation of PUMS was that it provided established income ranges for each type of income. These income

groups ranged from losses exceeding $19,998 to earnings exceeding $5 million. The age of persons was initially collapsed into five main cohorts (i.e., 15 to 24, 25 to 34, 35 to 54, 55 to 64, and 65 and older). These age cohorts were used because they represent meaningful clusters of the labor force, as noted earlier. Since the literature demonstrates important shifts in income earnings after age 65 (Maestas, 2004), more refined age cohorts of those ages 65 and older (i.e., 65 to 69, 70 to 74, 75 to 79, 80 to 84, and 85 and older) also were included in the model.

Stage 2

The second stage in the modeling process was to determine the number of earners, for each age cohort, for each of the eight income types. This was accomplished by summing the total number of persons reporting earnings by each income type. Since our interest is centered on the consequences of the shifting elderly population, additional attention was focused on the income distribution among seniors. Thus, the more refined age cohorts for those ages 65 and older were included. In order to assess the stability of the distribution of earnings over time, a three decade portrait was calculated from corresponding census files. These distributions are arrayed in Table 3. It is important to note that two of the income categories for 1980 are not directly comparable with 1990 or 2000. In particular, supplemental security and retirement income were not reported separately in 1980 and instead were reported under "other income". After comparing the decades, the distribution of income generation by age was determined to be fairly stable over time (see discussion in previous section). Thus, the 2000 distribution was used in the model.

Stage 3

The third stage in the process was to establish a point estimate for each income range, for each type of income, in order to calculate aggregate totals. The midpoint was used as the point estimate and it represents the statistical center of each income range. Negative income was set to zero. This seemed reasonable since negative income is restricted to self-employment and interest. Furthermore, only 2,450 people reported negative income in 2000, which was approximately one-half of 1 percent of all persons ages 15 and older. The midpoint for the last income range with reported North Dakota earners of all income types was set at $200,000 in order to be conservative in forecasting. There were 9,259 North Dakotans reporting incomes of $100,000 or more in 2000.

Stage 4

The fourth stage in the modeling process was to generate aggregate income for each age cohort, by each type of income. This was accomplished by multiplying the number of earners in each age cohort by the midpoint income estimate for each of the income ranges reported in the PUMS files. These products were then summed for each age cohort and for each type of income. The results are shown in Table 5.

Stage 5

The fifth stage in the modeling process centered on deriving the income earned in each age cohort per earner. This was done by dividing the aggregate income generated within each age cohort by the total earners in that age cohort. These age-specific income estimates "per earner" are displayed in Table 6. The estimate of average earnings by age cohort in the year 2000 ranged from $10,115 for those ages 15 to 24

Table 6. Average Per-Earner Income, by Income Type, by Age Cohort, in North Dakota: 2000

Earners by Income Type	Average Per-Earner Income for Earners Ages 15 and Older (Dollars)											
	Total	Ages 15 to 64					Ages 65 and Older					
		15 to 24	25 to 34	35 to 54	55 to 64	Total	65 to 69	70 to 74	75 to 79	80 to 84	85 plus	Total
Total Earners	$24,433	$10,115	$24,496	$32,098	$28,868	$25,288	$24,588	$20,789	$21,544	$18,561	$16,208	$20,858
Wage and Salary Income Earners	$23,285	$9,975	$23,549	$29,906	$27,727	$23,588	$21,251	$10,474	$12,570	$8,895	$29,564	$16,326
Self Employment Income Earners	$20,329	$7,407	$18,241	$24,246	$18,101	$21,291	$15,637	$13,324	$15,645	$8,267	$3,517	$13,749
Interest Income Earners	$6,425	$1,667	$2,031	$4,397	$5,813	$3,999	$8,868	$12,567	$11,777	$14,835	$9,263	$11,450
Social Security Income Earners	$8,163	$6,202	$4,988	$5,629	$7,060	$6,470	$8,787	$8,229	$8,384	$8,435	$8,626	$8,482
Supplemental Security Income Earners	$6,081	$4,024	$5,909	$4,792	$6,525	$5,339	$8,224	$5,675	$10,362	$11,946	$5,373	$7,270
Public Assistance Income Earners	$3,066	$1,249	$1,768	$3,482	$2,980	$2,594	$1,516	$3,129	$1,889	$1,249	$11,213	$4,251
Retirement Income Earners	$11,145	$2,247	$6,569	$13,694	$9,610	$10,990	$12,442	$10,687	$11,616	$11,287	$8,637	$11,227
Other Income Earners	$6,458	$3,470	$6,374	$5,655	$8,093	$5,763	$8,783	$8,437	$8,373	$9,897	$6,762	$8,413

Source: Calculated by the North Dakota State Data Center using data from the U.S. Census Bureau, 2000 Census 1% PUMS file.

to $32,098 for those ages 35 to 54. Average earnings among seniors ranged from $16,208 for those ages 85 and older to $24,588 for the youngest senior cohort (i.e., ages 65 to 69).

One of the drawbacks of using average per-earner income is revealed in the wage and salary income category among seniors. The data indicate that in 2000, seniors ages 85 and older received, on average, $29,564 in wage and salary income. This average wage and salary figure is surprisingly comparable to that of prime working-age earners (i.e., ages 35 to 54) who earned, on average, $29,906 in wage and salary income. The estimate for the older seniors is most likely skewed by a few older seniors who earned a relatively large salary. In fact, closer scrutiny reveals that 51 of the 508 seniors ages 85 and older who earned a wage or salary in 2000 were in the highest income range, earning at least $175,000.

Stage 6

The final stage in the modeling process was to project income earnings by applying the per-earner income estimate to age-specific population projections for the state. The population projections were based on a series developed in 2002 using a cohort-survival method (see Rathge, et al., 2002b). These projections used Census 2000 numbers as a baseline and applied three-year trends in births and deaths along with a 10-year trend line in migration to determine the future population of the state. Projections were provided in five-year age cohorts with a final age category of 85 years and older, thus allowing for use in the model. The projections of persons ages 15 and older by age cohort used in the model are provided in Table 1.

Assumptions

No attempt is made in this study to incorporate additional income that may be generated as a result of wealth transfer. A recent study sponsored by the Impact Foundation indicates that nearly $38 billion in household wealth will be transferred in North Dakota through estates between 2001 and 2020, with half of this wealth passing to heirs (Havens and Schervish, 2006).

The economic simulation model allows one to contrast different profiles of income earners and the aggregate income they produce given certain assumptions. The results reported in this study focus specifically on comparing the profile of North Dakota income earners in the year 2000 with a projected profile for the years 2015 and 2020. This projected profile is based on two basic assumptions. The first is that the age-specific distribution of residents will reflect the trend in births, deaths, and migration used to generate the population projections (see Rathge, et al., 2002b). This is a reasonable assumption because the birth and death rates have changed very little over the past decade. In addition, the age-specific migration rates that were used in the population projections have remained relatively stable during the past five years. As a result, the statewide population projections used in the modeling and generated in 2002 have been trending very closely with population estimates that have been released annually by the U.S. Census Bureau (see Rathge, et al., 2002b; U.S. Census Bureau, 2006b). For example, the 2005 population for North Dakota based on population projections was 640,200 (see Table 1). The Census Bureau estimate of the state's population for the year 2005 was 636,677, a difference of 3,523 residents or less than 1 percent.

The second basic assumption used in the economic modeling is that the age-specific distribution of income earners will be similar to what existed in 2000. A review of the data for the past three decades supports this assumption because there has been relative stability in the distribution of earners by age cohort as reported in Table 3. Moreover, the purpose of the simulations in this report is to simply contrast the profile of earners in the year 2000 with a profile for 2015 and 2020 given the assumption that the earning distribution is held constant. The difference in the profiles only reflects changes in the age composition. Therefore, one should interpret the findings by viewing the 2015 and 2020 data as a snapshot of what would exist if you simply overlay the projected population in 2015 and 2020 on the income earner distribution found in 2000. Therefore the income data forecast for 2015 and 2020 should be viewed as constant 2000 dollars without any attempt to adjust the income for inflation or changes in earnings. Another way to look at the data is to say, "What would the income earner profile have looked like in 2000 if the age distribution projected for 2015 or 2020 existed in 2000?"

Results from the Economic Simulation Model for North Dakota
The value of these modeling scenarios is that they offer a comparison of the changes that are likely to occur as a result of the shifting age distribution without some form of intervention. One must keep in mind that these portraits are single-year profiles. Therefore the changes that are illustrated in the profiles should be viewed as a contrast for only one year. If one wanted to assess the accumulative effect of the shifting age distribution, portraits for each projected year would need to be calculated and accumulated.

Projected Change in Income Earners
The likely change in income earners as a result of the demographic shifts projected over the next 10 to 15 years is shown in Table 7. What is most pronounced about the data is the dramatic and significant declines expected to occur in the young and prime working-age population. Overall, the loss in the number of earners among young adults (i.e., ages 15 to 24) is expected to reach 14,142 in 2015 compared to 2000 and 16,683 in 2020 compared to 2000. This reflects an estimated drop in earners of 19 percent for the year 2020 relative to 2000. An even more dramatic dip is projected for the prime working-age population (i.e.,

Table 7. Projected Change in Earners and Aggregate Income, by Income Type, by Age Cohort, in North Dakota: 2000 to 2015, and 2000 to 2020

Age of Earner and Income Type	Total Earners					Total Aggregate Income in Millions of Dollars ($1,000,000)				
		2015		2020			2015		2020	
	2000	Total	Change: 2000 to 2015	Total	Change: 2000 to 2020	2000	Total	Change: 2000 to 2015	Total	Change: 2000 to 2020
Ages 15 and older										
Total	469,396	491,507	22,111	496,178	26,782	$11,468.9	$12,010.2	$541.3	$12,038.5	$569.5
Wage and Salary	346,317	336,657	-9,660	326,021	-20,296	$8,064.2	$7,937.7	-$126.5	$7,644.7	-$419.4
Self Employment	51,523	55,176	3,653	55,001	3,478	$1,047.4	$1,078.7	$31.2	$1,061.9	$14.5
Interest	137,569	154,581	17,012	161,188	23,619	$883.9	$1,074.7	$190.8	$1,177.5	$293.7
Social Security	101,804	137,772	35,968	157,450	55,646	$831.0	$1,131.9	$300.9	$1,300.2	$469.2
Retirement	27,499	36,394	8,895	40,702	13,203	$306.5	$398.8	$92.3	$447.9	$141.4
Ages 15 to 24										
Total	85,614	71,472	-14,142	68,931	-16,683	$866.0	$722.9	-$143.1	$697.2	-$168.8
Wage and Salary	80,681	67,353	-13,328	64,959	-15,722	$804.8	$671.9	-$132.9	$648.0	-$156.8
Self Employment	2,125	1,774	-351	1,711	-414	$15.7	$13.1	-$2.6	$12.7	-$3.1
Interest	11,206	9,355	-1,851	9,022	-2,184	$18.7	$15.6	-$3.1	$15.0	-$3.6
Social Security	1,320	1,102	-218	1,063	-257	$8.2	$6.8	-$1.4	$6.6	-$1.6
Ages 25 to 34										
Total	72,647	72,698	51	67,422	-5,225	$1,779.5	$1,780.8	$1.3	$1,651.6	-$128.0
Wage and Salary	65,725	65,771	46	60,998	-4,727	$1,547.8	$1,548.8	$1.1	$1,436.5	-$111.3
Self Employment	7,866	7,872	6	7,300	-566	$143.5	$143.6	$0.1	$133.2	-$10.3
Interest	12,981	12,990	9	12,047	-934	$26.4	$26.4	$0.0	$24.5	-$1.9
Social Security	870	871	1	807	-63	$4.3	$4.3	$0.0	$4.0	-$0.3
Ages 35 to 54										
Total	175,521	146,493	-29,028	138,547	-36,974	$5,633.9	$4,702.2	-$931.8	$4,447.1	-$1,186.8
Wage and Salary	152,897	127,610	-25,287	120,689	-32,208	$4,572.6	$3,816.4	-$756.2	$3,609.4	-$963.2
Self Employment	26,853	22,412	-4,441	21,196	-5,657	$651.1	$543.4	-$107.7	$513.9	-$137.2
Interest	51,370	42,874	-8,496	40,549	-10,821	$225.9	$188.5	-$37.4	$178.3	-$47.6
Social Security	4,617	3,853	-764	3,644	-973	$26.0	$21.7	-$4.3	$20.5	-$5.5
Retirement	3,981	3,323	-658	3,142	-839	$54.5	$45.5	-$9.0	$43.0	-$11.5
Ages 55 to 64										
Total	45,053	78,416	33,363	77,436	32,383	$1,300.6	$2,263.7	$963.1	$2,235.4	$934.8
Wage and Salary	32,581	56,708	24,127	56,000	23,419	$903.4	$1,572.3	$669.0	$1,552.7	$649.3
Self Employment	8,111	14,117	6,006	13,941	5,830	$146.8	$255.5	$108.7	$252.3	$105.5
Interest	17,218	29,968	12,750	29,594	12,376	$100.1	$174.2	$74.1	$172.0	$71.9
Social Security	9,364	16,298	6,934	16,095	6,731	$66.1	$115.1	$49.0	$113.6	$47.5
Retirement	4,894	8,518	3,624	8,412	3,518	$47.0	$81.9	$34.8	$80.8	$33.8
Ages 65 and older										
Total	90,561	122,428	31,867	143,841	53,280	$1,888.9	$2,540.6	$651.9	$3,007.1	$1,118.2
Wage and Salary	14,433	19,213	4,780	23,375	8,942	$235.6	$328.3	$92.6	$398.2	$162.6
Self Employment	6,568	9,002	2,434	10,852	4,284	$90.3	$123.0	$32.7	$149.8	$59.5
Interest	44,794	59,393	14,599	69,976	25,182	$512.9	$670.0	$157.1	$787.7	$274.8
Social Security	85,633	115,647	30,014	135,840	50,207	$726.4	$984.0	$257.6	$1,155.4	$429.0
Retirement	17,964	23,935	5,971	28,566	10,602	$201.7	$268.3	$66.6	$321.1	$119.4

Source: Calculated by the North Dakota State Data Center using data from the U.S. Census Bureau, 2000 Census 1% PUMS file.

ages 35 to 54). A loss of 29,028 earners is expected when contrasting the year 2015 with 2000. This estimate escalates to a loss of 36,974 earners, or 21 percent, if one contrasts the year 2020 with 2000. In both of these age cohorts, more than 85 percent of the loss will occur among wage and salary earners.

A stark contrast in the number of earners is expected among the pre-retirees (i.e., ages 55 to 64). Projections indicate that between 2000 and 2015 the number of these earners will increase by 33,384. However, unlike the younger age cohorts, only 72 percent of these individuals will be wage and salary income earners using the 2000 profile. Thus, the overall losses in wage and salary earners that is projected to occur among those younger than age 55 will not be replaced by the growth among the pre-retiree wage and salary workers. Rather, a significant portion of total pre-retiree earners will earn income from sources other than wages and salaries, particularly interest income, retirement income, and self-employment income.

A similar but more dramatic increase among earners is expected to occur in the elderly population (i.e., ages 65 and older). As noted in Table 7, the increase in total elderly earners between 2000 and 2015 is expected to reach 31,867 and jump to 53,280 by 2020. This means that elderly earners will expand rapidly in both aggregate numbers and percentage of total earners over the next 10 to 15 years at the same time that young adult earners and prime working-age earners are declining. For example, in 2000, seniors (i.e., ages 65 and older) represented 19 percent of the total 469,396 income earners in the state. The 90,561 senior income earners are expected to expand their ranks to 122,428 by 2015 and represent 25 percent of all earners in the state. The modeling indicates these numbers and proportions are expected to jump to 143,841 senior earners by 2020 accounting for 29 percent of total earners. In contrast, earners between the ages of 15 and 54 totaled 333,782 in 2000 and accounted for 71 percent of all earners in the state. However, the projections indicate that earners in this age cohort will decline to 290,663 by 2015 and represent 59 percent of total earners and further drop to 274,900 by 2020 and account for 55 percent of total earners.

The relative change in income earners when contrasting the profiles for 2000 and 2020 is graphically illustrated in Figure 9. The most dramatic change that is anticipated will be among wage and salary earners. Even though the number of senior earners will increase dramatically, they will represent very few wage and salary earners. In fact, in 2000, seniors accounted for 4 percent of all wage and salary earners. Even with the movement of the baby-boom cohort into the senior ranks, if the proportion of seniors who are wage earners remains the same as in 2000, then their relative proportion of total wage and salary earners will expand to only 7 percent by 2020. This is expected to happen even though seniors are expected to account for 29 percent of all income earners in 2020.

Overall, the model indicates that the number of wage and salary earners is expected to decline by 20,296 people when contrasting 2000 with 2020, even though the total number of earners is expected to increase by 26,782 over the same time period. The difference is accounted for by the significant jump in individuals who are expected to earn social security, interest, and retirement income. The rise in earners of social security between 2000 and 2020 is expected to reach 55,646 and total 157,450 North Dakotans by 2020. Similarly, residents in the state who are expected to earn interest income will jump by 23,619 between 2000 and 2020 and total 161,188 residents by 2020, 43 percent of whom will be seniors.

Figure 9. Projected Change in Earners, by Income Type, by Age Cohort, in North Dakota: 2000 to 2020
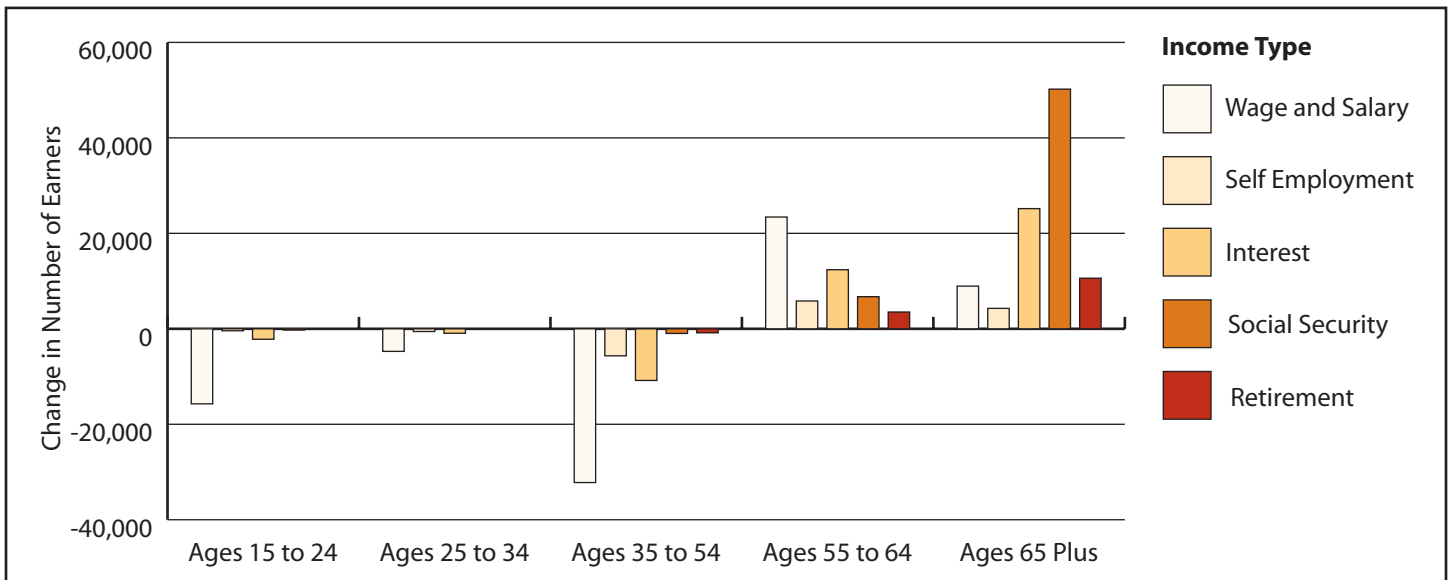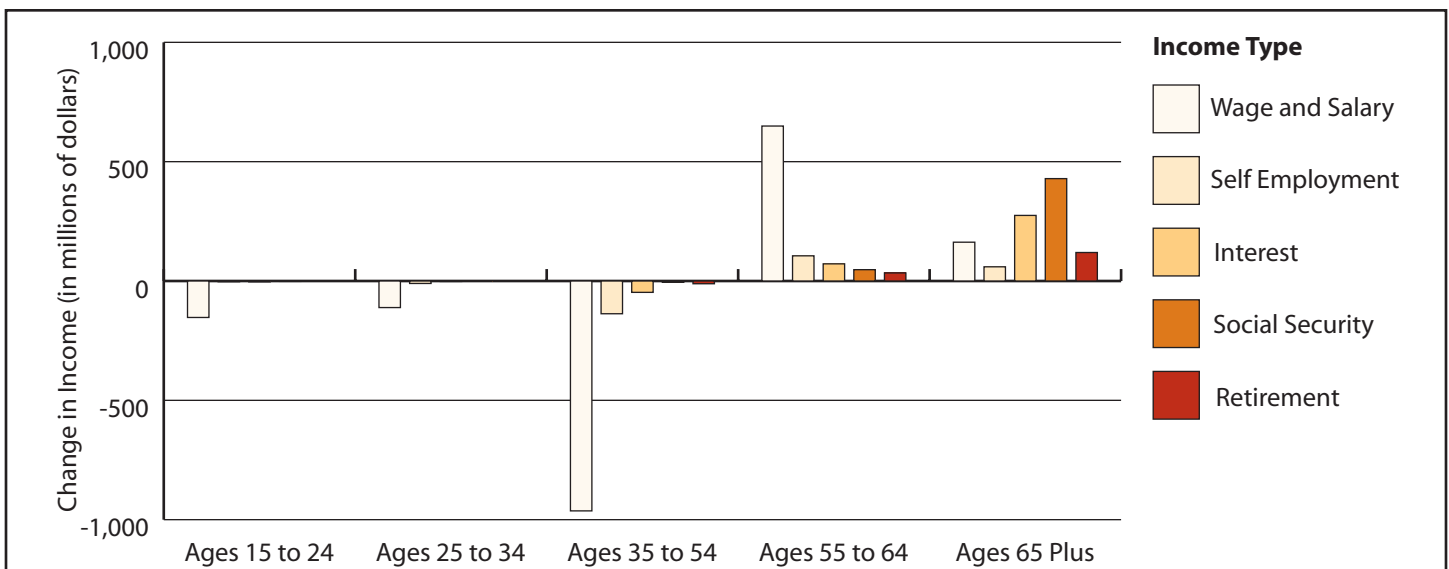

Source: Calculated by the North Dakota State Data Center using data from the U.S. Census Bureau, 2000 Census 1% PUMS file.

Projected Change in Aggregate Income

The consequence of these shifts in earners likely will have important implications on income generation in the state. The results of the shifting age profile on North Dakota's future income based on economic simulation modeling is displayed in Table 7 and Figure 10. The assumption used in the simulation is that the distribution of future earnings by type of income remains the same as in 2000. In brief, the modeling simply applies the age-specific profile of earnings by type of income reported in Census 2000 to the projected population for the years 2015 and 2020. These estimates, in essence, represent the amount of income that would be generated in North Dakota if we were to apply the age-specific population for 2015 and 2020 to the profile of income earners for 2000. This allows us to contrast total income generated in the

Figure 10. Projected Change in Total Aggregate Income, by Income Type, by Age Cohort, in North Dakota: 2000 to 2020

Source: Calculated by the North Dakota State Data Center using data from the U.S. Census Bureau, 2000 Census 1% PUMS file.

state for 2000 with what would occur by simply changing the demographic profile of the state. Therefore, these income estimates reflect constant 2000 dollars with no attempt to adjust for inflation or changes in earning power that might occur between 2000 and 2015 or 2020.

Results of the income simulation indicate that the demographic shifts expected to occur in the next 10 to 15 years will result in an overall net increase in income. If we were to apply the state's age profile projected for the year 2020 onto the earnings profile for the year 2000, the results show a net gain of nearly $570 million. However, where this income is generated has important implications which will be discussed in the next section. As noted in Figure 10, loss of wage and salary earnings from the prime working-age population (i.e., ages 35 to 54) is expected to exceed $963 million. Additional wage and salary losses of $111 million and $153 million are forecast for the age cohorts 25 to 34 and 15 to 24, respectively. These losses will be partially offset by gains from the pre-retirees and seniors, forecast at $649 million and $163 million, respectively. Nonetheless, the combined net loss in wage and salary income across all age cohorts is expected to exceed $419 million in 2020.

The simulation model indicates that the losses in wage and salary income will be offset by significant gains in income generated through social security, interest, and retirement benefits. The majority of these gains will be produced by seniors. For example, the aging of the baby boomers between 2000 and 2020 will place them in the age bracket eligible for social security. The net change in senior income derived from social security as a result of using the 2020 age profile compared to the 2000 age profile is $429 million. In addition, a significant difference in the number of seniors between 2000 and 2020 is forecast to result in a net gain of $275 million from interest income and $119 million from retirement income. In total, the difference in the profile of seniors contrasting 2000 and 2020 is forecast to translate into a net gain of $1.1 billion. This means that seniors in the year 2020 are expected to generate 25 percent of the state's total income compared to 17 percent in 2000.

The consequences of this shift are best understood when one recognizes that the bulk of seniors' income earnings comes from social security, interest, and retirement income. In 2000, income from social security, interest, and retirement income accounted for 18 percent of total income generated in the state or $2 billion of the state's $11.5 billion. The simulation model suggests that this proportion will increase to 24 percent of total income or nearly $3 billion of the state's projected $12 billion in income by the year 2020.

The simulation model's forecast of net income losses for the prime work force (i.e., ages 35 to 54) are dramatic. The demographic shift in this age cohort is forecast to produce 32,208 fewer wage and salary earners in 2020 relative to 2000. The corresponding consequence of this loss in earners translates into a net loss of nearly $1 billion in wage and salary income. Similar losses among wage and salary earners ages 25 to 34 and 15 to 24 are forecast to result in corresponding net losses of $111 million and $153 million, respectively. It is important to reiterate that these net losses correspond to only one year; the profile of 2000 compared to 2020.

IMPLICATIONS

The future demographic challenges for North Dakota and other Great Plains states require serious and thoughtful strategic planning by policy makers. The pace at which demographic change will occur can quickly overwhelm even the most ardent planners and community developers. This makes the looming demographic transition even more compelling and the need for action more urgent. This research highlights two of the fundamental issues that need to be addressed. The first is the need to reexamine labor force changes and the consequences they hold, especially for rural communities. Most rural communities are already disadvantaged because of skills mismatch (Greengard, 1998), chronic low wages (Gibbs and Cromartie, 2000), and decades of out-migration among the entry labor pool (Rathge, 2005). The predicted labor shortfall among the prime working-age population could devastate already fragile rural economic systems and accelerate the further demise of these communities. The second fundamental change that will need to be addressed is the dramatic population shift toward a ballooning elderly population. The economic simulation modeling outlined in this study demonstrates the potential contribution seniors could have on the state's economy. However, a growing senior population also places increased demands on infrastructure, social services, and health services (Rogers, 2002; Reeder and Calhoun, 2002). An action plan for addressing these two major demographic changes needs to be developed.

Strategies to Address a Changing Labor Force

The rapidly shifting demographic composition of the labor force will have important implications, especially for North Dakota and the Upper Great Plains whose population is aging faster than the nation. Nationally, population projections indicate that seniors ages 65 and older will expand by 1.3 percent per year between 2000 and 2010, 3.1 percent per year between 2010 and 2020, and 3.5 percent per year between 2020 and 2040 (Penner, et al., 2002). The corresponding consequence on the labor force results in a dramatic slow down in labor force growth. For example, in the U.S., the annual labor force growth rate during the decade of the 1990s was 1.13 percent. It is expected to drop to 0.88 percent for the 2000 to 2010 period and further decline to 0.34 percent for the 2010 to 2020 time period.

The research literature demonstrates that a slowdown in labor force growth will encourage employers to adopt one of several strategies. The first possible response is for employers to replace labor with capital. If labor becomes scarce or very costly relative to capital, employers will likely seek ways to replace workers with equipment, make labor-saving technological substitutions, or improve organizational efficiency (Little and Triest, 2002). Advancements in robotics, computerization, and increased reliance on out-sourcing illustrate movement in this direction.

A second possible response to addressing a declining domestic labor market is to tap the international labor markets. This is best reflected in recent increased legislative activities directed at immigration. For example, the Immigration Reform and Control Act (IRCA) of 1986 paved the way for the legalization of millions of undocumented aliens living in the U.S. since 1982. In addition, for fiscal years 2001 to 2003, Congress increased the number of H-1B non-immigrant visas available from 65,000 to 195,000 annually. Immigration legislation including guest worker programs is now being hotly debated in Congress.

Although immigration may expand the labor pool, its impact on local economies may be attenuated by the significant educational gap frequently found between foreign and domestic workers. Nearly 68 percent of Mexican immigrants ages 25 to 64, and 34 percent of immigrants from other Western Hemisphere countries have not completed high school. This is compared to 11 percent of U.S. born residents (Little and Triest, 2002). An extensive body of research suggests that substitution of labor between immigrants and domestic workers will have a limited value because the limited skill levels of recent immigrants makes them less competitive (Hamermesh, 2001).

A third alternative response is to expand labor participation among older workers. Voluntary retirement is relatively new in the U.S. and has increased rapidly over the years (Boskin and Hurd, 1978). In 1950, about half of the men in the U.S. ages 65 and older said they were retired relative to 84 percent by 1985 (Burtless and Quinn, 2000). After a marked increase in the proportion of men dropping out of the labor force by age 65, more recent data suggest this trend may have stabilized or even reversed (Quinn, 1999). There is some debate regarding how best to measure trends in retirement and whether current data actually do reflect a shifting downward trend (see Gendell and Siegel, 1992). Nonetheless, survey findings suggest that baby boomers expect to be engaged, active, and working long after age 65 (Stum, et al., 2002).

The proportion of potential workers who have reduced (or will reduce) their labor force participation is significantly larger than current legal immigration flow. Therefore, it is logical to assume that a more prudent approach to addressing the labor shortage would be to encourage older workers to remain in the labor force or reenter it rather than attempt to dramatically reform immigration laws. For example, in 1990, there were an estimated 425,000 legal immigrants of working age. In contrast, the average number of workers ages 51 and older who said that they retired in 1999 or 2000 was 1.6 million (Penner, et al., 2002). Simulation estimates by Toder and Solanki (1999) indicate that luring about 13 percent of persons ages 55 and older back into the work force would keep the ratio of effective labor force to total population constant between 1997 and 2040. If one adjusts for the growing resource demand required by an aging population, then the proportional increase jumps to 31 percent.

Elderly as an Economic Development Strategy

An economic development theme growing in popularity among developers and planners is to "Play on your relative strength." This is best accomplished by first isolating your community's key assets and then determining to which innovative niche the assets can be applied. The demographic trends for North Dakota and much of the Upper Great Plains indicates that one of its strengths is a growing elderly population. It should follow, therefore, that the elderly may be the innovative niche that could be tapped to advance the state's economic development. The simulation modeling reported in this study demonstrates the elderly will play a growing role in the state's economy. A key question that needs to be addressed is, "What role should they play?"

A fundamental concern to be addressed is whether seniors can be a viable source of economic development or whether they should be viewed as a potential drain on community resources. Fortunately, the notion that retirees can be a useful source of economic development is gaining acceptance (Reeder,

1998). In fact, Haas and Serow (2002) report that at least 10 states have implemented programs aimed at attracting seniors as part of an economic development program. In part, this is due to the realization that elderly can be economic assets to rural communities. They are consumers of goods and services, thus they stimulate local economies. Most seniors own property and therefore add to the local tax base. Seniors invest their capital in local communities and at times even continue to participate in the local labor market. In fact, the contribution of seniors to local and regional economies can be substantial. Sastry's (1992) economic impact analysis of in-migrating elderly to Florida found that a new job was created for every 2.5 retirees. The movement of more wealthy retirees to western North Carolina produced a new job for each retiree who relocated (Haas and Serow, 1990). Similar findings were reported by Bennett (1993) who evaluated the economic contribution of elderly moving to various South Atlantic coast destinations. However, most of these studies focused on amenity growth areas, and as Isserman (2000) reports, many rural areas that have persistently struggled will continue to be left out unless progressive policies are instituted.

One area of policy consideration aimed at attracting or retaining elderly that has received much attention has been tax burden. A flurry of economic analyses has been conducted to assess the consequence of state fiscal policies on elderly migration flows. Modeling of census migration flows demonstrate that elderly migration is influenced by fiscal policies (see Conway and Houtenville, 1998; Duncombe, et al., 2000). Indicators that have the largest influence are inheritance taxes, income taxes, and property taxes. These fiscal policies are also age-specific. For example, Woo (2003) has demonstrated that the young old (i.e., ages 60 to 74) are most influenced by income tax and property tax while older seniors (i.e., ages 75 and older) are most influenced by inheritance taxes. The data also suggest that such broad fiscal incentives might be counterproductive because the corresponding revenue losses from such programs would outweigh the benefits. Thus, targeting fiscal policy to specific niche groups might be most effective. As seniors lose mobility, lose a significant other, or have a major health concern, they look to family or friends for assistance, commonly called informal caregiving. Many of the returning elderly migrants to the Great Plains are in search of informal caregiving. Tax or fiscal incentives that assist caregivers should prove beneficial because they encourage the seniors to relocate while leveraging the economic cost of caring for the senior through the informal caregiver.

Another policy area that holds promise is to entice seniors to remain in the workforce, thereby reducing the labor shortage burden. A recent Harris survey indicates that, nationally, 95 percent of pre-retirees prefer to continue to work in some capacity even as volunteers (Penner, et al., 2002). Recent census figures indicate that 13 percent of all seniors in North Dakota ages 65 and older were employed and surveys indicated that most enjoyed only part-time work (Rathge, et al., 2002a). In fact, the main factor North Dakota seniors stated that would influence them to reenter the labor market was flexibility, especially in hours and benefits.

A major reason deterring seniors from reentering the labor market or expanding their work hours is the large number of legal and institutional barriers to flexible employment. One inhibiting factor is the age time frame defined in benefit pension plans. For example, if a plan views 65 as the normal age of retirement, there might be accrual disincentives for working past a certain age (e.g., age 55). In other words, increased

pension earnings gained by working past a certain age may not compensate for the corresponding loss of benefits for working the additional time (see Penner, et al., 2002). A second important drawback is health care costs. Employers hiring older workers incur much steeper premiums, sometimes twice the level of younger workers. In addition, employers hiring workers ages 65 and older are responsible for health care costs before Medicare contributes. These and other employee benefit issues are largely governed by three basic laws: the Tax Code, Employee Retirement Income Security Act (ERISA), and the Age Discrimination in Employment Act. These laws should be revisited to explore policies that might be beneficial to all.

The challenges to retiree-attractive policies are numerous. An investment in seniors as an economic development strategy means that communities will need to address seniors' current and future residential needs in order to discourage them from seeking more suitable environments. These needs include housing, medical services, transportation, social services, and a host of others. In addition to the resource and infrastructure challenges, communities will face developmental or political issues such as how best to interface government with institutions or groups within the community to best serve seniors (Skelley, 2004).

Herein lies both the challenge and opportunity. How can rural communities attract the needed labor and find the financial capital to serve the needs of its residents? As with most challenges that face rural communities, the desire to aggressively address these issues will likely determine success or failure. The intent of this research is to demonstrate the magnitude of change that will likely occur in North Dakota and hopefully initiate a debate that will foster action.

REFERENCES

Belt, Bradley D. (Ed.) (1999). *The 21st Century Retirement Security Plan: The National Commission on Retirement Policy Final Report*. Washington, DC: National Commission on Retirement, Center for Strategic and International Studies.

Bennett, D. Gordon. (1993). Retirement Migration and Economic Development in High-Amenity, Nonmetropolitan Areas. *Journal of Applied Gerontology*, *12*(4), 466-481.

Boskin, Michael J., & Michael D. Hurd. (1978). *The Effect of Social Security on Early Retirement*. NBER Working Paper No. W0204. Cambridge, MA: National Bureau of Economic Research.

Burtless, Gary, & Joseph F. Quinn. (2000). *Retirement Trends and Policies to Encourage Work among Older Americans*. Paper presented at annual conference of the National Academy of Social Insurance, Washington, D.C. (January 26-27).

Conway, Karen Smith, & Andrew J. Houtenville. (1998). Elderly Migration and State Fiscal Policy: Evidence from the 1990 Census Migration Flows. *The National Tax Journal, 54*(1), 103-123.

Duncombe, William, Mark Robbins, & Douglas Wolf. (2000). *Chasing the Elderly: Can State and Local Governments Attract Recent Retirees?* Aging Studies Program Paper No. 22. Syracuse, NY: Center for Policy Research, Maxwell School of Citizenship and Public Affairs, Syracuse University.

Gendell, Murray, & Jacob S. Siegel. (1992). Trends in Retirement Age by Sex, 1950-2005. *Monthly Labor Review*, *115*(7), 22-29.

Gibbs, Robert, & John B. Cromartie. (2000). Low-Wage Counties Face Locational Disadvantages. *Rural Conditions and Trends: Socioeconomic Conditions Issue*, *11*(2), 18-26.

Greengard, Samuel. (1998). Economic Forces are Squeezing Growth Potential - But HR Can Unlock a Prosperous Future. *Workforce*, *77*(3), 44-54.

Haas, William H. III, & W.J. Serow. (1990). *The Influence of Retirement In-Migration on Local Economic Development*. Final Report to the Appalachian Regional Commission. ARC Contract 89-48 NC-10269-89-I-302-0327. North Carolina Center for Creative Retirement, University of North Carolina-Asheville.

Haas, William H. III, & W.J. Serow. (2002). The Baby Boom, Amenity Retirement Migration, and Retirement Communities: Will the Golden Age of Retirement Continue? *Research on Aging*, *24*(1), 150-164.

Hamermesh, Daniel S. (2001). *Older Workers in the Coming Labor "Shortage:" Implications of Labor Demand*. Roundtable presentation at the Retirement Research Consortium, The Brookings Institution, Washington, DC (March 23).

Havens, John J., & Paul G. Schervish. (2006). *Wealth Transfer in North Dakota: A Call to Action-Investing in Our Future*. Fargo, ND: Impact Foundation. Retrieved from http://www.dakmed.org/impact/pdf/wealth-transfer-nd.pdf

Internal Revenue Service. (2006a). Statistics of Income Division, Individual Master File System. *Table 2. Individual Income and Tax Data, by State and Size of Adjusted Gross Income, Tax Year 2004*. January. Retrieved from http://www.irs.gov/pub/irs-soi/04in35nd.xls

Internal Revenue Service. (2006b). Tape extraction from Tax Year 2005 data. Unpublished data.

Isserman, Andrew. (2000). Creating New Economic Opportunities: The Competitive Advantages of Rural America in the Next Century. *International Regional Science Review*, *24*(1), 38-58.

Little, Jane Sneddon, & Robert K. Triest. (2002). The Impact of Demographic Change on U.S. Labor Markets. *New England Economic Review*, 1, 47-72.

Maestas, Nicole. (2004). *Back to Work: Expectations and Realizations of Work After Retirement*. Working Paper WP 2004-085. Annarbor, MI: Michigan Retirement Research Center, University of Michigan.

Parker, Tim. (2005). *Measuring Rurality: 2004 County Typology Codes*. Retrieved August 18, 2006, from http://www.ers.usda.gov/Briefing/Rurality/Typology

Penner, Rudolph G., Pamela Perun, & Eugene Steuerle. (2002). *Legal and Institutional Impediments to Partial Retirement and Part-Time Work by Older Workers*. Washington, DC: The Urban Institute.

Quinn, Joseph F. (1999). *Has the Early Retirement Trend Reversed?* Economics Department Working Papers in Economics. Chestnut Hill, MA: Department of Economics, Boston College.

Rathge, Richard. (2005). The Changing Population Profile of the Great Plains. *Great Plains Sociologist*, *17*(2), 82-99.

Rathge, Richard, Richard Ludtke, Ramona Danielson, Mandy Clemenson, Jordyn Nikle, Steph Noehl, Lindsey Bergeron, & Tammy Karlgaard. (2002a). *Needs Assessment of Long Term Care, North Dakota: 2002*. Fargo, ND: North Dakota State Data Center, North Dakota State University.

Rathge, Richard, Mandy Clemenson, & Ramona Danielson. (2002b). *North Dakota Population Projections: 2005 to 2020*. Fargo, ND: North Dakota State Data Center, North Dakota State University.

Reeder, Richard J. (1998). Retiree-Attraction Policies for Rural Development. *Agriculture Information Bulletin* No. 741. Washington, DC: Food and Rural Economic Division, Economic Research Service, U.S. Department of Agriculture.

Reeder, Richard J., & Samuel D. Calhoun. (2002). Federal Funding in Nonmetro Elderly Counties. *Rural America*, *17*(3), 20-31.

Rogers, Carolyn C. (2002). The Older Population in 21st Century Rural America. *Rural America, 17*(3), 2-10.

Sastry, M. L. (1992). Estimating the Economic Impacts of Elderly Migration: An Input-Output Analysis. *Growth and Change*, *23*(1), 55-79.

Skelley, B. Douglas. (2004). Retiree-Attraction Policies: Challenges for Local Governance in Rural Regions. *Public Administration and Management: An Interactive Journal*, *9*(3), 212-223.

Stum, Marlene, Janet Bechman, & Suzann Enzian Knight. (2002). *Later Life and Financial Security: What's Beyond 60?.* Financial Security in Later Life National Initiative, University of Minnesota. Retrieved from http://www.fsos2.che.umn.edu/stum/fsll/FactSheet.PDF

Toder, Eric, & Sandeep Solanki. (1999). *Effects of Demographic Trends on Labor Supply and Living Standards.* The Retirement Project Occasional Paper, No. 2. Washington, DC: The Urban Institute.

U.S. Census Bureau. (1924). Census of Population: 1920, *Number and Distribution of Inhabitants*, North Dakota. Washington, DC: U.S. Government Printing Office.

U.S. Census Bureau. (1952). Census of Population: 1950, *Volume II, Characteristics of the Population*, Part 34, North Dakota. Washington, DC: U.S. Government Printing Office.

U.S. Census Bureau. (1973). 1970 Census of Population, *Volume 1 Characteristics of the Population*, Part 36, North Dakota. Washington, DC: U.S. Government Printing Office.

U.S. Census Bureau. (2003). 2000 Census of Population and Housing, *Population and Housing Unit Counts* PHC-3-36, North Dakota. Washington, DC: U.S. Government Printing Office.

U.S. Census Bureau. (2004). *U.S. Interim Projections by Age, Sex, Race, and Hispanic Origin*. Retrieved August 2, 2006, from http://www.census.gov/population/www/projections/popproj.html

U.S. Census Bureau. (2006a). *Annual Estimates of the Population by Sex and Five-Year Age Groups for the United States: April 1, 2000 to July 1, 2005*. NC-EST2005-01. Retrieved August 2, 2006, from http://www.census.gov/popest/estimates.php

U.S. Census Bureau. (2006b). *Annual Estimates of the Population for Counties of North Dakota: April 1, 2000 to July 1, 2005*. CO-EST2005-01-38. Retrieved August 2, 2006, from http://www.census.gov/popest/estimates. php

U.S. Census Bureau. (2006c). *Annual Estimates of the Population for Incorporated Places of North Dakota: April 1, 2000 to July 1, 2005*. SUB-EST2005-04-38. Retrieved August 2, 2006, from http://www.census.gov/popest/ estimates.php

Weeks, John R. (1992). *Population: An Introduction to Concepts and Issues*. Belmont, CA: Wadsworth Publishing Company.

Woo, Seokjin. (2003). *An Empirical Analysis of the Effects of State Fiscal Policy on Retirement Migration*. Madison, WI: Department of Economics, University of Wisconsin-Madison.