

**U.S. HOUSING PROJECTION: PERCEPTIVES FROM POPULATION  
GROWTH AND DEMOGRAPHIC FACTORS**

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A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF  
THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE

in

THE FACULTY OF GRADUATE STUDIES

(Forestry)

THE UNIVERSITY OF BRITISH COLUMBIA

(Vancouver)

October 2012

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## **Abstract**

Over the past century, population growth and favourable demographic factors have strongly influenced the U.S. housing market. Demographic factors such as age cohorts, race and ethnicity have formed longstanding housing trends and preferences. These demographic factors are expected to continue as the U.S. population increases over the next few years.

In the U.S. West, the population is expected to increase the most compared to the rest of the country. As a result, this thesis examined six Metropolitan Statistical Areas (MSAs) in the U.S. West and forecast housing demand in relation to the number of units of housing starts and the volume of construction lumber required to build these housing units.

The population and demographic data from 2006 to 2015 for these six MSAs were analysed and results indicated cities with a large population base are expected to have higher housing starts demand and lumber consumption than cities with a smaller population base. Furthermore, different population age cohorts defined as Baby Boomers, Generation X and Generation Y will also affect housing preferences in terms of the size and type of the houses. Another key demographic trend is the mix in race and ethnicity, specifically with the high percentage of Hispanic population in the U.S. West. The Hispanics are the largest and fastest growing ethnic population in the U.S. West and are expected to be a major population segment influencing the future of the housing market.

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## Acknowledgements

Writing this thesis has been the most challenging task in my life in terms of balancing my time between work, family and the pursuit of a graduate degree. Without the immense support, guidance and understanding of the following people, completing this thesis would not have been a reality!

- Professor David Cohen, it gives me the greatest pleasure in acknowledging him as he always found ways to motivate and encourage me through one of the toughest times of my life.
- To my sisters and parents, who I am forever indebted to them as they are never too far to jump in and help keep my days on an even keel.
- To my two adorable daughters, who I owe my deepest gratitude to as they constantly express in the cutest and sweetest ways to inspire me to finish my degree.
- To my lovely wife, who is my strongest supporter with the utmost patience in seeing me pursue this dream and endeavour over the last several years. Thank you for believing in me and pushing me to do better.

*To my daughters, Kylie and Mya*



# 1 Introduction

Demographic factors are powerful tools in understanding the past and foretelling the future (Foot, 1996). Many economists refer to demographic factors as indicators of “trend” or sustainable demand for housing in the long-term (Harvard Joint Center for Housing Studies, 2002). The short-term fluctuation in relation to the “trend” is caused by macroeconomic factors such as income, interest rates, consumer confidence, and job market fluctuations.

The U.S. demographic factors have strong influences on the housing market (Adair, 2003). Historically, U.S. demographic<sup>1</sup> and socio-economic factors account for approximately two-thirds of the U.S. housing demand and the remaining one-third comes from replacing aging homes and replenishing low home inventories (National Association of Home Builders, 2001). Therefore, by analysing historical housing usage data, the future housing demand can be determined through population projections and demographic trends. Specifically, considering historical housing preferences of different generational cohorts<sup>2</sup> and also race and ethnicity<sup>3</sup> groups will further improve the future estimation of housing demand as the population increases (Adair, 2003). Therefore, this thesis will utilize U.S. demographic factors to estimate future housing trends and construction lumber demand on an annualized basis as the population increases from 2006 to 2015.

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<sup>1</sup> Demographic factors – net household formations, births, deaths, and net immigrations (Adair, 2003).

<sup>2</sup> Cohort is a group of people born at roughly the same time that have roughly a similar experience (Foot, 1999).

<sup>3</sup> Race relates to a person's appearance - chiefly the color of their skin. It is determined biologically, with genetic traits such as skin color, eye color, hair color, bone/jaw structure, etc. Ethnicity, on the other hand, relates to cultural factors such as nationality, culture, ancestry, language and beliefs (Diff En, 2009).

The overall structure of this thesis is divided into six sections, including this introduction in Section 1. Section 2 focuses on assessing the current state of the U.S. economy and the impact it has had on the housing market. The section also includes a look back into the growth in the U.S. population over the last century which was led by the increase in immigration<sup>4</sup>. In addition, this section also summarizes the housing preferences by different generational cohorts and race and ethnicity. Section 3 addresses the objectives of this thesis and introduces the six U.S. West Metropolitan Statistical Areas<sup>5</sup> (MSAs) which will be thoroughly examined. Section 4 describes the research methodology that was applied to this study and also an explanation for the delay from initial analysis to this thesis preparation. Section 5 provides the research results from the data used to project population growth and potential housing demand for the six MSAs. Estimation of the volume of construction lumber consumed based on estimated housing starts is estimated in the discussion in Section 6. Lastly, Section 7 concludes with key findings from the thesis and remarks on the future of the housing market in the six MSAs.

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<sup>4</sup> Immigrant – a person who immigrates to the United States enters from another country to live in the United States (U.S. Census Bureau, 2012).

<sup>5</sup> A geographic entity designated by the federal Office of Management and Budget for use by federal statistical agencies. An MSA consists of one or more counties, except in New England, where MSAs are defined in terms of county subdivisions (primarily cities and towns). See central city, consolidated metropolitan statistical area, metropolitan area, New England County Metropolitan Area, primary metropolitan statistical area, and statistical entity (U.S. Census Bureau, 2012).

## 2 Background

The U.S. housing market has experienced record highs and record lows over the first decade of the 21<sup>st</sup> century. To fully understand what caused this dramatic market behaviour, an in-depth look at the current economic climate and historical population trends is essential in uncovering some of this phenomenon. Furthermore, the population changes in generational cohorts and different ethnic groups have led to specific housing types and preferences, which may provide clues as to what future housing demand may entail.

### 2.1 The U.S. Housing Market

At the time of this research, the worst U.S. housing market collapse ever had caused the U.S. economy to go into a recession, and recovery has been slow following years of lacklustre economic growth (The Economist, 2010). In 2009, U.S. housing starts<sup>6</sup> were the lowest on record at 554,000 units based on a seasonal annual adjusted rate (SAAR). By 2011, total U.S. housing starts improved slightly to 608,800 units SAAR (Figure 1) (U.S. Census Bureau, 2012). Conversely, 2011 single-family housing starts were nine percent lower than in 2010 at 430,600 units SAAR. Single-family housing starts, which represent 70 percent of the total U.S. housing starts, are important to the lumber industry since it consumed roughly one third of all U.S. lumber consumed in 2007. With the current weak housing market, lumber consumption from single-family construction as a ratio of the total U.S. lumber consumption has fallen from 34% in 2007 to 18 percent in 2011 (Forest Economic Advisors, LLC, 2011).

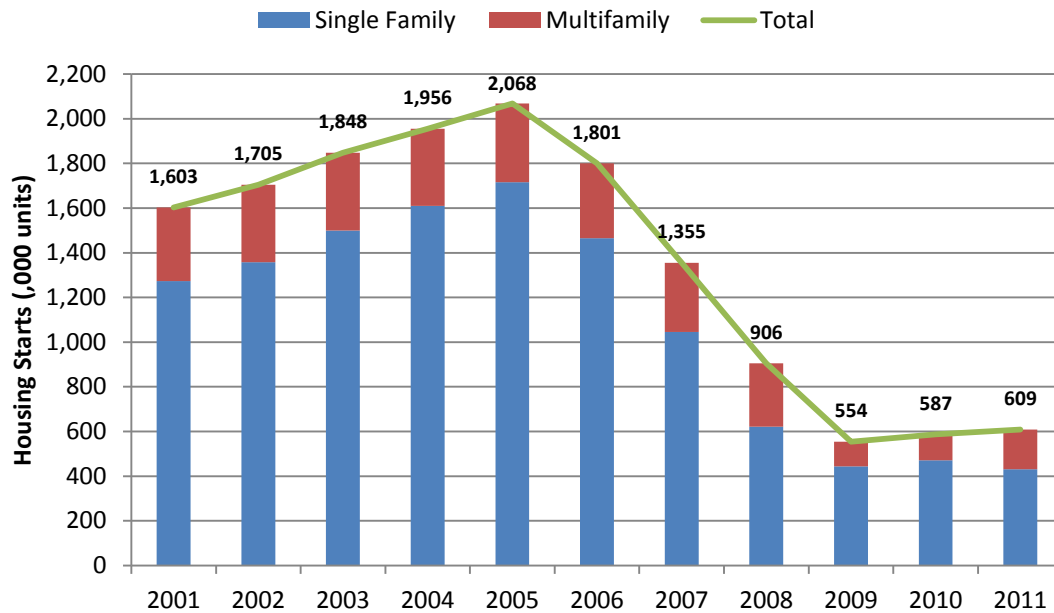
The collapse of the U.S. housing market stretched back to the second quarter of 2006 as single-family house prices began to fall after steady price appreciation through most of the 2000's. By the first quarter of 2009, home prices had recovered modestly. This was

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<sup>6</sup> Housing Starts - A start is defined as excavation (ground breaking) for the footings or foundation of a residential structure. For a multifamily structure, all units are counted as started when the structure is started (NAHB, 2012).

the result of the U.S. Federal Government introducing an economic stimulus package in 2009 under the Home Buyer Tax Credit<sup>7</sup> for first-time and existing home buyers (Emrath, 2009). Unfortunately, with the expiry of the Home Buyer Tax Credit on April 30, 2010, U.S. housing demand fell and home prices began to decline again.

**Figure 1 - U.S. Housing Starts from 1990 to 2010**



Data series source: U.S. Census Bureau, New Residential Construction, 2012

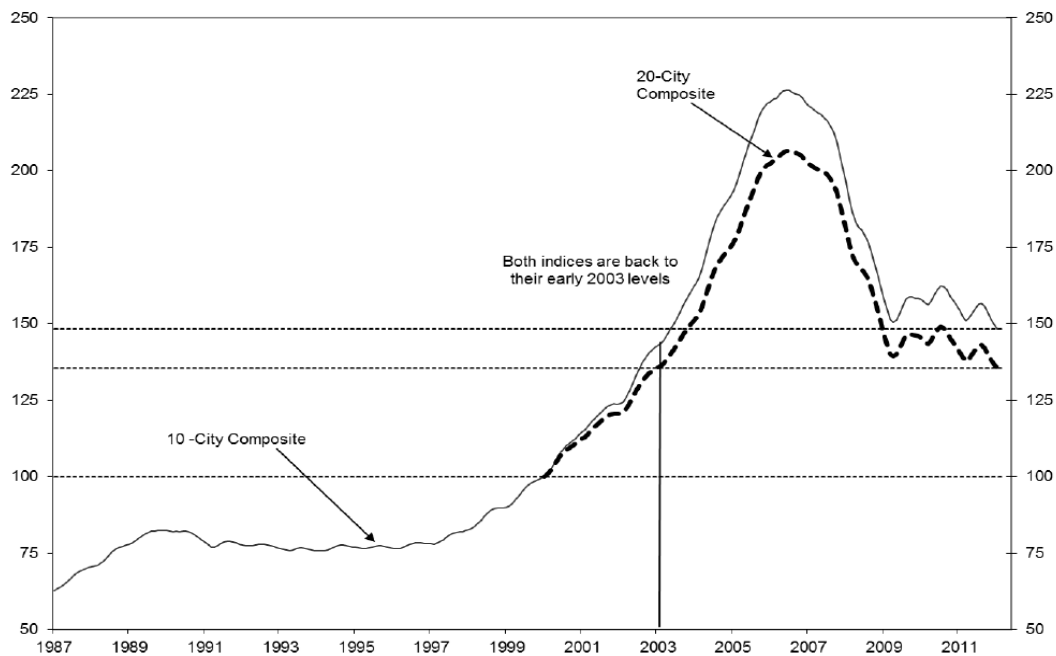
According to the S&P/Case-Shiller Home Price Indices<sup>8</sup>, home prices fell from the peak in June/July of 2006 to a low in April 2009. Currently, home prices are back at the level of summer 2003, but not as low as in the 1900's (Figure 2) (S&P Indices & Fiserv, 2012).

<sup>7</sup> Home Buyer Tax Credit - The Worker, Homeownership, and Business Assistance Act of 2009 extended the tax credit of up to \$8,000 for qualified first-time home buyers purchasing a principal residence. The tax credit now applies to sales occurring on or after January 1, 2009 and on or before April 30, 2010. It also authorized a tax credit of up to \$6,500 for qualified repeat home buyers who purchase home from November 6, 2009 and on or before April 30, 2010 (Baldheadtherealtor, 2011).

<sup>8</sup> The S&P/Case-Shiller index is a value-weighted average of single-family home prices for the original 10 metro areas and also a more expanded list of 20 metro areas represented throughout the nine U.S. Census divisions. The indices have a base value of 100 in January 2000. Therefore, an index value of 150

Furthermore, low mortgage rates are still ineffective in reviving the slumping housing market and preventing further depreciation in home prices. The 30-year mortgage rate is at a historical low hovering at four percent in March of 2012 (Figure 3) (Freddie Mac, 2012). Over the last three decades, mortgage rates have fallen gradually since the high in 1981 of over 16 percent.

**Figure 2 – S&P/Case-Shiller U.S. Home Price Indices**



© S&P/Case-Shiller Home Prices Indices 2011, by permission

The severity of the U.S. economic malaises and the length of the housing retrenchment make it difficult to forecast when there will be a recovery, given the fragility of the U.S. economy. Nonetheless, the outlook for housing will be very encouraging based on favourable demographic factors such as improving immigration trends, aging Baby Boomers and the maturing Generations X and Y (National Association of Home

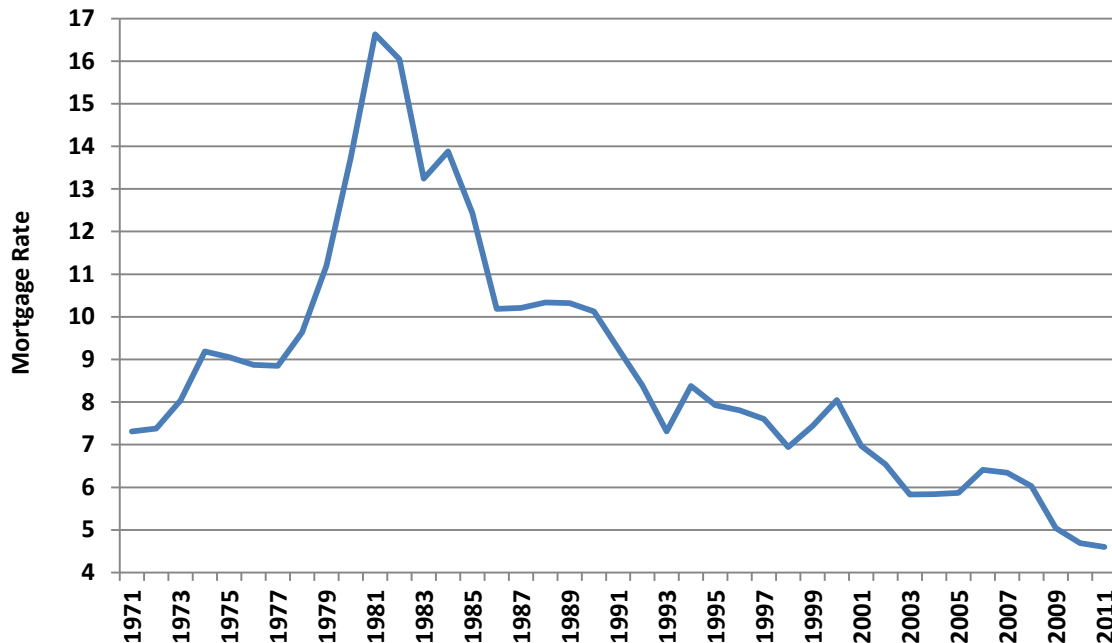
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translates to 50% appreciation rates since January 2000 for a typical home located within the subject market (S&P Indices & Fiserv, 2012)

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Builders, 2001). In the long term, demographic factors will re-emerge as the prime drivers of housing starts and sustain future demand for housing as soon as the U.S. emerges from its current recessionary economic environment.

**Figure 3 – 30-Year Mortgage Fixed-Rate**



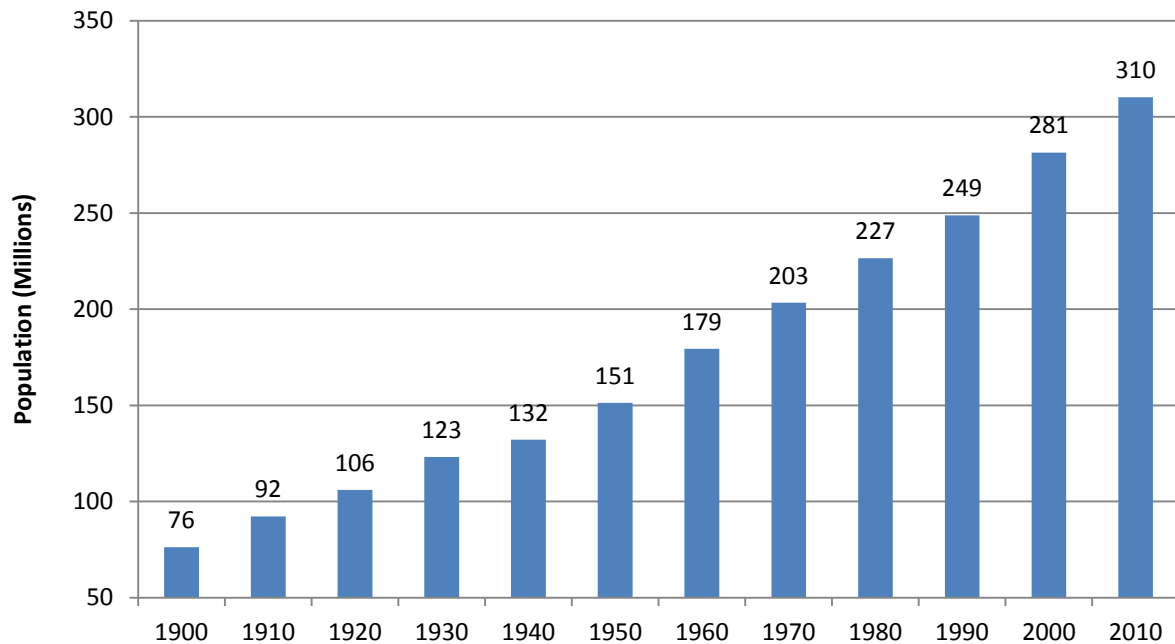
Data series source: Freddie Mac, Weekly Primary Mortgage Market Survey®, 2012

## **2.2 U.S. Population and Household Trends**

During the 20<sup>th</sup> century, the U.S. population has risen substantially from 76 million in 1900 to 310 million in 2010 (Figure 4) (U.S. Census Bureau, 1993) (U.S. Census Bureau, 2011). The increase in population of over 2 million people per year has led to a shift towards urbanization, where by the end of the century, approximately half of the population resides in suburbs of major cities areas across the country (Hamilton, 2004). Regionally, the population of the U.S. West grew faster than in the South, Northeast and Midwest regions of the country in every decade of the century (U.S. Census Bureau,

2011). The U.S. Census Bureau forecast the population will increase steadily in the first half of the 21<sup>st</sup> century to 439 million by 2050 (U.S. Census Bureau, 2008).

**Figure 4 – U.S. Total Population from 1900 to 2010 (Millions of People)**



Data series source: U.S. Census Bureau, U.S. Population Projections - Table 1, 2008

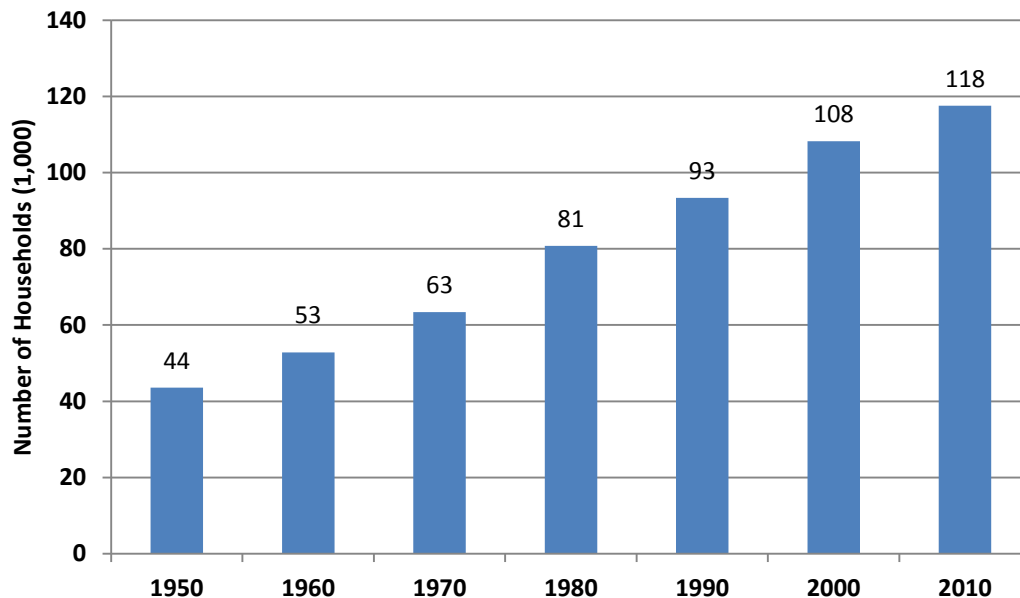
As the U.S. population increased over the years, the number of households<sup>9</sup> has also increased steadily (Figure 5). Since 1950, averages of over 1 million households per year were formed (U.S. Census Bureau, 2011). From 1970 to 1980, this average climbed to 1.6 million households per year as Baby Boomers left their homes and started to live on their own. From 1980, the number of households fell to 1.05 million per year before rising to 1.2 million per year during the first decade of the 21<sup>st</sup> century. The increase in

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<sup>9</sup> Household - A household includes all the people who occupy a housing unit as their usual place of residence. Households can be categorized as family households or non-family households. A family household contains at least two persons and a non-family household contains only one person (U.S. Department of Commerce, 1996).

the number of households is the result of immigration, which will be discussed in the following Section 2.3.

**Figure 5 – Total U.S. Households from 1940 to 2010**

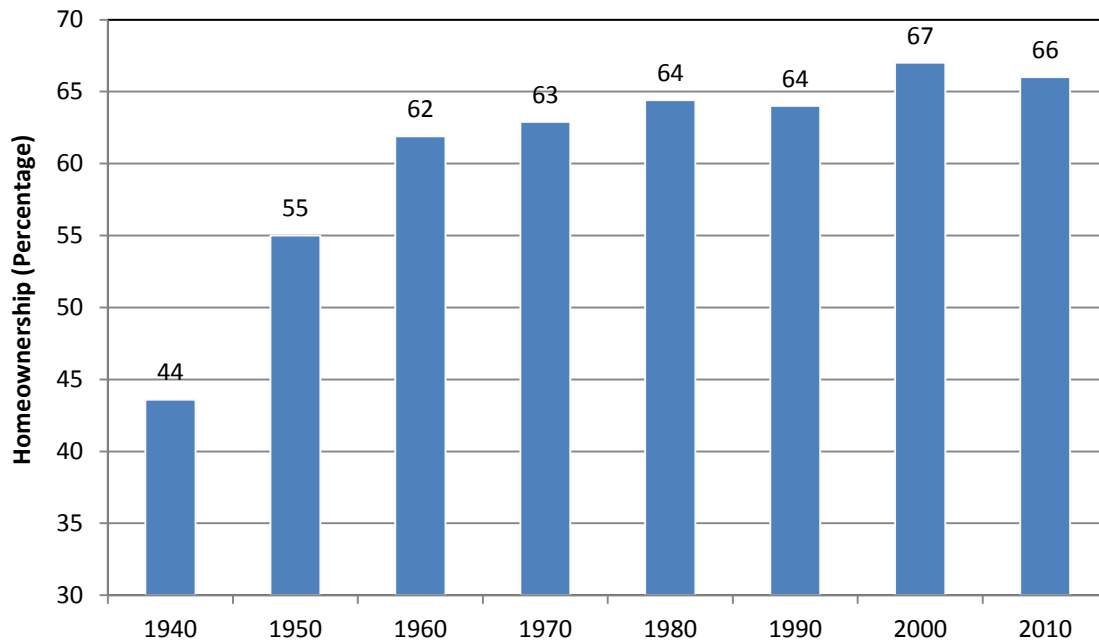


Data series source: U.S. Census Bureau, Families and Living Arrangements, 2011

The steady increase in U.S. households resulted in the stock of housing units increasing from 35 million in 1940, to 111 million in 2010 (Danter Company, 2011). After the Second World War, much of the increase was attributed to economic prosperity and the government housing initiatives to increase homeownership with low cost Federal Housing Loans. U.S. homeownership increased from 44 percent in 1940 to 62 percent in 1960 (Figure 6) (U.S. Census Bureau, 2012). From 1960 to 1990, homeownership was steady between 62 to 64 percent before increasing to 67 percent in 2000. Through this time period, the number of housing units increased with the share of owner occupied dwellings gaining faster than renter occupied dwellings (Figure 7) (U.S. Census Bureau, 2012). By 2010, the weak housing market caused a decrease in the percentage of both owner occupied and renter occupied dwellings.

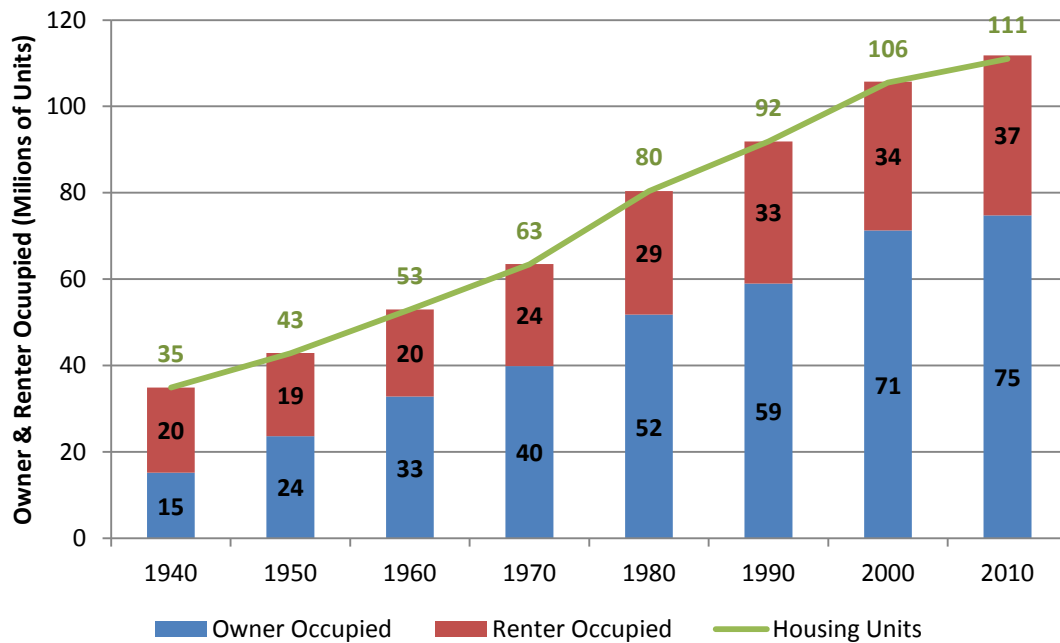


**Figure 6 – U.S. Homeownership Rate from 1940 to 2010**



Data series source: U.S. Census Bureau, Table 17. Homeownership Rates for the United States, 2012

**Figure 7 - Occupied Housing Units by Tenure from 1940 to 2010 (Millions of Units)**



Data series source: U.S. Census Bureau, Construction & Housing: Housing Units and Characteristics-Table 987, 2012

Since U.S. household formation impacts housing demand, understanding the different types of household is critical to this study. Households can be defined as family households or non-family households; both types of households have been trending in opposite directions over the last 60 years (Table 1) (U.S. Census Bureau, 2011). In 1960, family households represented 85 percent and non-family households made up the remaining 15 percent of the total U.S. households. In 2010, the percentage of family households decreased to 67 percent as non-family households increased to 33 percent.

**Table 1 – Percentage of Family and Non-Family Household (1960 to 2010)**

<b>Years</b>	<b>Family Household</b>	<b>Non-family Household</b>	<b>Total</b>
<b>1960</b>	85%	15%	100%
<b>1970</b>	81%	19%	100%
<b>1980</b>	74%	26%	100%
<b>1990</b>	71%	29%	100%
<b>2000</b>	68%	32%	100%
<b>2010</b>	67%	33%	100%

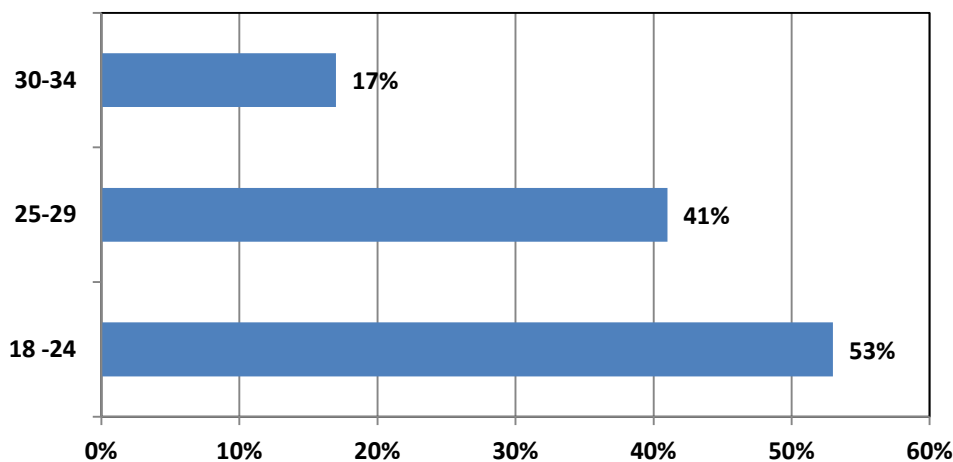
Data series source: U.S. Census Bureau, Families and Living Arrangements, 2011

The increase in non-family households was due to young Americans, particularly the female population, delaying marriages in pursuit of higher education and careers (Population Reference Bureau, 2011). More recently, the weak U.S. economy has increased financial pressure on young Americans and also has discouraged them from getting married or starting a family. According to Pew Research, 15 percent of Americans between the ages of 18 to 34 have postponed marriage because of the recession, and 14 percent have delayed having a baby (Pew Research Center, 2012). The cost of raising a child to the age of 17 has increased by 22 percent since 1960 to \$222,360 (USDA, 2010). The effect of delaying childbirth has translated to a decline in birth

rates<sup>10</sup> from a high of 69.6 per thousand in 2007 to 64.7 in 2010, the lowest level in the last decade.

Another economic reason for the decline in family households is young adults ages 18 to 34 moving back in with their parents (Pew Research Center, 2012). On average 24 percent of this age group lived with their parents with the percentage by ages are shown on Figure 8. The percentage of this living arrangement by gender is very similar with men and women representing 40 percent and 38 percent respectively. However, when comparing by race, the share increases from young Blacks at 32 percent, to Whites at 38 percent and Hispanics at 45 percent.

**Figure 8 - Percentage of Young Adults Staying at Home**



Data series source: Pew Research, The Boomerang Generation, 2012

This age cohort is commonly defined as “generational boomerang”, those who previously lived independently and have returned to their parental home. This shift in living arrangements has further inhibited the growth of U.S. residential construction (Forest Economic Advisors, 2011 ).

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<sup>10</sup> Birth rate is the number of births per thousand women ages 15-44 (Centers for Disease Control and Prevention, 2012).

The decade long growth in the U.S. housing market started to decline in 2005 and eventually led to housing collapse and then the global financial crisis in August 2007. Prior to the housing market downturn, the U.S. population increased steadily, and while demographic factors can explain much of the growth in housing, the impact of immigration also contributed to this growth, as discussed in the next section.

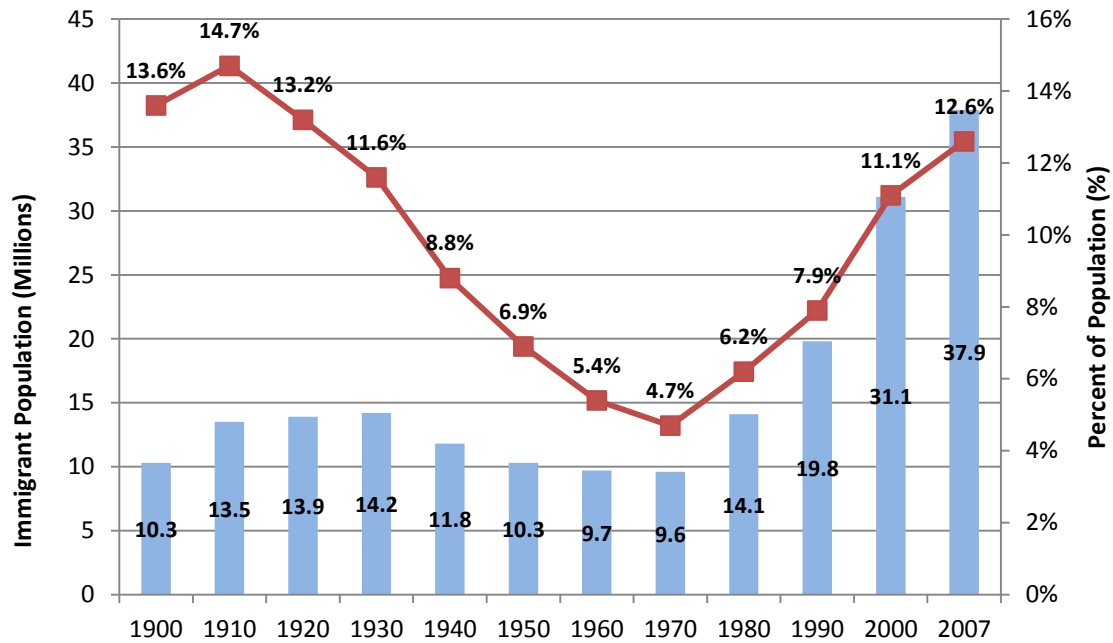
### **2.3 Immigration Driving Population Growth and Household Sizes**

The increase in U.S. population was led by a strong flow of immigration which started in the 1980's and continued into the 21<sup>st</sup> century (Figure 9) (Center for Immigration Studies, 2007). Figure 9 shows the total immigrant population increasing from 14.7 million in 1980 to 37.9 million in 2007. As a percentage of the total U.S. population, immigrants represented 6.2 percent in 1980, compared to 12.6 percent in 2007. The U.S. has not reached this high a proportion of immigrants in the population since 1910, when 14.7 percent of the population were considered immigrants.

From 2002 to 2007, approximately one million immigrants entered the U.S. per year, with another 320,000 arriving with temporary visas (The Economist, 2008). The largest unknown is the number of illegal immigrants, which was estimated to be approximately 500,000 entries per year and is not included in the data shown in Figure 9.

The Center for Immigration Studies (2007) found immigrants resided primarily in a handful of states. The five states with the highest proportion of immigrant population are California, New York, New Jersey, Florida, and Nevada (Table 2) (Center for Immigration Studies, 2007).

**Figure 9 – U.S. Immigrants Population and Percent from 1900 to 2007**



Data series source: Center for Immigration Studies, Background, 2007

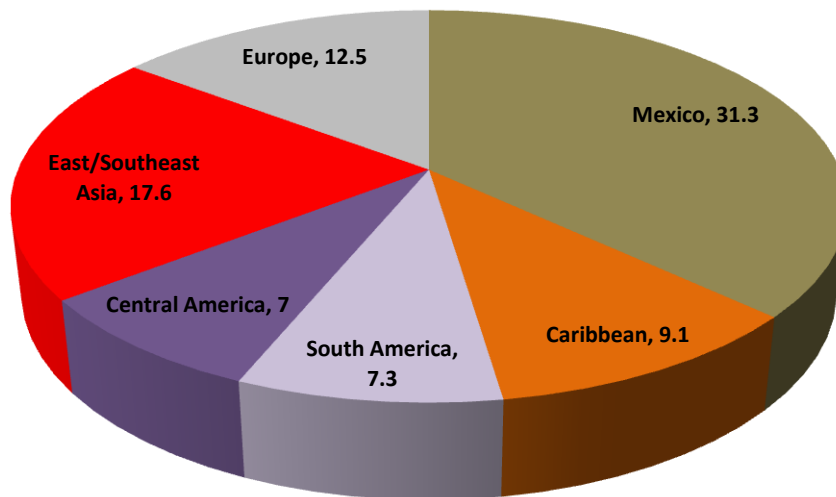
**Table 2 - Percentage of Immigrants by State in 2007**

Rank	States	Percent of Immigrants (%)
1	California	27.6
2	New York	21.6
3	New Jersey	21.6
4	Florida	19.1
5	Nevada	18.0
6	Hawaii	18.0
7	Texas	14.8
8	Arizona	14.2
9	Massachusetts	14.2
10	Illinois	13.5
11	Rhode Island	13.3
12	Maryland	13.0
	Nation	12.6

Data series source: Center for Immigration Studies, Background, 2007

When categorizing immigrants by the country of origin, Mexico represents almost one-third of all immigrants or 11.7 million (Figure 10) (Center for Immigration Studies, 2007). When combined with immigrants from other Spanish speaking countries in Latin America (Mexico, Central and South America, and the Caribbean), this group represents 54.6% of total immigrants in 2007. East Asia/Southeast Asia makes up the next largest share at 17.6 percent of total immigrants.

**Figure 10 – Region and Country of Origin of Immigrants in 2007**



Data series source: Center for Immigration Studies, Background, 2007

The household size of an immigrant family is considerably larger than a U.S.-born family. In 2007, the Centre for Immigration Study showed the average number of persons per household for an immigrant family was 3.1 compared to 2.4 for a U.S.-born family (Table 3) (Center for Immigration Studies, 2007). This was the case for all states. Immigrants in California and Georgia have the highest number of persons per household at 3.4. In contrast, U.S.-born households in New York City and the state of Florida have the lowest number of persons per household at 2.3 and 2.4 respectively. This data was collected prior to the global financial crisis and the return of the boomerang generation to the family home.

**Table 3 - Household Size by State in 2007**

	Number of Persons Per Household	
	Immigrant	U.S. Born
Arizona	3.2	2.5
Colorado	3.2	2.5
Texas	3.3	2.5
California	3.4	2.5
L.A. County	3.3	2.4
Massachusetts	2.9	2.5
Florida	3.2	2.3
Nevada	3.1	2.4
Georgia	3.4	2.4
New York	2.8	2.4
New York City	2.8	2.2
Illinois	3.2	2.4
North Carolina	3.3	2.4
New Jersey	3.1	2.5
Maryland	3.2	2.5
Virginia	3.1	2.5
Nation	3.1	2.4

Data series source: Center for Immigration Studies, Background, 2007

### **2.3.1 The Economic Attraction of Immigration**

The reason immigrants chose to settle in the U.S is primarily due to economic factors. According to the Organization for Economic Co-operation and Development's (OECD) 2003 edition of Trends in International Migration, the primary reasons for moving from one country to another country are 1) economic attractions, 2) presence of family members or people of the same ethnic origin; and 3) the proximity of the destination country to the country of origin (Organisation for Economic Co-operation and Development (OECD), 2003). The biggest draw is the wage disparity between developing and developed countries. For example, the U.S. has an average GDP per head of \$46,000 compared to \$8,000 in Mexico (The Economist, 2010). It is not surprising that millions of Mexicans have entered America illegally in search of a better life. A

current estimate of the total number of illegal immigrants in the United States is 11 million, roughly the population of Ohio.

#### 2.3.1.1 Employment Opportunities

Many Mexicans will risk their lives for better earning opportunities and to fill jobs that most locals in developed countries will not consider. They are more flexible than the U.S.-born workers and willing to move into areas where labour is in short supply, thus easing the bottlenecks of labour shortages (The Economist, 2002). They provide the just-in-time supply of labour to jobs that Americans are unwilling to accept at any wage. While living in the host country, they are also consumers of goods and services and rental accommodations.

The strain on public service and the tax system is not as severe as one might imagine. During strong economic growth immigrants can reduce wage pressures, preventing inflation from rising (The Economist, 2008). With the current economic slowdown, many immigrants have returned to their home country. This is quite evident in recent months, where the flow of migrants from Mexico to America decreased as the housing market worsened and jobs in the construction sector disappeared (The Economist, 2008).

As developed countries, such as the U.S, move into more service-oriented economies, the need for skilled workers increases. In 2000, the World Bank sampled 52 million migrants in 20 rich countries and concluded that 36 percent of them held a college degree (The Economist, 2008). In the U.S., at the height of the dot-com boom, one-third of educated workers in Silicon Valley were from Asia (USA Today, 2001).

The emerging trend of educated immigrants has now outnumbered those immigrants with just a high school degree (Brookings Institution's Metropolitan Policy Program, 2011). Of the working-age immigrants (ages 25 to 64), one-third of them have a college degree compared to 19 percent in 1980. More U.S. employers are choosing educated immigrant



workers over domestic employees as they are already trained with the proper skills for the job.

#### 2.3.1.2 Wage Competition

One of the most contentious issues is the net effect immigration has on America's wages. Some empirical research shows immigrants have little impact on wages. Dr. George Borjas, one of the most prominent economists on immigration, indicated that society as a whole does benefit from immigrants. Without a doubt, basic economic theory argues that immigration increases the labour supply in the economy and the competition in the labour market. This will eventually decrease wages. Nevertheless, this downward pressure on wages has the greatest impact on low wages and low skilled U.S.-born workers (Borjas, 1994). The majority of Americans are enjoying a healthier economy with an increased supply of labour and lower prices since immigrants accept jobs that Americans are often unwilling to take. Consequently, certain businesses or industries exist because of this work force. For example, immigrants have revived and sustained the textile and agriculture industries in the U.S. (The Economist, 2002). Other U.S. business, such as restaurants and domestic household services, have also benefited from immigrants. Furthermore, since the introduction of the H-1B visa in 1990, which allows for six-year work permits for white-collar immigrant workers, America has benefited from having skilled and educated people from all over the world. These immigrants are facilitating the development of science and technology.

The benefits from immigrants are quite profound, mainly in the form of entrepreneurialism and innovation (Davis, 2002). One particular example that Davis quoted was "imagine Silicon Valley without immigrants". Skilled immigrants will earn more than unskilled immigrants and therefore, they will contribute more to tax and social-security systems and are less reliant on social assistance programs (Borjas, 1994).

### **2.3.2 Immigrants To Support an Aging Population**

The need to sustain healthy immigration levels is vital to slow down the increasing average age of the U.S. population (Heuveline, 2003). The aging workforce in the U.S., and in most developed countries, is impeding economic growth in these countries. The IMF has forecast that by 2050 the world's aging workers will increase by 40 percent. The shortage of young U.S.-born workers with the proper skills or motivations will continue to attract more immigrants.

Generally, immigrants are younger than the average age of citizens in developed countries. The benefit to the host country is their youthful energy which allows them to do more and be more productive (The Economist, 2008). The main reason that migrants are younger is the high fertility rates<sup>11</sup> in developing countries versus developed countries. In the U.S., the average age was 28 in 1970 and increased to 35.3 in 2000. The most recent U.S. Census report in 2010 indicated the average age was 37.2 and is expected to increase over the years (U.S. Census Bureau, 2011).

As the population gets older, the costs per worker to support the young and, most importantly, the elderly will increase (Pew Research Center, 2008). The dependency ratio gives insight into the number of people of non-working age compared to the number of those of working age (Investopedia, 2001). A high ratio means those of working age and the overall economy face a greater burden in supporting the aging population. The Pew Research Center calculated the dependency ratio in 2005 to be 59 children and elderly people per 100 adults of working age. By 2050, this ratio will rise to 72 dependents per 100 adults of working age. Therefore, the ability to support an aging population is calculated based on the dependency ratio below.

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<sup>11</sup> Fertility rate is defined as the number of children that would be born to each woman if she were to live to the end of her childbearing years (Organisation for Economic Co-operation and Development (OECD), 2011).

Dependency Ratio is the number of children (0-14 years old) and older persons (65 years or over) compared to the total working population (aged 15-64) (United Nations, 2012).

$$\text{Dependency Ratio} = 100 \times [(Population (0-14) + Population (65+)) / Population (15-64)]$$

Source: Investopedia, 2001

### **2.3.3 Backlash towards Immigration in America**

In America, hostility towards immigrants is becoming more common as xenophobia is on the rise again (The Economist, 2008). Most people from host countries with a high and increasing percentage of immigrants are not convinced of the economic benefits. In the U.S., the concern that the current housing market crisis will lead to a deep and prolonged recession and economic slowdown has most Americans anxious about immigration (The Economist, 2008). The evidence of this came on April 30, 2010 when Arizona passed State Bill 1070 (State of Arizona - Ministry of Citizenship, 2012). This Bill requires visitors 14 years old or older staying in the U.S. longer than 30 days to register with the U.S. government and to have registration documents in their possession at all times. Without proper documents, law enforcement may fine up to a maximum of \$100 and incarcerate first-time offenders for 20 days. The law came under much protest and demonstrations at the Arizona State building and also at Capitol Hill. Even President Obama criticized the law and may take up the issue nationally, especially when minority votes were critical during 2008 presidential election. The Republicans' 2009 campaign targeted the foreign-born population in the southeast region and the Democrats were focusing on the Latinos in Arizona, Nevada, Utah and New Mexico.

Over the last few decades, the U.S. has experienced demographic change as a result of an increase in immigration. Many communities have been reshaped with respect to social, economic and political factors as immigrants integrate into the American society. Equally as important as immigration, the generational cohort is also a key demographic factor that is transforming the U.S. population landscape. The next section will discuss the different generational cohorts as they move through their life cycles.

## **2.4 Generational Cohorts**

In America, different age groups, often categorized as generational cohorts, have their own identities, lifestyles and preferences for housing types (Sacramento Area Council of Government, 2011). Each generational cohort has a profound impact on the population and also demonstrates specific housing preferences. This section will discuss the three key generational cohorts in America, specifically Baby Boomers, Generation X and Generation Y, and their demands on housing.

### **2.4.1 Defining Baby Boomers, Generation X and Generation Y**

In the U.S., generational cohorts are commonly defined by their birth years and given names such as Baby Boomers, Generation X and Generation Y (Table 4). Baby Boomers are those who were born from 1946 to 1964 (U.S Census Bureau, 2012). During these years, the rise in birth rate was the result of young American males returning from their tours of duty overseas after World War II. This rise in births contributed to a steady growth in population around major U.S. metropolitan areas, which eventually led to the development of suburbanization<sup>12</sup>.

The generation following the Baby Boomers is Generation X, with birth years between 1965 and 1979 (United States Department of Labor, 2004). In 2006, Generation X accounted for 61 million people in the United States, or 20 percent of the total U.S. population. Following Generation X is Generation Y, also known as the Millennial Generation, which is much larger in population size than Generation X at 68 million, and represented 22 percent of the population in 2006.

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<sup>12</sup> Suburbanization (or suburbanisation) is a term used to describe the process of population movement from within towns and cities to the rural-urban fringe. It is one of the many causes of the increase in urban sprawl. Many residents of metropolitan areas no longer live and work within the central urban area, choosing instead to live in satellite communities called suburbs and commute to work via automobile or mass transit.

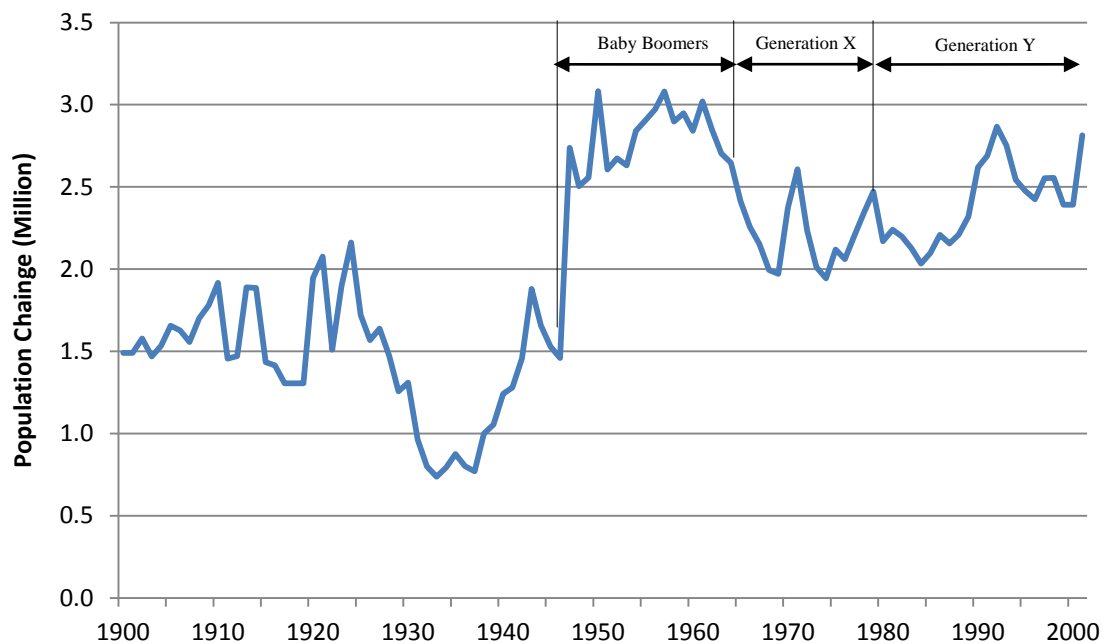
**Table 4 – U.S. Generational Cohorts by Birth Years and Population**

Years	Generation	2006 Population (,000)	Percent of Total
1946 - 1964	Baby Boomers	79,653	26%
1965 - 1979	Generation X	61,401	20%
1980 - 2000	Generation Y	67,952	22%
Other		99,594	32%
Total		308,600	100%

Data series source: U.S. Department of Labor, Monthly Labor Review, 2004

Figure 11 shows the population growth by year for the last century. Graphically, it illustrates that the population increased in 1946 at the beginning of the Baby Boomers generation and then again in late 1900's during the Generation Y's period.

**Figure 11 – Annual Population Change Increase from 1900 to 2000**

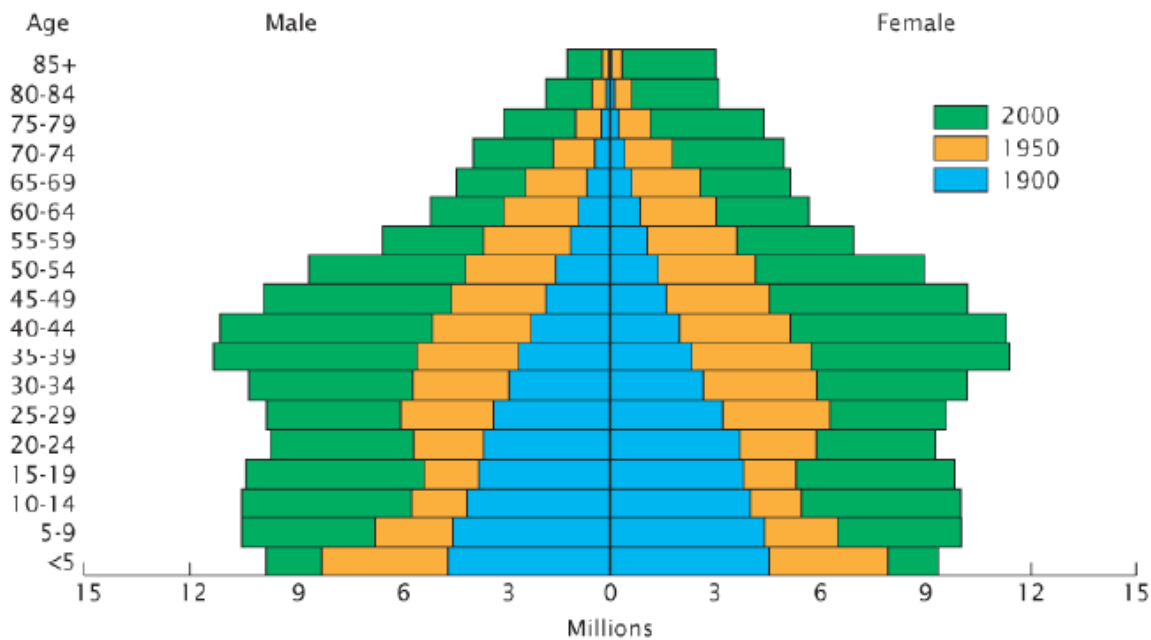


Data series source: U.S. Department of Labor, Monthly Labor Review, 2004

Another method to graphically represent a population is in the form of a population pyramid. The population pyramid shows the age and gender distribution plotted as horizontal bars with the males on the left and females on the right (U.S. Census Bureau,

2002). In 1900, the shape of the U.S. population pyramid was a classic bell shape representing a period of high birth rates due to the increased number of infant mortalities and lower average life span (U.S. Census Bureau, 1996). The shape of the pyramid changed over the next 50 to 100 years to having a bulge in the middle age group in 2000 (Figure 12) (U.S. Census Bureau, 2002). This population bulge between ages 35 to 44 corresponds to the dominant population of the Baby Boomers in America.

**Figure 12 - Total Population by Age and Sex: 1900, 1950 and 2000**



© U.S. Census Bureau, decennial census of population, 2002, by permission

Below the bulge are Generations X and Y, with a combined population size larger than the Baby Boomer population. They are predicted to be a major contributor to household formation and expected to demand more housing as they come of age. The housing preferences and characteristics by different generational cohorts will be examined in the following sections of this chapter.

## 2.4.2 Housing Preferences By Different Generational Cohorts

Home purchases are often driven by an individual's or a family's life events such as job relocation or retirement (National Association of Realtors, 2009). The current U.S.

economic instability has added further uncertainty for would-be buyers and sellers. A recent survey by the National Association of Realtors<sup>13</sup> (NAR) indicated that low interest rates and weak house prices have attracted some cautious home buyers and investors into the market in recent years.

The National Association of Realtors survey found recent home buyers have the following demographic profiles as shown in Table 5. The average age of first-time buyers was 30 years old versus 48 years old for repeat buyers. Repeat buyers' income was much higher than the first-time buyer - \$88,100 versus \$61,600. Forty-nine percent of first-time buyers were married as compared to 69 percent of repeat buyers. Single females were also a key segment of the housing market, representing 25 percent of first-time buyers and 17 percent of repeat buyers.

**Table 5 – Profile of Home Buyers in 2009**

	<b>First-Time Buyers</b>	<b>Repeat Buyers</b>
Average Age	30	48
Average Annual Income	\$61,600	\$88,100
Household Composition		
• Married	49%	69%
• Unmarried couples	12%	5%
• Single females	25%	17%
• Single males	12%	8%

Data series source: National Association of Realtors, Profile of Home Buyers and Sellers 2009

#### 2.4.2.1 Baby Boomers

Baby Boomers have been severely impacted by the recent economic/financial crisis because they are approaching retirement (National Association of Realtors, 2009). Their home equity and financial investments have been reduced, thus their retirement plans may have been altered or delayed. Baby Boomers are a major segment of the housing market because of their insatiable desire for real estate. According to the U.S. Census

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<sup>13</sup> Survey results were from the National Association of Realtors, who mailed 120,038 questionnaires to home buyers who purchased a home between July 2008 and June 2009. The survey response rate was 7.9%. (National Association of Realtors, 2009)

Bureau, they have a homeownership rate of 77 percent, compared to the national average of 66 percent in 2011 (U.S. Census Bureau, 2012). In addition to having a high homeownership rate, Baby Boomers (between the ages of 45 to 64) are also active in the second home market; 18 percent own two homes and five percent own three or more homes (Table 6). These percentages were similar for Americans aged 65 and older.

**Table 6 – Number of Homes Currently Owned by Age (Percent Distribution)**

<b>Number of Homes</b>	<b>18 to 24</b>	<b>25 to 44</b>	<b>45 to 64</b>	<b>65 or older</b>	<b>All Buyers</b>
One	98	90	76	75	85%
Two	2	8	18	19	12%
Three or more	1	2	5	5	3%
Total	100%	100%	100%	100%	100%

Data series source: National Association of Realtors, Profile of Home Buyers and Sellers 2009

The average age of Baby Boomer home buyers is 53 years old with an average annual income of \$79,600 (Table 7) (National Association of Realtors, 2009). The majority of this cohort is repeat home buyers with an average purchased home price of \$263,000 for an estimated 2,000 square feet per home. For Baby Boomers, the three main reasons for purchasing a home are “the desire to own a home” at 23 percent, “job-related relocation” at 13 percent and “a change in family situation” at 10 percent. These reasons and percentages differ considerably for Generation X and Y home buyers and will be discussed further in the next subsection.



**Table 7 – Baby Boomer Home Buyers Profile in 2009**

<b>Profile</b>	<b>Baby Boomers (ages 45-64)</b>
Average age (Years)	53
Average income (US\$)	\$79,600
% of first-time buyers	24%
Top 3 reason for owning <ul style="list-style-type: none"> <li>• Desire to own a home</li> <li>• Job-rated relocation</li> <li>• Change in family structure</li> </ul>	23% 13% 10%
Size of home (Square feet)	2,000
Price of home (US\$)	\$263,000

Data series source: National Association of Realtors, Profile of Home Buyers and Sellers 2009

#### 2.4.2.2 Generations X and Y

The impact Generations X and Y have on the current and future demand on housing cannot be overlooked. Their total population outnumbers the Baby Boomers and they are entering prime household formation and home buying ages (American Plywood Association, 2010). Therefore, this will drive the demand for starter homes in the next 20 years. The profiles of home buyers for these two generations are shown on Table 8. Similar to the Baby Boomers, the main reason for owning a home is the desire to own one. For Generation Y, “the desire to own a home” was ranked the highest at 62 percent. However, since their average income was lower than that of Generation X, both the price and the size of the homes are lower than those for Generation X or Baby Boomers. For Generation Y, home affordability is rated the third most important reason for purchasing a home.

The National Association of Realtors survey indicates that the majority of first-time buyers fall into these two generational cohorts (National Association of Realtors, 2009). The first-time buyers are a growing segment of the housing market and in 2009 represented 47 percent of the market (Figure 13). This is the highest market share over the last decade and has proven to be the most resilient segment during the current economic downturn. This may indicate some of the pent-up demand created by young

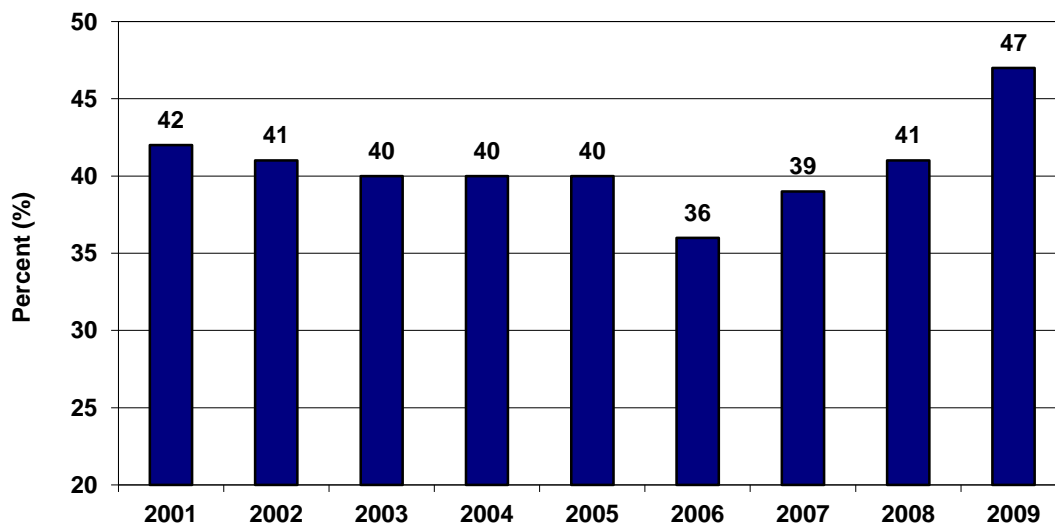
adults who previously lived with their parents and are now financially capable of purchasing their first home (Joint Center for Housing Studies of Harvard University, 2011).

**Table 8 – Generation Y & X Home Buyers Profile in 2009**

Profile	Gen Y (ages 18-24)	Gen X (ages 25-44)
Average age (Years)	23	32
Average income (US\$)	\$48,400	\$75,300
% of first-time buyers	97%	61%
Top 3 reason for owning (%)		
• Desire to own a home	62%	43%
• Want a larger home	-	11%
• Job-rated relocation	-	9%
• Affordability of home	8%	-
• Change in family structure	9%	-
Size of home (Square feet)	1,600	2,000
Price of home (US\$)	\$225,000	\$282,000

Data series source: National Association of Realtors, Profile of Home Buyers and Sellers 2009

**Figure 13 – Proportion of Home Buyers that are First-Time Buyers**



Data series source: National Association of Realtors, Profile of Home Buyers and Sellers 2009

Regionally, the U.S. West has the highest percent of first-time buyers at 51 percent. The Northeast and Midwest tied at 48 percent and the South is at 45 percent. Seventy-four percent of first-time buyers purchased detached single-family homes: lower than repeat buyers (Table 9). However, first-time buyers were more likely to purchase a townhouse/row house or apartment than repeat buyers.

**Table 9 – Type of Home Purchased by First-Time and Repeat Buyers (% Distributions)**

<b>Types of Home</b>	<b>First-Time Buyers</b>	<b>Repeat Buyers</b>	<b>All Buyers</b>
Detached single-family home	74	82	78
Townhouse/row house	10	6	8
Apartment/condo 5 or more units	9	6	7
Duplex/apartment/condo in 2-4 units	3	2	2
Other	5	4	5
Total	100%	100%	100%

Data series source: National Association of Realtors, Profile of Home Buyers and Sellers 2010

As noted above, demographic characteristics of home ownership vary by age groups. These variations also exist when comparing home ownership by race and ethnicity across the U.S. The following section will highlight the diversity in home ownership of the population.

## **2.5 Race and Ethnicity**

In terms of home ownership by race and ethnicity, U.S.-born Americans still represent the majority of the first-time and repeat home buyers (National Association of Realtors, 2009). American-born first-time and repeat buyers represented 89 and 93 percent respectively (Table 10). Foreign-born home buyers' percentage share was less than 10 percent. Traditionally, immigrants are house renters rather than house owners for the reason that they have a much higher poverty rate and lower incomes resulting from differences in educational levels, age, marital status and geographic location (Hamilton, 2004)

**Table 10 – National Origin of First-Time and Repeat Buyers (% of Distribution)**

<b>Birth Origin</b>	<b>First-Time Buyers</b>	<b>Repeat Buyers</b>	<b>All Buyers</b>
Born in U.S.	89	93	91
Not Born in U.S.	11	7	9
Total	100%	100%	100%

Data series source: National Association of Realtors, Profile of Home Buyers and Sellers 2009

When analysing home buyers based on race and ethnicity, White/Caucasian has the lion's share of the total home buyers profile at 85 percent (Table 11). The other ethnic groups are evenly split at five percent between Blacks, Hispanics and Asian. However, marginal differences were found between first-time and repeat buyers. First-time buyers were at a slightly higher percentage compared to repeat buyers across non-White/Caucasian.

**Table 11 – Race/Ethnicity of First-Time and Repeat Buyers (% of Respondents)**

<b>Race/Ethnicity</b>	<b>First-Time Buyers</b>	<b>Repeat Buyers</b>	<b>All Buyers</b>
White/Caucasian	79%	89%	85%
Black/African-American	7	4	5
Hispanic/Latino	6	4	5
Asian/Pacific Islanders	7	3	5
Other	2	2	2
Total	100%	100%	100%

Data series source: National Association of Realtors, Profile of Home Buyers and Sellers 2009

The White/Caucasian group are the major home buyers across all four geographical regions of the country (Table 12). The Black/African-American and Hispanic/Latino groups tied for second across the nation. However, regional differences emerge as the Black/African-American group is mainly in the South at eight percent. In the Midwest, the Black/African-American/Hispanic/Latino and Asian/Pacific Islanders are fairly evenly distributed between three to two percent of the home buyers surveyed. In the West, the Hispanic/Latino population is an overwhelming second at 10 percent. For this

reason, it is important to understand their housing needs and the impact on future housing demand in the U.S. West of the growing Hispanic/Latino population.

**Table 12 – Race/Ethnicity of Home buyers by Region (% of Respondents)**

<b>Race/Ethnicity</b>	<b>Northeast</b>	<b>Midwest</b>	<b>South</b>	<b>West</b>	<b>All Buyers</b>
White/Caucasian	89	93	83	75	85
Black/African-American	4	3	8	3	5
Hispanic/Latino	3	2	5	10	5
Asian/Pacific Islanders	5	2	1	1	2
Other	1	1	2	3	2
Total	100%	100%	100%	100%	100%

Data series source: National Association of Realtors, Profile of Home Buyers and Sellers 2009

### 3 Objectives

The U.S. population is expected to increase at a steady rate for the next few years. This will lead to an increase in household formation and subsequently growth in housing demand. Many industry analysts are using population and household formation to forecast U.S. housing demand data for the country as a whole; limited forecast information is published on a regional or even on a MSA level. Understanding the housing demand at these micro levels is essential for local city planners, land developers, homebuilders and more importantly lumber producers who supply products to housing projects.

As the U.S. economy emerges from the current recessionary environment, the outlook for housing is encouraging based on favourable population and immigration<sup>14</sup> growth (Adair, 2003). As a result, the objective of this thesis is to synthesize homebuyers' preferences and patterns from Section 2 and apply them to demographic factors to estimate housing trends and construction lumber demand on an annualized basis as the population increases from 2006 to 2015. Demographic data published by Woods & Poole Economics (Woods & Poole Economics, 2004) was used to analyze the following six U.S. West MSAs:

1. Phoenix-Mesa-Scottsdale, Arizona
2. San Diego-Carlsbad-San Marcos, California
3. Denver-Aurora, Colorado
4. Sacramento-Arden-Arcade-Roseville, California
5. Las Vegas-Paradise, Nevada
6. Albuquerque, New Mexico

All references to these six MSAs will be shortened to just their first name. For example, Phoenix-Mesa-Scottsdale, Arizona will be referred to as Phoenix. These six U.S. West

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<sup>14</sup> Immigrant – a person who immigrates to the United States enters from another country to live in the United States (U.S. Census Bureau, 2012).

MSAs were chosen by a major softwood lumber producing company in British Columbia as part of their market expansion strategy into the U.S. West. The specific objectives for the six MSAs are:

- To determine the size and rate of population growth from 2006 to 2015;
- To segment the population into different generational cohorts and highlight the variation between the MSAs;
- To understand the population diversity in each MSA based on different race and ethnicity groups; and
- To estimate future housing demand and construction lumber volume usage as a result of the population increase and the change in demographic factors from 2006 to 2015.

## **4 Methodology**

To meet the objectives of this research, demographic forecast data was purchased from Woods & Poole Economics, Inc. (W&P), an independent research firm based in Washington, D.C. that specializes in long-term economic and demographic projections. This data was purchased in 2004 and the decision was made by the major lumber producer to investigate the growth specifically between the years 2006 to 2015. W&P data was used as the base of all demographic analyses in the Results section and eventually the calculation of lumber consumption in the Discussion section.

### **4.1 The Use of Woods & Poole Economic Data**

In 2005, U.S population and demographic data was purchased from W&P, specifically a compact disc entitled 2004 Complete Economic and Demographic Data Source (CEDDS). W&P data were retrieved from the compact disc and downloaded into Microsoft Excel 2007 in order to perform further analyses. The database consisted of detailed U.S. population figures by age, sex, race and household size on national, state, county and MSA levels. All figures are broken down on an annual basis starting from 1970 to 2030 and include the U.S. Department of Commerce historical figures from 1970 to 2000 and estimates for 2001 and 2002. Data from 2003 and beyond were forecast from W&P.

The data analyses and comparisons conducted were based on the objectives stated in Section 3 of this thesis. In this thesis, the total populations for 2006 and 2015 by MSA were extracted from W&P, the author then ranked and calculated the annual population growth and percent increases from 2006 to 2015. Table 13 in Section 5.1 is an example where the population data from W&P was used to tabulate the “Annual Growth” rate by absolute and percentage terms. This format is consistent throughout the Results section where the population data from W&P was summarized and compared by different generational cohorts and race and ethnicity groups between 2006 and 2015. Then the author computed the “Population Change” and “Annual Change” for each of the MSAs.



In the Discussion section, the annual population increase by MSAs from Section 5 was used to calculate the “Potential Housing” units in 2015. Section 6.1, Table 19 illustrates how these values were calculated. The calculation consisted of the “Annual Growth” divided by the number of “Persons per Household”. The number of persons per household captured the differences and the profile mix between immigrants and U.S.-born population from the Center for Immigration Studies (Center for Immigration Studies, 2007).

In the case of 2015 “Projected Housing” units for each MSA, the amount of “Lumber Consumption” can be determined by applying the proportion of single family and multifamily houses for each MSA and then multiplying this by the average home size in the U.S. West and the amount of lumber consumption per square foot of home. Table 20 in Section 6.1 illustrates these different components used to calculate the “Lumber Consumption” for each MSA. The percentage breakdown of single and multifamily homes was sourced from the 2011 U.S. Census Bureau Permit report by MSA for 2010 (U.S. Census Bureau, 2011). The average home size and the lumber consumption per square foot for the U.S. West and the entire U.S. were estimations from Forest Economic Advisors’ 5 year forecast (Forest Economic Advisors LLC, 2011).

#### **4.2 Woods & Poole Data, Model & Projections**

The W&P forecast is considered as the “middle” forecast scenario, similar to the U.S. Census “middle” forecast scenario and the UN medium variant. W&P 1-year MSA forecast accuracy is within  $\pm 1.8$  percent compared to  $\pm 7.6$  percent for the 10-year forecast. The W&P forecast model disclaimer is that the future is unknown and some of the data may not accurately reflect future events (Woods & Poole Economics, 2004, p. 19). Unlike other sciences, economics and demographics cannot rely on experimentation to test theories and verify hypotheses; therefore, historical data are used for analyses and theories are developed to explain this historical data (Woods & Poole Economics, 2004, p. 18).

### **4.3 Research Delay**

The thesis process was interrupted during the collapse of the U.S. housing market which led to the global financial crisis in September 2008 (Reavis, 2009 ). Most developed nations experienced the largest economic contraction in the modern era and governments' finances were strained (Warwick McKibbin, 2009).

In the U.S., the dramatic decline in housing demand was uncharacteristic compared to the trend prior to the economic recession. This thesis was halted and data during the recessionary period were taken into consideration and evaluated on how the overall data series may be impacted. Upon further assessment of the effect caused by the economic malaise, it was decided only data preceding the housing downturn will be incorporated. This decision is based on the expectation that as the economy recovers, the demographic fundamentals indicated in this thesis will steer housing demand back on the course as it was prior to the global financial crisis.

Another reason for the delay in this thesis was that the author's full-time employment workload intensified following a corporate cost-cutting initiative during the economic downturn. The author was left managing three different sales and marketing roles of a major forest products firm as the company reduced payroll by 20 percent in 2009. The time which was needed to manage work and personal life with a young growing family was stretched.

## 5 Results

This section presents the findings from utilizing W&P Economics population data for 2006 and 2015. All analyses were performed by the author and the results are summarized in three sub-sections. Sub-section 4.2 presents the MSA population projection and identifies reasons for the increase in population prior to the global economic crisis. Sub-section 4.3 breaks down the population growth by generational cohorts, specifically Baby Boomers and Generations X and Y, in each MSA. Sub-section 4.4 analyzes race and ethnicity and their impact on the MSAs.

### 5.1 U.S. National and MSA Population Projections

From 2006 to 2015, the total U.S. population is projected to increase by nine percent from 299 million in 2006 to 327 million in 2015. This equates to an annual rate of population growth of one percent or approximately three million people per year for the next nine years (Table 13). This rate of population growth is slightly lower compared to the 1.1 percent increase per year from 1990 to 2000 (U.S. Census Bureau, 2001). The decrease in the rate of growth is due to the aging population which consequently increases the number of deaths in the U.S. (U.S. Department of Commerce, 1996). The following section addresses the population growth for each of the MSAs.

**Table 13 – U.S. Population Increase from 2006 to 2015**

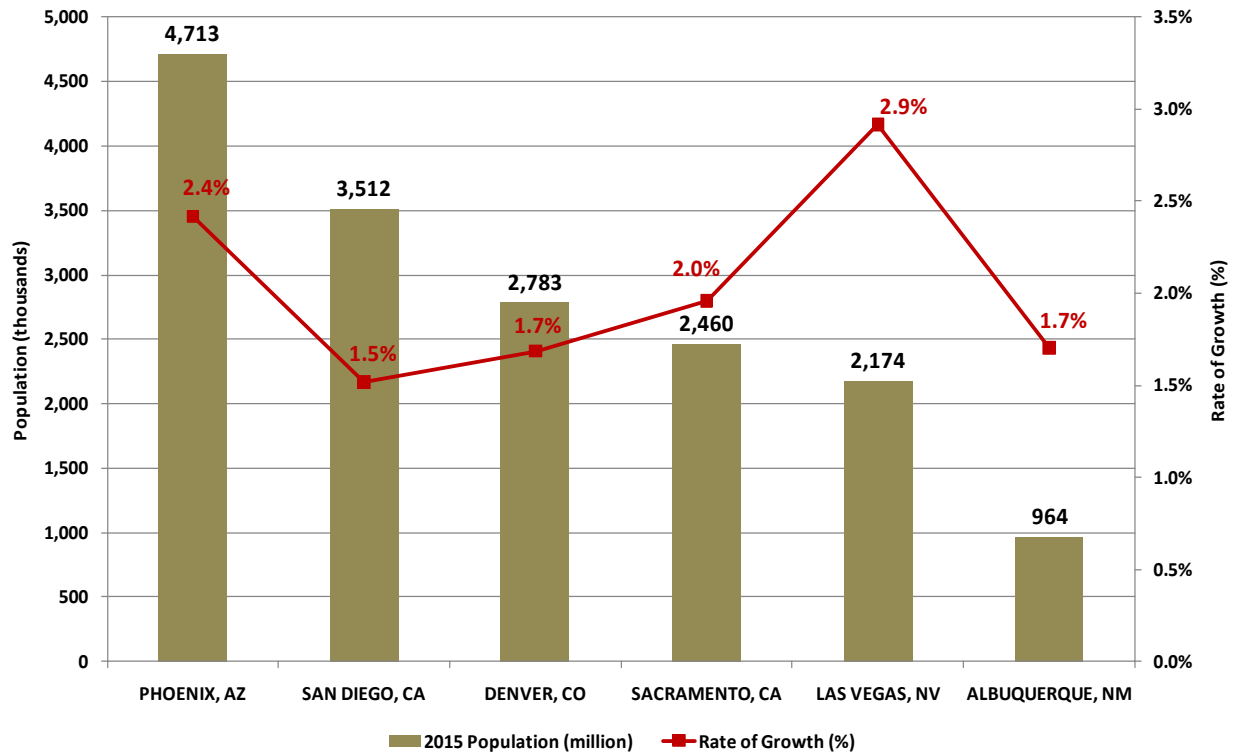
MSA	Population (,000)		Annual Growth	
	2015	Ranking	(Thousands)	(Percent)
PHOENIX	4,713	11	94	2.4%
SAN DIEGO	3,512	17	47	1.5%
DENVER	2,783	21	41	1.7%
SACRAMENTO	2,460	23	41	2.0%
LAS VEGAS	2,174	29	50	2.9%
ALBUQUERQUE	964	55	14	1.7%
<b>Subtotal</b>	<b>16,606</b>		<b>287</b>	<b>2.0%</b>
<b>Total U.S.</b>	<b>327,322</b>		<b>3,039</b>	<b>1.0%</b>

Population data series source: W&P Economics, 2004. Annual growth rates calculated by author

### 5.1.1 MSA Population Projections

The 2015 population for each of the MSAs and their annual rate of growth for the nine years are shown on Figure 14. During the nine-year period, the most populated MSA will be Phoenix at 4.7 million and the least populated will be Albuquerque with just under one million people. The weighted average annual rate of growth for all six MSAs is two percent, twice as high as the national average of one percent. On an annual basis, the highest rate of growth will be Las Vegas at 2.9 percent and the lowest will be San Diego at 1.5 percent.

Figure 14 – 2015 Population and Annual Growth Rates from 2006 to 2010



Population data series source: W&P Economics, 2004. Annual growth rates calculated by author

### 5.1.2 Las Vegas

As previously mentioned, Las Vegas is forecast to have the highest annual rate of growth compared to the rest of the MSAs. At a 2.9 percent annual growth rate, Las Vegas is expected to add 50,000 people annually for a total of 2.17 million in 2015. Las Vegas

has the second smallest population of all six MSAs and is ranked 29<sup>th</sup> nationwide out of a total of 350 MSAs in the country.

Much of the population increase in the past decade stemmed from the growth in employment opportunities serving the 36 million people visiting Las Vegas annually (City of Las Vegas , 2012). The employment opportunities, combined with reasonable housing costs, contributed to the population growth (Rothman, 2002). According to Hal Rothman, the city is the last place in America where a person with limited skills is able to live as a middle-income resident. Typically, jobs are found in tourism, gaming and conventions. Recently, emerging sectors such as light manufacturing and banking are also creating jobs for newcomers (Las Vegas Convention and Visitors Authority, 2012).

### **5.1.3 Phoenix**

From 2006 to 2015, the population of Phoenix is expected to grow on an annual basis by 2.4 percent, or 94,000, to a total population of 4.7 million people by 2015. Compared to the other five MSAs, Phoenix will have the largest population and the second fastest growth rate during the nine-year period. On a national level, Phoenix will rank as the eleventh largest city in the U.S. in 2015.

Before the 2008 economic recession, the population growth in Phoenix had been spurred by favourable housing affordability and a low cost of living for the middle-class families which was approximately 25 percent lower than San Diego, San Francisco and Denver (The Arizona Republic, 2005).

As for its economy, growth has been bolstered by manufacturing base industries such as the aerospace (Southwest Airlines) and electronics (Microchip Technology and Intel) industries based in the greater Phoenix area (Arizona International Growth Group (AZIGG, 2011). In addition, financial companies like American Express and Charles Schwab with large back office support and data centres are drawn to Phoenix for its low occurrence of weather disruptions or earthquakes. In terms of supply chain, Phoenix also

has many large distribution centers to supply major cities throughout the Southwest, including Los Angeles and San Diego located 350 miles to the west.

#### **5.1.4 San Diego**

In 2015, San Diego will be the second largest MSA in this study at 3.5 million people and will rank as the 17<sup>th</sup> overall most populated MSA in the country. However, it is expected to have the slowest annual growth rate at 1.5 percent, which is an additional 47,000 people per year.

In recent years, much of the population growth has been attributed to the city's temperate Mediterranean climate and the country's largest military naval base, employing one-fourth of the residents in San Diego (Global Security, 2005). Located along the coastline, San Diego has established itself as a major cruise ship port, generating over two thousand jobs and an estimated \$190 million revenue for the local economy (San Diego Convention & Visitors Bureau, 2008).

#### **5.1.5 Denver**

The population of Denver is expected to reach 2.8 million in 2015. This is equivalent to an annual increase of 1.7 percent or 41,000 people per year. Denver is the third largest MSA in this study and ranks 21<sup>st</sup> overall in the country.

Denver has transformed the city into the nation's largest park system with over 200 parks within the city limits and 20,000 acres of parks in the nearby mountains (HomeToDenver, 2008). Residents can enjoy outdoor activities year round. Therefore, the state of Colorado has the lowest obesity rate in the country, which contributes to the average resident's annual health insurance rate being \$400 lower than the national average. In terms of commerce, Fortune Magazine has named Denver numerous times as one of the "Best Cities for Business" (Fortune Magazine, 2011). It has the most highly educated residents in the country with 92 percent of the population having a high school diploma (82 percent national) and 35 percent having a Bachelor's degree (23 percent

national) (HomeToDenver, 2008). Denver also has the nation's fourth shortest commute time (Zuercher, 2005), and an Airports Council International's AETRA<sup>15</sup> survey in 2006 voted Denver as having the third best airport by airport size of over 40 million passengers annually (Airports Council International, 2008)

#### **5.1.6 Sacramento**

With a population smaller than Denver, Sacramento is expected to reach 2.46 million people in 2015 with an annual growth rate of two percent from 2006 to 2015. Sacramento will add 41,000 people per year with a relatively strong rate of population growth of two percent per year.

Over the last decade, the primary source of population increase for Sacramento came from new residents migrating from coastal California and immigrants seeking lower housing costs, job opportunities and post-graduate education (Public Policy Institute of California, 2004). State government agencies and college campuses are established throughout the city, providing stable, well-paid, equal-opportunity employment. Sacramento is the most racially and ethnically integrated major city in the U.S. and it is expected to remain so into 2015 (Bower, 2002).

#### **5.1.7 Albuquerque**

Albuquerque has the smallest population of the MSAs in this study. The total population is expected to be less than one million people in 2015, with an annual increase of 1.7 percent or 14,000 per year. On a national level, Albuquerque will rank 55<sup>th</sup> out of the 350 MSAs in the U.S.

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<sup>15</sup> AETRA is a comprehensive quarterly data analysis for each individual airport, solely based on customer perception. AETRA is designed to enhance customer satisfaction at all participating airports for the benefit of both the passengers and the airport. AETRA is taken from the Latin word *aethra* meaning 'the upper air, clear sky' and is not an acronym (Airports Council International, 2008)

The population growth in Albuquerque has been driven by the state's incentive programs, which lowered personal income taxes and capital gains and tax credits for businesses creating new jobs paying over \$40,000 per year salary (Tatge, 2006 ). This has led to the lowest business costs in the country, and it was also rated the best place to do business by Forbes magazine in 2006. The increase in real wages has attracted many high-skilled manufacturing workers such that Albuquerque has the 13<sup>th</sup> largest concentration of engineers in the U.S. with 31 percent of the adult population having a college degree. Another major source of population growth came from the increase in Hispanic population migration from Mexico (U.S. Census Bureau, 2011). The Hispanic population rate of growth was highest in the state of New Mexico at 46.3 percent from 2000 to 2010, with California in second place at 38 percent.

## **5.2 Total U.S. Cohorts Population Projections**

This section explores generation cohort projections on both national and MSA levels. Specifically, the Baby Boomers, Generation X and Generation Y populations will be compared between and within each of the MSAs. As discussed earlier in the literature review, generational cohorts play an important role in many aspects of housing demand, from where different cohorts live and the size of houses to the reasons for buying a home. Therefore, understanding the effect these three generational cohorts have on the population is important in this study.

From 2006 to 2015, the U.S. Baby Boomer population is expected to decrease by 23 percent from 79 million to 61 million people (Table 14). Conversely, the population of Generations X and Y will increase at a rate of five percent and seven percent respectively. One assumption is that immigrants, who are typically younger in age, will fall under these two generational cohorts. In absolute terms, Generation X will increase from 61 million to 64 million from 2006 to 2015, an annual increase of 330,000 people per year. Generation Y will climb from 67 million to 73 million from 2006 to 2015, or 556,000 people per year. On a per annum basis, the percentage increases are marginal at 0.5 percent for Generation X and 0.8 for Generation Y.



**Table 14 – Population of Generational cohorts and Percent Change (2006 to 2015)**

Generation Cohorts	Birth Years	2006	2015	Percent Change (Percent)	Annual Rate	
		(Million)	(Million)		(Million)	(Percent)
Baby Boomers	1946 -1964	79	61	-23%	-2	-2.5%
Generation X	1965 -1979	61	64	5%	0.3	0.5%
Generation Y	1980 - 2000	68	73	7%	0.6	0.8%

2006 & 2015 population data series source: W&P Economics, 2004.

Annual growth rates calculated by author

Baby Boomers are expected to represent 18 percent of the U.S. population in 2015, down from 26 percent in 2006 (Table 15). Generations X and Y, even with a projected increase in population, will see little change in their share of the total population.

**Table 15 – Generational Cohorts’ Percentage Share of the Total U.S. Population (2006 to 2015)**

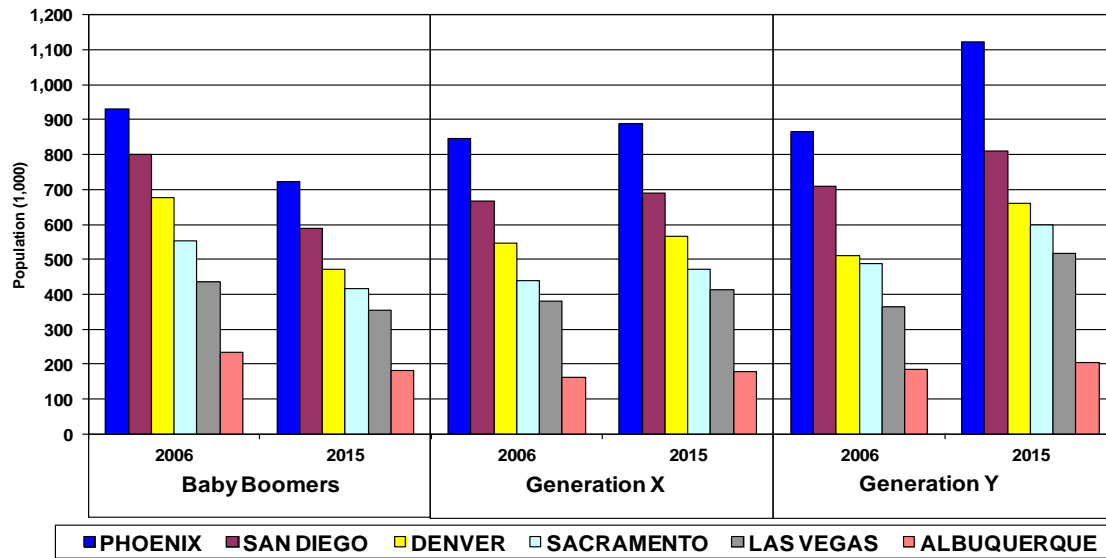
Generation Cohorts	2006	2015
	(Percent)	(Percent)
Baby Boomers	26.3%	18.2%
Generation X	18.7%	19.0%
Generation Y	22.0%	21.6%

Percentage share calculation was generated from W&P Economics 2006 and 2015 population data.

### 5.3 Generational Cohort Projections by MSA

The MSA population change by generational cohort is expected to follow a similar trend as the rest of the country. Generation X and Y populations will increase while the Baby Boomers will decrease. However, the magnitude of change for each generation is far greater when comparing the MSAs to the rest of the U.S. Figure 15 shows this trend with the actual population by generation in each MSA for 2006 and 2015.

**Figure 15 - MSA Population by Generational cohort**



Population data series source: W&P Economics, 2004.

The differences for each MSA will be discussed in the rest of Section 5.4. The discussion will also include the population change by generational cohort and the comparison of their percentage share in each MSA against the other MSAs (Table 16). However, the discussion will not include inflows of retired population, which include some Baby Boomers moving from cooler climate regions of the U.S. to warmer states such as Arizona and Nevada.

**Table 16 – Generation Cohort Population Projections by MSA (2006 to 2015)**

MSA	2015 Population (Thousands)	Percent Change 2006-2015 (Percent)	Annual Change		Percent of Population	
			(Thousands)	(Percent)	2006	2015
<b>Baby Boomers</b>						
PHOENIX	723	-29%	-23	-3%	24.0%	15.3%
SAN DIEGO	588	-36%	-24	-4%	25.9%	16.7%
DENVER	471	-44%	-23	-5%	28.0%	16.9%
SACRAMENTO	416	-33%	-15	-4%	26.4%	16.9%
LAS VEGAS	355	-22%	-9	-3%	25.3%	16.3%
ALBUQUERQUE	182	-28%	-6	-3%	27.8%	18.9%
MSA Weighted Average		-33%	-19	-4%	25.9%	16.5%
<b>Total U.S.</b>	<b>61,293</b>	<b>-23%</b>	<b>-2,000</b>	<b>-2.5%</b>	<b>25.8%</b>	<b>18.2%</b>
<b>Generation X</b>						
PHOENIX	889	5%	5	1%	21.8%	18.9%
SAN DIEGO	689	3%	3	0%	21.6%	19.6%
DENVER	567	4%	2	0%	22.6%	20.4%
SACRAMENTO	471	7%	4	1%	20.9%	19.1%
LAS VEGAS	414	8%	4	1%	22.1%	19.0%
ALBUQUERQUE	177	9%	2	1%	19.2%	18.4%
MSA Weighted Average		5%	3	1%	21.7%	19.3%
<b>Total U.S.</b>	<b>64,194</b>	<b>5%</b>	<b>333</b>	<b>0.5%</b>	<b>18.7%</b>	<b>19.0%</b>
<b>Generation Y</b>						
PHOENIX	1,123	23%	29	3%	22.4%	23.8%
SAN DIEGO	810	13%	11	1%	22.9%	23.1%
DENVER	659	23%	17	2%	21.1%	23.7%
SACRAMENTO	599	18%	12	2%	23.4%	24.3%
LAS VEGAS	517	29%	17	3%	21.2%	23.8%
ALBUQUERQUE	205	11%	2	1%	22.0%	21.3%
MSA Weighted Average		17%	12	2%	21.0%	22.1%
<b>Total U.S.</b>	<b>72,535</b>	<b>7%</b>	<b>556</b>	<b>0.8%</b>	<b>22.0%</b>	<b>21.6%</b>

2015 population data series source: W&P Economics, 2004. All other analysis performed by the Author

### 5.3.1 Las Vegas

From 2006 to 2015, the total Baby Boomers' population is expected to decline by 22 percent to 355,000 in 2015 (Table 16). This is the smallest percentage decrease compared to the other MSAs. On the other hand, the Generation Y growth rate of 29 percent is the highest amongst all the six MSAs with 517,000 people. Generation X will increase eight percent and is expected to record the second highest increase in the study. As a percentage of the total Las Vegas population, the Baby Boomers will decline from

25 percent to 16 percent from 2006 to 2015. In contrast, Generation Y will increase from 21 percent to 24 percent during the same period. The Generation X population will fall from 22 percent to 19 percent.

### **5.3.2 Phoenix**

Phoenix, being the most populated MSA in this study, will have the largest population for all three generational cohorts in 2015. The Baby Boomers population will decrease by 29 percent, for 723,000 people. In addition, Baby Boomers in Phoenix will represent only 15 percent of the population, the lowest of all MSAs. Phoenix is the only MSA with a Generation Y population over residents in 2015 for a 23.8 percent share of its population. Generation X is forecast to grow five percent to 889,000, a 19 percent share of the population.

### **5.3.3 San Diego**

From 2006 to 2015, the decline in the Baby Boomers will be the second highest in percentage terms of the six MSAs. The W&P forecast calls for a 36.7 percent decline or 215,000 people over the nine-year period. Generation X will have the lowest growth rate at three percent, equivalent to 689,000 people, but this still represents the second highest percentage share of Generation X at 19.6 percent, behind Denver at 20.4 percent. The growth rate of Generation Y is the second lowest at 13 percent and this is also the second smallest cohort, representing 23.1 percent of the population.

### **5.3.4 Denver**

In Denver, the population of Baby Boomers will decline by 44 percent for a total of 471,000 people in 2015. This will be the largest rate of decline for these six MSAs. The reduction in population is quite dramatic as the percentage share of Baby Boomers declines from being the highest of the six MSAs at 28 percent in 2006 to one of the lowest at 17 percent in 2015. Conversely, Generation Y is expected to grow by 22 percent, increasing this cohort from 21 percent to 24 percent, representing a total of

659,000 people. The growth rate for Generation X is fairly flat, rising just under four percent over the nine years to 567,000, but Denver is still expected to have the highest percentage of Generation X residents.

### **5.3.5 Albuquerque**

Albuquerque has the smallest population size; therefore, the change in percentage will have less of an effect in absolute terms. In 2015, Albuquerque is expected to have the highest proportion of Baby Boomers at 18.9 percent for a total of 182,000 people. This percent share is higher than the national average of 18.2 percent. Compared to the other six MSAs, the populations of Generations X and Y are expected to be the lowest at 18.4 percent and 21.3 percent, equating to totals of 177,000 and 205,000 respectively.

### **5.3.6 Sacramento**

In 2015, Generation Y in Sacramento will increase by 18 percent, for a total of 599,000 residents in 2015. This will represent the highest proportion of Generation Y of all MSAs at 24.3 percent. Generation X and Baby Boomers will have the third smallest population at 471,000 and 416,000 respectively. In terms of percent share of the Sacramento population, Generation X will account for 19 percent versus Baby Boomers at 16.9 percent.

## 5.4 Race and Ethnicity Projections

The diversity of the U.S. population continues to increase over the years. The gains in Hispanic and Asian populations are changing the ethnicity of the country. In this section, these changes will be discussed both on a national and an MSA level.

### 5.4.1 Total U.S. Race and Ethnicity Projections

From 2006 to 2015, W&P estimated the U.S. White population will increase by three percent from 201 million to 208 million people for an annual increase of 677,000 people (Table 17). This percentage increase is the smallest compared to the other races, but the White population is still expected to be the majority of the U.S. population at 63 percent. In terms of percentage increase, the Asian population will have the highest percentage gain at 33 percent. The total population will be 19 million and will represent six percent of the total U.S. population. The total Asian population is the second smallest of the five ethnic groups, thus it has a lesser effect on the overall U.S. population.

**Table 17 – U.S. Population by Race and Ethnicity (2006 to 2015)**

Rank	Ethnic Group	2015 Population (Thousands)	Percent of Total (Percent)	Population Change 2006-2015 (Percent)	Annual Change (Thousands) (Percent)	
1	White	207,547	63%	3%	677	0.3%
2	Hispanic	56,084	17%	27%	1,333	3.0%
3	Black	42,143	13%	11%	482	1.3%
4	Asian	18,783	6%	33%	517	3.7%
5	Native American	2,765	1%	11%	30	1.2%
	<b>Total</b>	<b>327,322</b>	<b>100%</b>	<b>9%</b>	<b>3,039</b>	<b>1.0%</b>

2015 population data series source: W&P Economics, 2004. All other analysis performed by the Author

The Hispanic population will continue to be the second largest ethnic group and is forecast to represent 17 percent of the nation's population in 2015. This group is expected to have the largest population gain at 27 percent from 44 million in 2006 to 56 million in 2015, which equates to an annual increase of 1.3 million people.

The Black population is expected to increase by 11 percent from 38 million to 43 million people. This group will remain the third largest ethnic population in the U.S. The Native

American group will be the smallest segment of the population at 2.76 million in 2015, accounting for less than one percent of the U.S. population.

#### **5.4.2 MSA Race and Ethnicity Projections**

From 2006 to 2015, the growth rates for all race and ethnicity population in the six MSAs are expected to be higher than the total U.S. ethnic population. Mirroring the national trend, the Asian population will have the highest percentage increase in all six MSAs, followed by the Hispanics, Blacks, Native Americans and Whites (Table 18).

**Table 18 – MSA Population By Race and Ethnicity**

	<b>2015 Population (Thousands)</b>	<b>Percent Total (Percent)</b>	<b>Population Change 2006-2015 (Percent)</b>	<b>Annual Change (Thousands) (Percent)</b>	
<b>PHOENIX</b>					
Hispanic	1,594	33.8%	39%	49	4%
Black	174	3.7%	22%	3	2%
White	2,707	57.4%	13%	34	1%
Asian	143	3.0%	41%	5	5%
Native American	94	2.0%	22%	2	2%
<b>Total</b>	<b>4,713</b>	<b>100.0%</b>	<b>22%</b>	<b>93.6</b>	<b>2%</b>
<b>LAS VEGAS</b>					
Hispanic	604	28.3%	37%	18	4%
Black	203	9.5%	30%	5	3%
White	1,174	55.0%	18%	20	2%
Asian	143	6.7%	41%	5	5%
Native American	12	0.5%	10%	0	1%
<b>Total</b>	<b>2,136</b>	<b>100.0%</b>	<b>25%</b>	<b>48</b>	<b>3%</b>
<b>SAN DIEGO</b>					
Hispanic	1,220	34.7%	29%	30	3%
Black	207	5.9%	14%	3	2%
White	1,635	46.6%	1%	3	0%
Asian	426	12.1%	29%	11	3%
Native American	23	0.6%	15%	0	2%
<b>Total</b>	<b>3,512</b>	<b>100.0%</b>	<b>14%</b>	<b>47</b>	<b>2%</b>
<b>DENVER</b>					
Hispanic	699	25.1%	33%	19	4%
Black	162	5.8%	16%	3	2%
White	1,750	62.9%	7%	12	1%
Asian	154	5.5%	56%	6	6%
Native American	19	0.7%	17%	0	2%
<b>Total</b>	<b>2,783</b>	<b>100.0%</b>	<b>15%</b>	<b>41</b>	<b>2%</b>
<b>ALBUQUERQUE</b>					
Hispanic	460	47.7%	25%	10	3%
Black	26	2.7%	24%	1	3%
White	394	40.9%	5%	2	1%
Asian	26	2.7%	46%	1	5%
Native American	58	6.0%	11%	1	1%
<b>Total</b>	<b>964</b>	<b>100.0%</b>	<b>15%</b>	<b>14</b>	<b>2%</b>
<b>SACRAMENTO</b>					
Hispanic	534	21.7%	39%	17	4%
Black	203	8.2%	23%	4	3%
White	1,356	55.1%	6%	9	1%
Asian	347	14.1%	40%	11	4%
Native American	21	0.9%	11%	0	1%
<b>Total</b>	<b>2,460</b>	<b>100.0%</b>	<b>18%</b>	<b>41</b>	<b>2%</b>

2015 population data series source: W&P Economics, 2004. All other analysis performed by the author



### **5.4.3 Phoenix**

From 2006 to 2015, the White population in Phoenix is expected to increase the slowest growth compared to the other ethnic groups. On the other hand, Whites will remain the population majority at 57 percent in 2015. Phoenix has the nation's ninth highest Hispanic population which is expected to increase by four percent per year to 1.6 million by 2015. This percentage increase is the highest of the six MSAs. Native Americans will account for less than 2 percent of the population in Phoenix and will continue to lead the country with the highest concentration of Native Americans at 94,000 people.

### **5.4.4 Las Vegas**

The Asian population is expected to have the largest percentage increase of all six MSAs at 41 percent from 2006 to 2015. On an annual basis, this increase is five percent, resulting in a total of 143,000 people by 2015. Ironically, in relation to the other ethnic groups, the Asians constitute only seven percent of the total population. The White population, with a two percent increase per year, will present 55 percent of the total 1.17 million people in 2015. At a distant second, the Hispanics will represent 28 percent of the population for a total of 604,000. The concentration of Blacks in Las Vegas leads all other six MSAs with a 10 percent share of the population, totalling 203,000 people in 2015.

### **5.4.5 Albuquerque**

Albuquerque is the only MSA where the Whites are not a majority of the population in 2015. The Hispanics will represent 48 percent and the Whites 41 percent. In absolute terms, the total Hispanic population is the smallest of all MSAs in the study. The other races and ethnicities such as the Native Americans, Blacks and Asians will continue to be a minority, making up a total of just under 12 percent of the population.

### **5.4.6 San Diego**

In San Diego, the White population is forecast to increase modestly – less than one percent – for a total of 1.6 million in 2015. The emerging Hispanic population will

increase by three percent per year for a 35 percent share of the population. In 2015, the Hispanic population is expected to reach 1.2 million people, or 35 percent of the total population in San Diego. The Asian population of 428,000 will represent 12 percent of San Diego's population. This will be the largest Asian population in all six MSAs.

#### **5.4.7 Denver**

In 2015, Denver will have the highest percentage of Whites at 63 percent compared to the rest of the MSAs. The total White population will be 1.75 million in 2015. Representing one-quarter of the total population will be the Hispanics with 699,000 people. The Asians and Blacks will be equally represented at six percent for a total of 154,000 and 162,000 respectively. The growth in Asians is the highest at six percent per annum compared to the other five MSAs in this thesis.

#### **5.4.8 Sacramento**

Sacramento is the most ethnically diverse city compared to the other MSAs. The percentages of Asian, Blacks and Hispanics population will be well represented in the city by 2015. The population distribution is divided in half, with Whites representing 55 percent and the rest of the ethnic groups making up the remainder of the population. The percent share breakdown is as follows: Hispanics at 22 percent, Asians at 14 percent, Blacks at eight percent, and Native Americans at one percent.

This section demonstrated that the population growth rates for all MSAs will exceed that of the entire U.S. from 2006 to 2015. Moreover, the population composition based on generational cohorts, race and ethnicity groups will also change more than in the rest of country. As a result, these demographic factors will drive future housing demand in these six MSAs. In the next section, additional calculations will be performed on the demographic data in order to estimate the number of housing units and the volume of construction lumber needed for each MSA by 2015.

## **6 Discussion**

This Section discusses the residential housing demand and the total volume of softwood lumber usage by MSA resulting from the changes in demographic factors from 2006 to 2015. Section 6.1 provides an estimate of the single and multifamily housing units for each MSA and further calculates the potential volume of softwood lumber needed to build these units. Section 6.2 and 6.3 explore the key findings that relates to the type of housing each generational cohort and race and ethnic groups will potentially demand in the future.

### **6.1 Housing Potential by MSA**

The U.S. population is expected to increase approximately one percent per year. With the population increasing, additional housing will be needed to accommodate this growth in people living in the country. Therefore, an estimated residential housing demand was calculated from the population projection, statistics on the number of persons per household and the percent of immigrants (Table 19). Overall, the estimated U.S. housing demand is projected to be 1.221 million units per year. Essentially, this is the number of units needed to house the growing population, regardless if the houses are newly built homes or from the existing inventory of homes. For the purpose of this research, we will assume the estimated housing demand is only for new homes so further calculations can be performed on the volume of lumber consumed in Table 20

The annual population growth rate of all six MSAs is expected to be double that of the U.S. average growth rate in 2015. Thus, based on the method of estimating housing demand, Phoenix, with the largest population of the six MSAs, will need approximately 36,000 units of housing annually. Albuquerque will have the smallest population, hence the lowest housing projection of 5,550 units each year. As for the other four MSAs, the housing opportunities are fairly similar, ranging between 14,900 units to 19,800 units per year.

**Table 19 – Potential Housing Demand in 2015**

MSA	Population (,000) 2015	Annual Growth		Persons by Household		Immigrants (%)	Potential Housing (,000 Unit)
		(,000)	(%)	(Immigrants)	(U.S.-Born)		
PHOENIX	4,713	93.6	2.4%	3.2	2.5	14.2%	36
SAN DIEGO	3,512	46.9	1.5%	3.4	2.5	27.6%	17
DENVER	2,783	40.7	1.7%	3.2	2.5	9.1%	16
SACRAMENTO	2,460	41.0	2.0%	3.4	2.5	27.6%	15
LAS VEGAS	2,174	50.2	2.9%	3.1	2.4	18.0%	20
ALBUQUERQUE	964	14.2	1.7%	3.2	2.5	9.2%	6
<b>Subtotal</b>	<b>16,606</b>	<b>287</b>	<b>2.0%</b>	<b>3.3</b>	<b>2.5</b>	<b>18.0%</b>	<b>109</b>
<b>Total U.S.</b>	<b>327,322</b>	<b>3,039</b>	<b>1.0%</b>	<b>3.1</b>	<b>2.4</b>	<b>12.6%</b>	<b>1,221</b>

2015 population data series source: W&P Economics, 2004.

Household data source: Center of Immigration Studies, 2007. All other analysis performed by the author

In 2015, the U.S. housing market will demand approximately 14 billion board feet measure (Bfbm) of lumber, with single family homes representing 92 percent of the lumber volume (Table 20). Phoenix is expected to consume 418 million fbm, followed by Las Vegas at 225 million fbm. San Diego, Denver and Sacramento will consume roughly the same amount of lumber volume, ranging from 164 to 169 million fbm. Albuquerque will be the smallest at 64 million fbm.

**Table 20 – Potential Lumber Consumption by MSAs**

MSA	Potential Housing (Unit)	Single Family (Percent)	Multifamily (Percent)	Lumber Consumption (MMfbm)		
				Single Family	Multifamily	Total
PHOENIX	35,995	89%	11%	396	22	418
SAN DIEGO	17,057	65%	35%	138	32	169
DENVER	15,889	74%	26%	146	22	168
SACRAMENTO	14,900	80%	20%	148	16	164
LAS VEGAS	19,891	85%	15%	209	16	225
ALBUQUERQUE	5,551	88%	12%	61	4	64
<b>Subtotal</b>	<b>109,284</b>	<b>81%</b>	<b>19%</b>	<b>1,098</b>	<b>111</b>	<b>1,209</b>
<b>Total U.S.</b>	<b>1,221,472</b>	<b>80%</b>	<b>20%</b>	<b>12,749</b>	<b>1,146</b>	<b>13,895</b>

**Average Home Size**

	Single Family	Multifamily
U.S. West	2,344	1,141
U.S.	2,374	1,130

**Lumber Consumption per Square Feet of Space (fbm/sq ft.)**

	Single Family	Multifamily
U.S. West	5.30	4.65
U.S. Average	5.47	4.23

Single family and multifamily source: U.S. Census Bureau, 2011

Average home size and lumber consumption per square foot source: Forest Economic Advisors LLC, 2011

Clearly, the number of housing units will be largely dependent upon the ratio of the immigrant population to the U.S.-born population. Therefore, the influence from

immigrants will be discussed later in this section under race and ethnicity by MSA. Nevertheless, the opportunities for housing will be the greatest for Phoenix and Las Vegas based on the increase in population from 2006 to 2015.

## 6.2 Housing Demand by Generational Cohorts

In 2015, Generations X and Y are expected to surpass the population of Baby Boomers as the Baby Boomers population decreases and the Generation X and Y populations increase. Table 21 illustrates the population sizes by these three generational cohorts and their respective age ranges in 2015. Generations X and Y will be the key demand drivers for housing given their projected population increase. Furthermore, Generations X and Y will be entering their prime ages as first-time home buyers and/or repeat home buyers. According to the National Association of Realtors, the average age of first-time and repeat and home buyers is from 30 to 48 years old (National Association of Realtors, 2009). In 2015, both Generation X and Y's age ranges will fall between ages 30 to 48.

**Table 21 – U.S. Cohort Population and Age Ranges in 2015**

<b>Generational Cohorts</b>	<b>Population</b>	<b>Age Range</b>
Baby Boomers	61 Million	51 – 69
Gen X	64 Million	36 – 50
Gen Y	73 Million	15 – 35

2015 population data series source: W&P Economics, 2005.  
Generational cohort grouping performed by the author

In regards to the size of homes purchased, first-time buyers' homes are on average 1,600 square feet, or 500 square feet less than repeat buyers. Single family homes are the main type of homes first-time and repeat buyers purchase. The percentage share of single family homes is 74 percent for first-time buyers versus 82 percent for repeat buyers (Table 22).

**Table 22 – Size and Type of Home Purchased by First-Time and Repeat Buyers**

	<b>First-Time Buyers</b>	<b>Repeat Buyers</b>
<b>Median Size Home</b>		
Square Footage	1,600	2,100
<b>Type of Home</b>		
Single Family (%)	74%	82%
Multifamily (%)	26%	18%

Data series source: National Association of Realtors, Profile of Home Buyers and Sellers 2010

Given the median sizes of the homes, the demand for lumber volume consumption can be calculated. This calculation is based on the lumber consumption per square foot of home for both single and multifamily homes, assuming that each household will demand one housing unit. The methodology in calculating the number of households is the same as in section 5.1 where the total population growth is divided by the number of persons per household in each MSA. Table 23 shows the potential lumber consumption in millions fbm for Generations X and Y for single and multifamily homes.

**Table 23 – Generation X & Y Annual Housing Units and Lumber Consumption**

MSA	2015 Population (Thousands)	Annual Population Increase		Potential Households	Lumber Consumption (MMfbm)		
		(Thousands)	(Percent)		Single-Family	Multifamily	Total
<b>Generation X</b>							
PHOENIX	889	5	1%	1,849	8.0	1.5	9.6
SAN DIEGO	689	3	0%	933	4.1	0.8	4.8
DENVER	567	2	0%	894	3.9	0.7	4.6
SACRAMENTO	471	4	1%	1,361	5.9	1.1	7.1
LAS VEGAS	414	4	1%	1,478	6.4	1.2	7.7
ALBUQUERQUE	177	2	1%	720	3.1	0.6	3.7
<b>Total</b>	<b>3,207</b>	<b>19</b>	<b>3.9%</b>	<b>7,236</b>	<b>31.4</b>	<b>6.1</b>	<b>37.5</b>
<b>Generation Y</b>							
PHOENIX	1,123	29	3%	11,002	43.2	13.3	56.5
SAN DIEGO	810	11	1%	4,120	16.2	5.0	21.1
DENVER	659	17	2%	6,480	25.4	7.8	33.2
SACRAMENTO	599	12	2%	4,443	17.4	5.4	22.8
LAS VEGAS	517	17	3%	6,678	26.2	8.1	34.3
ALBUQUERQUE	205	2	1%	945	3.7	1.1	4.8
<b>Total</b>	<b>3,914</b>	<b>88</b>	<b>13%</b>	<b>33,667</b>	<b>132.0</b>	<b>40.7</b>	<b>172.7</b>

2015 population data series source: W&P Economics, 2004. All other analysis performed by the author

### 6.2.1 Generation Y

In 2015, Generation Y is expected to have a strong influence on the U.S. housing market. Generation Y will be between the ages of 15 to 35 years old. According to the National

Association of Realtors, since the average age of a first time home buyer is 30 years old, Generation Y will be considered as a prime target market segment as first time home buyers. First time homes are typically starter homes as described in the previous subsection. Starter homes are small and use less construction lumber materials. However, with Generation Y's strong population growth in all six MSAs, there will be a projected demand of 34,000 housing units requiring 172 Million fbm of lumber annually (Table 23).

Generation Y in Phoenix will consume the most lumber volume at 56.5 Million fbm per year, with single family homes accounting for 76 percent of the volume. Las Vegas and Denver will have similar levels of lumber consumption at 33 Million fbm followed by the next two closest MSAs, Sacramento and San Diego, with lumber demand at roughly 21 to 23 Million fbm. Albuquerque is forecast to have the smallest lumber demand at 4.8 MMfbm.

### **6.2.2 Generation X**

In 2015, Generation X will be 36 to 50 years old. The U.S. Department of Labour indicated the peak income earning years are between ages 35 to 54 (Financial Engineer, 2008). Therefore, Generation X will be entering their peak earning years and will trade up to larger homes with the potential of purchasing second homes. The assumption is they will follow the same home purchasing pattern as the Baby Boomers as they come of age. In 2015, Generation X is expecting to demand 7,000 housing units per year requiring 37.5 Million fbm of lumber (Table 23).

The average percentage gain for Generation X for all six MSAs is slightly higher than the national average. However, the annual population increase of four percent for Generation X is lower than the 14 percent annual rate of growth for Generation Y. Therefore, the projected number of housing units and the volume of construction lumber volume consumed by Generation X will be one-fifth that of Generation Y.

Generation X in Phoenix, with the largest population, will demand 1,849 housing units and less than 10 Million fbm of lumber per year. The second and third largest housing and lumber demand will be Sacramento and Las Vegas. The small population sizes and low growth rate of Generation X in the rest of the MSAs will not lead to any significant demand in terms of housing units and lumber consumption per year.

### **6.2.3 Baby Boomers**

With the expected decline in the Baby Boomers population, using methodology by which housing and lumber demand are calculated in this study will result in negative housing units and lumber consumption. Therefore, no detailed discussion will be done in this section. However, the percentages of the Baby Boomer population in Denver, Albuquerque and Sacramento are slightly higher than the weighted average of 16.5 percent for all MSAs in 2015. Therefore, the homeownership will also be higher in these MSAs since homeownership rate for ages 55 to 69 in the U.S West was 74 percent (U.S. Census Bureau, 2012), compared to the Generations X and Y, whose homeownership rates were 60 percent and 32 percent respectively.

Another characteristic of Baby Boomers is that they are homeowners of two or more homes. Twenty-four percent of Baby Boomers have two or more homes, compared to 10 percent for homeowners between ages 25 to 44 (National Association of Realtors, 2009). Therefore, Denver, Albuquerque and Sacramento, with higher percentages of Baby Boomers, can expect purchases of second homes or vacation properties from this cohort.

### **6.3 Housing Demand by Race and Ethnicity**

In 2009, the majority of the home buyers in the U.S. West were Whites/Caucasians, representing 75 percent of the population. The Hispanic/Latino group was a distant second with 10 percent (National Association of Realtors, 2009). As mentioned in the Results section, the amount of Hispanic/Latino population added each year will be the highest for most of the MSAs. Based on the size of the Hispanic/Latino population



increase each year, this ethnic group is expected to represent a considerable portion of the future housing demand.

From 1995 to 2005, Hispanic/Latino owner-occupied homes increased from 3.1 million units to 6.0 million for a homeownership rate of 42-49 percent (Ready, 2006). The average wage of a Hispanic worker is 67 percent less than non-white Hispanic. However, multiple wage earners and larger households result in narrowing this gap of household income to 74 percent that of non-Hispanic White households. Approximately 32 percent of Hispanic households include relatives that are not part of the immediate family compared to 19 percent of non-Hispanic households. This makes housing more affordable and homeownership a possibility for Hispanics. As a result, 52 percent of Hispanic households live in single-family detached houses, compared to 70 percent of non-Hispanics.

With the Hispanic population having a higher number of persons per household than the other races and ethnicities, homebuilders targeting this segment of the population will need to consider ways to accommodate larger household sizes economically. This type of building and design consideration will need to be more prominent as the Hispanic population increases throughout most of the U.S. West.

The following discussion will focus on the potential housing units and lumber volume consumed by race and ethnicity with an emphasis on the Hispanic population. The analysis below assumes all races and ethnicities demand the same proportion of single-family and multifamily percentage for each MSA. Given that historically the Hispanic population live in single-family dwellings less than non-Hispanics, this thesis intended to keep the study in a general context of housing demand and preference across all races and ethnicities.

The projected annual population increase in each MSA by race and ethnicity groups is shown in Table 24. The table also shows the estimated housing units and lumber

consumption per year. Phoenix, having the largest population of the six MSAs, will have the highest lumber consumption for Whites and Hispanics at 240 Million fbm and 141 Million fbm respectively. Las Vegas, with the second smallest population of the MSAs, will have the second highest consumption volume for Whites at 124 Million fbm and Hispanics at 64 Million fbm. This will possibly lead to more single family homes being built in Las Vegas than the other, more populated MSAs such as San Diego, Denver and Sacramento. Denver is projected to have the highest percentage of Whites at 62.9 percent of the population and will have the third largest lumber consumption volume at 106 Million fbm. Albuquerque, the only MSA with the Hispanic population as the majority of the population, will only consume 31 Million fbm of lumber volume per year. The low lumber consumption volume is due to the size of the population but homebuilders and architects should not overlook this unique population characteristic of Albuquerque when targeting this housing market.

The Asian population will grow the fastest compared to the other race and ethnicity groups. However, given the small percentage representation of this group, the demand for housing will not have much effect on each of the MSAs.

**Table 24 – Race and Ethnicity Groups Annual Housing Demand and Lumber Consumption**

	<b>2015 Population (Thousands)</b>	<b>Percent Total (Percent)</b>	<b>Annual Population Increase (Thousands) (Percent)</b>		<b>Potential Housing (Units)</b>	<b>Lumber Consumption (MMfbm)</b>
<b>PHOENIX</b>						
Hispanic	1,594	33.8%	49	4.3%	12,178	141
Black	174	3.7%	3	2.4%	1,330	15
White	2,707	57.4%	34	1.4%	20,675	240
Asian	143	3.0%	5	4.5%	1,092	13
Native American	94	2.0%	2	2.5%	720	8
<b>Total</b>	<b>4,713</b>	<b>100.0%</b>	<b>93.6</b>	<b>2.4%</b>	<b>35,995</b>	<b>418</b>
<b>LAS VEGAS</b>						
Hispanic	604	28.3%	18	4.1%	5,628	64
Black	203	9.5%	5	3.3%	1,891	21
White	1,174	55.0%	20	2.0%	10,933	124
Asian	143	6.7%	5	4.5%	1,331	15
Native American	12	0.5%	0	1.1%	108	1
<b>Total</b>	<b>2,136</b>	<b>100.0%</b>	<b>48</b>	<b>2.8%</b>	<b>19,891</b>	<b>225</b>
<b>SAN DIEGO</b>						
Hispanic	1,220	34.7%	30	3.2%	5,927	59
Black	207	5.9%	3	1.6%	1,007	10
White	1,635	46.6%	3	0.2%	7,944	79
Asian	426	12.1%	11	3.2%	2,069	21
Native American	23	0.6%	0	1.6%	110	1
<b>Total</b>	<b>3,512</b>	<b>100.0%</b>	<b>47</b>	<b>1.5%</b>	<b>17,057</b>	<b>169</b>
<b>DENVER</b>						
Hispanic	699	25.1%	19	3.7%	3,990	42
Black	162	5.8%	3	1.8%	924	10
White	1,750	62.9%	12	0.8%	9,988	106
Asian	154	5.5%	6	6.2%	881	9
Native American	19	0.7%	0	1.9%	106	1
<b>Total</b>	<b>2,783</b>	<b>100.0%</b>	<b>41</b>	<b>1.7%</b>	<b>15,889</b>	<b>168</b>
<b>ALBUQUERQUE</b>						
Hispanic	460	47.7%	10	2.7%	2,648	31
Black	26	2.7%	1	2.7%	152	2
White	394	40.9%	2	0.5%	2,268	26
Asian	26	2.7%	1	5.1%	149	2
Native American	58	6.0%	1	1.2%	334	4
<b>Total</b>	<b>964</b>	<b>100.0%</b>	<b>14</b>	<b>1.7%</b>	<b>5,551</b>	<b>64</b>
<b>SACRAMENTO</b>						
Hispanic	534	21.7%	17	4.3%	3,233	36
Black	203	8.2%	4	2.5%	1,227	14
White	1,356	55.1%	9	0.7%	8,213	90
Asian	347	14.1%	11	4.4%	2,101	23
Native American	21	0.9%	0	1.2%	128	1
<b>Total</b>	<b>2,460</b>	<b>100.0%</b>	<b>41</b>	<b>2.0%</b>	<b>14,900</b>	<b>164</b>

2015 population data series source: W&P Economics, 2004. All other analysis performed by the author

## 7 Conclusion

The length of the U.S. housing retrenchment is difficult to forecast given the overall weakness in the U.S. economy. As the country emerges from the current recessionary economic environment, demand for housing will gradually improve. The outlook for housing will be very encouraging, stemming from favourable demographic factors such as the improving immigration trends and the growing population of Generations X and Y (Joint Center for Housing Studies, 2007).

In this thesis, the study focused on the population growth and key demographic trends of six metropolitan cities in the U.S. West from 2006 to 2015. Comparison between the six MSAs indicated cities with a large population base are expected to have a higher housing demand and lumber consumption than cities with a smaller population base. For example, Phoenix, with the largest population of 4.7 million in 2015, will need approximately 36,000 units of new homes annually. On the other hand, Albuquerque, with the smallest population of less than 1 million, will demand only 5,551 units of new homes each year. Based on these housing projections, the estimated volume of construction lumber consumed ranges from 418 MMfbm for Phoenix to 64 MMfbm for Albuquerque.

From 2006 to 2015, the population by age cohort for all six MSAs indicated the Baby Boomer population is expected to decrease at an annual rate of four percent, faster the estimated rate of 2.5 percent for all of the U.S. On the contrary, the Generation X and Y populations are expected to increase at an annual rate of one and two percent respectively, slightly higher than the national average of less than one percent for both generations. Therefore, Generation X and Y will be key market segments for housing given their projected population increase. Generation X and Y will be entering their prime ages as first-time home buyers and/or repeat home buyers. For Baby Boomers, since their population is expected to decline, their housing demand based on theoretical calculations will result in zero housing growth during the investigated period.

The population growth rate for all race and ethnicity populations in the six MSAs are expected to be higher than the rest of the country. The Asian population will have the highest percentage increase for all MSAs, followed by the Hispanics, Blacks, Native Americans and Whites. However, the Hispanic population will continue to be the second largest ethnic group in five out of the six MSAs. Albuquerque is the only MSA where the Hispanic race is larger than the White race. The high percentage of Hispanic residents in these six MSAs will demand single-family housing starter homes and also slightly larger homes to accommodate the multi-generational Hispanic households.

In conclusion, the size of the population and the magnitude of the population increase will affect future housing demand and consequently lumber consumption for each of the MSAs. In addition, different generational cohorts influence in the size and type of houses they will reside in. Furthermore, the expected increase in the Hispanic population will continue to shape the house market landscape with homes that can accommodate multiple generations in the U.S. West.

Given the expected incremental increase in housing demand and consequently the rise in lumber consumption from 2006 to 2015, the ability for the North American lumber producers to respond to this increase in demand will be a challenge. A number of sawmills have closed indefinitely due to the poor economic environment and weak housing demand since 2008. As a result, the industry's production capacity has reduced as a result of the slower housing construction activity than historical norm. As population and housing demand increase for these 6 MSAs in 2015, the lumber supply constraint will be apparent, which eventually supports higher lumber prices in the near future. North American lumber producers will have to find ways to increase production capacity through manufacturing efficiency and or reallocation of volumes by geographic markets. The imbalance between supply and demand will lead to marketing and structural changes to North American lumber producers in the near term.

## **7.1 Research Limitations**

This research has two basic limitations: an outdated data source and the shift in home buyers' preferences and behaviours due to the recent U.S. economic recession.

The data used in the demographic trend analysis was purchased in 2004 from Woods and Poole Inc. which incorporated 2000 U.S. Census Bureau data, with additional updates from the Census Bureau in 2003. Clearly, this data is not current, especially when the 2010 U.S. Census data was released later in 2011. Therefore, the forecast data from W&P used in this thesis will be to some extent inaccurate. Specifically, the analyses of future housing trends and softwood lumber consumption in new home construction might also be misinterpreted in the discussion of MSAs by age cohorts and race and ethnicity.

Another limitation is that the data on home buyers' preferences and behaviours by different age cohorts and race and ethnicity was based on surveys conducted prior to the 2008 U.S. economic downturn and the collapse of the housing market. As a result, the profile of a typical home buyer pre-recession might not be the same post-recession as the housing market recovers from the oversupply of houses and falling home values across the nation.

## **7.2 Future Research**

Demographic factors are a driving force behind the U.S. housing demand (NAHB, 2001). Different age cohorts and ethnicity backgrounds have a variety of preferences when relating to housing. Understanding what consumers want in terms of the type and style of homes is critical to manufacturers of building and lumber products. Wood used in homes can range from the exterior facade with solid wood siding or fascia to wooden window trims. In the interior, wood can also be used extensively from wooden floors to moulding and millwork detailing on walls, floors and ceilings. The amount of lumber products used on a home also varies depending on the floor square footage of the home and the type of homes in terms of single family or multifamily dwellings. Therefore,

homebuilders and architects can benefit and differentiate themselves from the norm by understanding what different demographic segments of the population demand.

For primary and secondary wood producers, recognizing the needs of different demographic markets can facilitate the production of specific grades and sizes of wood products. Further understanding of the change in consumer preferences in home sizes and the types of dwelling can potentially lead to the different softwood lumber consumption levels and thus the ability to channel product flow to each specific region or MSAs depending on the demographic makeup.

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