LUND UNIVERSITY
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What are the determining factors and consequences of population ageing? (A regional case study of Skåne county, Sweden, 1970-2014)

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Abstract: Increasing proportions of elderly are one of the major challenges arising from changes in the age distributions of many Western societies. Whilst much attention has been to paid to continental and national trends of population ageing, relatively little consideration has been to regional patterns of population ageing. This paper focuses on the population ageing process in 33 municipalities in Skåne county in the south of Sweden. This paper uses a previously used municipality classification tool to arrange the municipalities in to one of six categories based on their population size, population density, population distribution, accessibility and if the municipality contains a large town or city. Initially, the paper introduces the topic of population ageing, and conducts a thorough review of all key relevant literature in the field. Historic panel data is then analysed to scrutinise and quantify to what extent the proportion of elderly is affected by factors such as foreign born residents, median income, unemployment level, fertility rates and type of municipality. Crucial relationships between proportion of elderly and foreign born residents, unemployment levels and types of municipality are discovered. Finally, recommendations based on these results are suggested to policymakers.

Key words: regional, population ageing, elderly, foreign born, unemployed, municipality, urban, rural

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1.0 - Introduction

1.1 - Research problem

As populations around the globe age at a previously unseen pace, economists, policymakers and the general public have begun to ponder what the causes and consequences of a rapidly aging population will mean to their societies and social orders, and crucially how treasured welfare providing institutions can harness additional demands on their services during already austere times.

A 2013 UN paper on population aging reported that "the number of older persons (aged 60 years or over) is expected to more than double, from 841 million people in 2013 to more than 2 billion in 2050": such is the scale of the challenge of global population aging (UN, 2013, p.xii).

Whilst much research and focus has been placed upon population aging at a continental and national level, very little attention has been paid to regional variations in the population aging process and what the causes and consequences of these are. This paper aims to fill some of that void.

1.2 - Research background

The author regards two previous studies of particular relevance to the topic of the causes and consequences of population aging amongst the Swedish population, these are: Bengtsson and Scott's 2011 paper: *Population Aging and the Future of the Welfare State: The Example of Sweden* and Johansson and Rauhut's 2013 paper: *Young women and Rural Exodus – Myths and Realities – A Case Study of Rural Sweden.* A short overview of these two papers and their contributions will now be presented.

Bengtsson and Scott's paper begins by offering an excellent overview of the current state of the process of population ageing in Sweden. The authors explain that the sharp decline in fertility rates during the 20th century has been the primary cause

of population aging in Sweden. Declining mortality at adult ages and increasing life expectancy has played a secondary role in the population ageing process, but has actually had a more pronounced effect in the re-shaping of the age structure.

The paper continues with the discussion of the consequences of population ageing, namely that the more elderly amongst the overall population, the higher the dependency ratio of those who are too young or too old to work will be. By the time individuals reach their mid-sixties, their net consumption exceeds their net income. This is largely owing to rising health, social care and pension costs as the elderly continue to live longer and longer following their retirement. The authors argue that as the share of elderly rises, so will consumption, and that the costs of providing current levels of care and pension payments in the future without policy changes will be unsustainable.

The authors then switch focus to possible strategies to combat the challenge of population ageing: namely, reversing the fall in fertility and changing the age structure through immigration. Bengtsson and Scott argue that achieving an increase in fertility rates would be hard to achieve, and would actually worsen public finances in the short term, as the dependency ratio would rise. They continue by stating net migration to Sweden since the 1930s has only had a small restraining effect on population aging. The challenge of timely migrant integration in to the labour market is also raised.

Bengtsson and Scott conclude that only by increasing the tax base can the costs of population ageing be financed. This could be achieved by increases in the retirement age, working hours and the size of the workforce. This paper offers a good literary overview of the key causes and consequences of population aging in Sweden, but lacks any serious data testing on the causes of population aging or data on the consequences of any demographic changes such as increases in immigration on the population aging process. Finally, the paper only offers a holistic view of Sweden and does not consider any regional variations in the population ageing process.

Johansson and Rauhut's 2013 paper meanwhile raises the challenge of limited labour market and educational opportunities for young people, especially women in Västernörrland county, a remote and economically weak region of Sweden. Whilst this paper does not have population aging at its core, its does consider the impacts of differing economic, migration, social and demographic structures, in particular out-migration of the young and the consequences that this has upon population structure, and is thus of relevance to this thesis.

The paper begins by discussing changing urban-rural relations. Many rural areas have suffered from continued depopulation, and this has lead to increases in the elderly in many rural areas. De-industrialisation in rural areas has led to increased unemployment, forcing many people to move to dynamic and knowledge based larger urban areas to find suitable employment. In addition, the increased propensity of the young to study has meant that many young people migrate away from rural areas to satisfy their educational goals. Their destination is usually metropolitan areas, particularly those with a university, and this has in turn helped to slow the increase of elderly in these areas. The authors do however report that increased refugee migration which has taken place since the 1990s has helped to slow population decrease in some rural areas.

The article also briefly discusses differences in urban and rural fertility patterns. Rural areas traditionally experienced higher levels of fertility than urban areas (most likely owing to the demand for labour in agricultural practices). Today however, fertility rates in rural and urban areas of Sweden are roughly the same.

The paper concludes by re-affirming that Sweden is very much a dual-country, consisting of duel counties. Many rural areas have been hit by structural unemployment as a result of deindustrialisation. This has led to fewer labour market opportunities for the young, particularly women, resulting in net out-migration and even population decline in some rural areas. Outwards migration of the young has skewed the age structure in many of these rural areas and has resulted in increasing ratios of elderly residents.

Johansson and Rauhut's article performs admirably well in raising awareness of Sweden's two-speed counties and the vastly differing demographic and economic conditions experienced in some rural and urban areas. Its focus however is on the migration patterns of young women in the county, and not on population ageing. The article does an extensive job of investigating this, and has been seen as a springboard for a county based study on the causes and consequences of population aging.

1.3 – Motivation for study

As mentioned at the outset of this introduction, relatively little academic research has been carried out in the field of regional causes and consequences of population ageing. This thesis aims to partially fill that gap by conducting a quantitative longitudinal study to further investigate and quantify the causes and consequences of population ageing at a regional level as discussed by Bengtsson and Scott (2011). Johansson and Rauhut's 2013 research in to the migration patterns of young women in Västernörrland, and the vast differences which they reported amongst regional economic, demographic, social, migration and labour market trends gives justification to conduct this study at a regional level.

The aim of this thesis is to gain a better understanding in to the causes and consequences of regional variations in population ageing and consequently this paper's research question is as follows: What are the determining factors and consequences of population ageing? (A regional case study of Skåne county, Sweden, 1970-2014)

In order to answer this research question, the following five hypotheses will be tested:

H1: Municipalities which contain a large town or city experience lower proportions of elderly than those municipalities which do not

H2: Total fertility rate (TFR) and proportion of elderly are negatively correlated: municipalities with lower fertility rates experienced larger increases in proportion of elderly

H3: Municipalities with larger proportions of foreign born residents have a lower proportion of elderly than municipalities with lower proportions of foreign born residents

H4: Municipalities with higher than average annual median incomes experienced lower proportions of elderly (as a greater proportion of their populations are at working ages and are thus likely to earn more than retirees)

H5: There is a positive relationship between proportion of unemployed and proportion of elderly

The potential contribution of this thesis is sizeable as by testing the above hypotheses the paper will identify and quantify the determining factors driving population ageing. Thus, the report's recommendations can in future be utilised by national and regional policymakers in implementing suggested policies aimed at slowing the rate of population ageing. Whilst this study only analyses data from Skåne county, the findings are also of great relevance to other counties which also contain municipalities which are similar to those found in Skåne county.

1.4 - Outline

This thesis is divided in to six chapters. Chapter 1 consists of an introduction to this thesis paper. Chapter 2 contains a review of key relevant literature in the field of population aging and its causes and consequences; many of the reviewed articles have a particular focus on Sweden. In addition, key Swedish demographic data is also presented and discussed in this chapter. Chapter 3 discusses the methods used in this study, in particular how data was collected and how it has been analysed.

Chapter 4 presents the results and findings of rigorous data testing. Finally, chapter 5 offers a discussion of the study's major findings, information on whether or not the study's hypothesis could be confirmed, and lastly offers a number of recommendations to policymakers.

2.0 - Literature review

2.1 - What is population ageing?

Population ageing can be defined as a shift in the age distribution of a population towards older ages (Gavrilov and Heuveline, 2003). This phenomenon began to affect Western European populations (including Sweden) during the latter half of the 20th century. A consequence of population ageing is a decline in the working-age population, this is a challenge facing many industrialised economies, especially those in the West, East Asia and Latin America (Lee and Mason, 2011). The challenges presented by population ageing should not be underestimated and include funding issues for public health care and pension systems, slower economic growth and the financial burdening of future generations to pay for today's elderly (Lee and Mason, 2011).

2.2 - What gave rise to population ageing in industrialised nations?

Lee and Mason (2011) explain that the current 'age transition' began during the 1950s. During this decade, couples began to increase their childbearing, bringing about the so-called 'baby-boom'. In addition, infant and child mortality rates began to fall dramatically. These combined factors led to a significant rise in the share of the population made up by children.

By the 1970s, the children of the 'baby-boom' generation began to enter the workforce, this coupled with a reduction in childbearing patterns lead to an increase in working age populations as a share of their national populations (Lee and Mason, 2011). Today, the 'baby-boom' generation are beginning to retire, causing both a decrease in the working age population and an increase in the elderly population. Lower than replacement levels of fertility (2.1 children per woman) in previous decades means that the numbers of elderly departing from the workforce cannot be equally replaced by the young entering the workforce. Increases in life expectancy, mean that the elderly are expected to live longer, which will further increase the ratio

of elderly in the population. Consequently, population ageing has the potential to quickly and dramatically alter the age distribution patterns of a given population.

2.3 - The Generational Economy

The economic behaviour of individuals changes as they progress throughout life from childhood to becoming elderly; if large scale changes in the age distribution of a population occur, then substantial changes in economic behaviour are destined to follow. Lee and Mason (2011) state that there are four types of economic activity: production, consumption, sharing resources and saving resources (all of which can be done publicly or privately). At certain stages of a life cycle, individuals will consume more than they produce and vice-versa. The atypical individual consumes more than they produce throughout their childhood years through their consumption of education, which if they decide to study at university may well continue in to their late twenties. Once an individual has completed their education, they enter the workforce, become economically productive, earn a salary and pay income tax to the government, at this stage they are net-producers. Upon retirement, individuals stop producing, and become net consumers again in the form of pension receipts and health-care services. As the elderly are destined to become an increasingly large proportion of many Western populations, their economic behaviour will increasingly influence the shape and performance of those economies. The consequences of population ageing may be very different should the elderly decide to postpone their retirement, consume their amassed wealth or consume large amounts of publically-financed health care (Lee and Mason (2011). This final point is of particular relevance to Sweden with her strong welfare state and comparatively high (and increasing) public health care costs for the elderly.

Table 1 below displays consumption, production and labour income in a Western industrialised nation, Germany. In the first illustration, one can observe that only at ages from mid-twenties to early-sixties do individuals earn more than they consume, thus, at all other ages, individuals are net consumers. In addition, consumption by the elderly is much greater than that of the young, this is most likely owing to high health and care costs. The second illustration in Table 1 portrays a

very similar pattern with regards to the age specific production and consumption of a population. A stand out observation is the sharp spike in consumption for those aged above ninety, this could be associated with the high costs of health care during the final months of life. It is reasonable to expect similar patterns of age-specific consumption and production for Sweden which is also a wealthy western European industrialised nation, however, the Swedish welfare state model may in fact foster even greater levels of consumption amongst Sweden's young and elderly than in Germany.

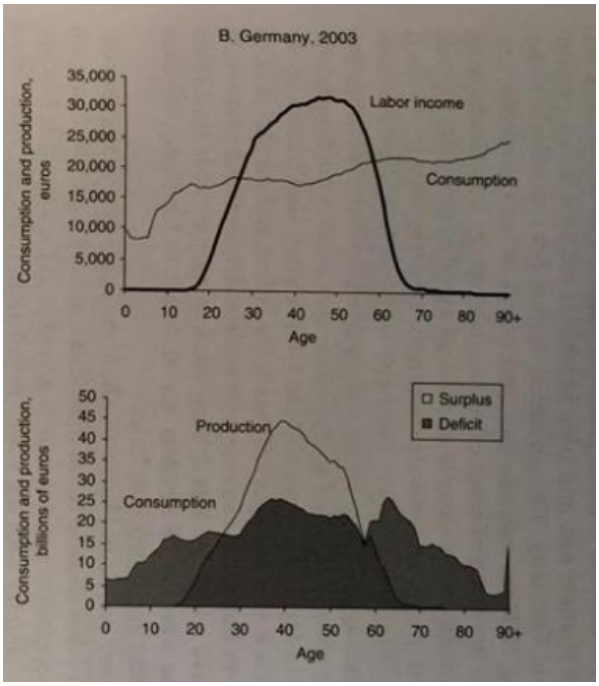


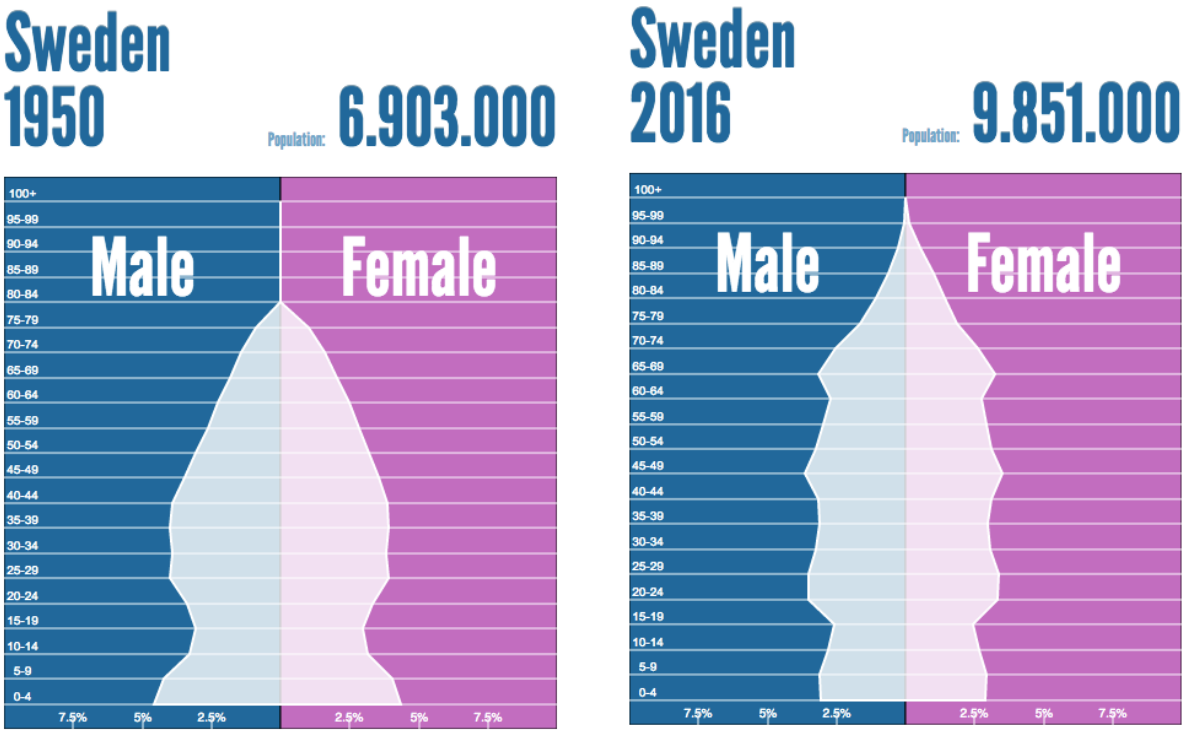
Table 1: Economic lifecycles: per capita and aggregate consumption and production (labour income) by age for Germany, 2003 (Lee and Mason, 2011).

2.4 - Population distribution (by age and gender)

A traditional way of illustrating the age and gender distribution of a given population is to use a population pyramid. The traditional structure of a population resembles that of a pyramid; consisting of infants and children at the bottom of the diagram whom represent the most populous group in the population, followed by young adults, and so on. The general trend being that the older the age segment, the smaller their share of the population (Parker, 2014). This population structure

remained unchanged around the globe throughout much of history until the 'age transition' which brought about reduced fertility and reduced mortality in industrialised nations.

Tables 2 and 3 below display Sweden's population structure in 1950 and then again in 2016. In 1950, the population structure does resemble a pyramid shape, with the youngest in society (those aged between 0 and 4 years of age) being the largest group in the population representing 9,0% of the total population. Meanwhile, the elderly, those aged 65 years of age or above, consist of a mere 8,7% of the total population. If one moves forward to the present day (2016), the population structure no longer resembles a pyramid, instead it resembles a column. The youngest in society now represent just 6,0% of the population and are no longer the largest group in society, this place has now been taken by the 45 to 49 year olds who represent 7,1% of the population. The elderly now represents a much larger share of the population: 20,2%, consequently, around one in five of the population is now elderly. This seismic change in the population structure in such a relatively short space of time, has led to huge changes in the dependency ratio and also in the size of the workforce as a proportion of the population.



Tables 2 and 3: Sweden's population structure in 1950 and 2016 (Populationpyramid.net, n.d.)

Table 4 below summarises the changes in population structure in Sweden between 1950 and 2016. Not only has the elderly's share of the population increased from 8,7% to 20,2%, but the percentage of working age individuals in the population has fallen from 67,6% to 62,3%. This means that a lower proportion of individuals are now of working age than in 1950 and thus the percentage of the population most likely to be net producers in the economy has fallen. In addition, the dependency ratio which measures the ratio of individuals who are either children or elderly (non-working people) compared to working age people increased from 32,4% in 1950 to 37,7% in 2016. Consequently, the proportion of the population whom are not at working ages, and are thus net consumers in the economy has increased.

Summary of Sweden's population structure in 1950 and 2016			
	1950	**2016**	**Net change**
Children (0-14 years of age)	23,7%	17,5%	-6,2%
Working age (15-64 years of age)	67,6%	62,3%	-5,3%
Elderly (65+ years of age)	8,7%	20,2%	11,5%
	100,0%	100,0%	
Dependency ratio (children and elderly)	32,4%	37,7%	5,3%

Table 4: Summary of Sweden's population structure in 1950 and 2016 (Data taken from Populationpyramid.net, n.d.)

2.5 - Fertility

Table 5 below shows the fertility transition which took place in Sweden. The data shows a sharp and rapid decline in fertility between the 1890s and 1930s. In 1891, the first year in this data series, Total Fertility Rate (TFR) was recorded at 4,14 children per woman, by 1934, a mere 43 years later it had more than halved to 1,69 children per woman. Bengtsson and Dribe (2014) whose study analyses the fertility transition in the south of Sweden during this period offer several theories for the sudden fall in fertility: firstly, they argue that a change in ideology regarding the

desired number of children along with the new concept of family limitation was the primary reason for the sudden fall in fertility. They claim that this change was initiated by the elite and middle classes, then trickled down through the social order to the skilled labourers and finally to the farmers. A contributing but less influential factor was the fall in infant and child mortality, thus, the children that were born stood an ever greater chance of surviving childhood and reaching adulthood, consequently, parents had fewer children. Other contributing factors include the emergence of welfare providing institutions such as pensions and unemployment benefits which reduced the benefits or insurance of having children. Finally, the emergence of a 'quality over quantity' attitude towards childbearing, where as parents had fewer children but invested more in each child further reduced levels of fertility.

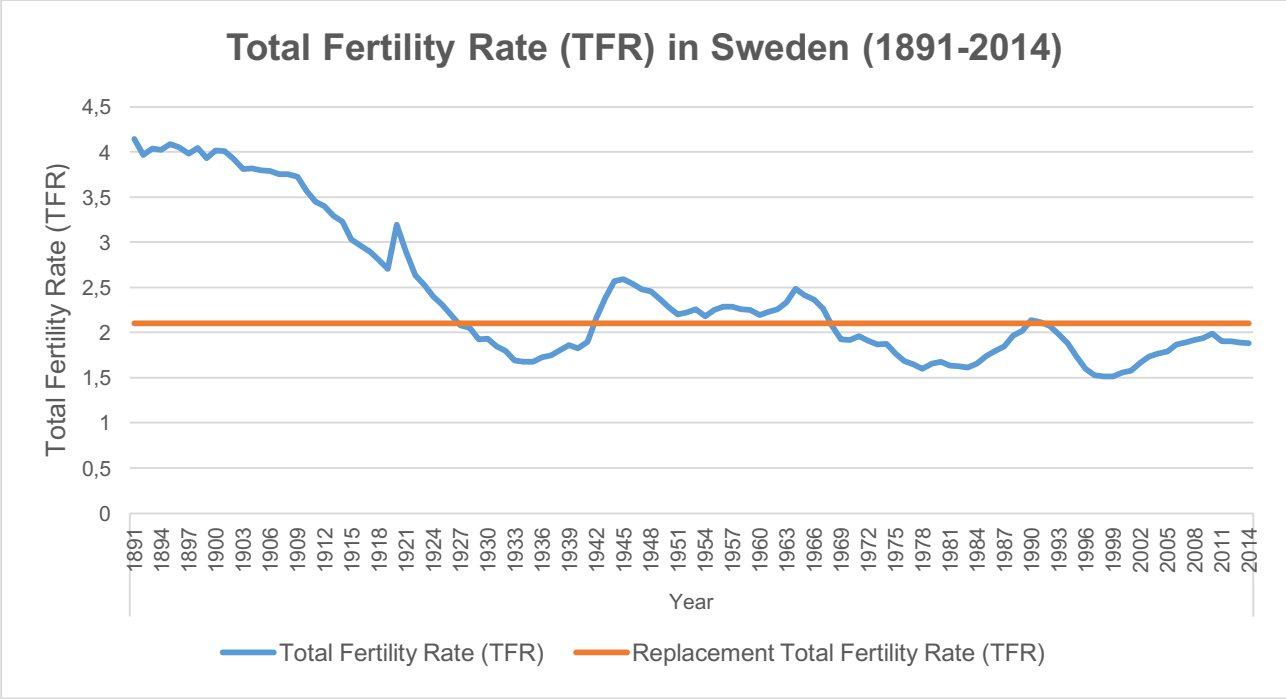


Table 5: Total Fertility Rate (TFR) in Sweden (1891-2014) (Data taken from Human Fertility Database, 2016)

Since 1968 to the present day (with the exception of 1990 and 1991), Sweden has consistently recorded less than replacement levels of fertility (2,1 children per woman). This means that not enough children are being born to replace the current population (disregarding immigration). It also means that elderly cohorts who were born when fertility rates were much higher represent an increasing share of the population. The effects of sub replacement fertility and the second demographic

transition include a greater reliance on migrants and a reduced emphasis on social cohesion (Surkyn, Deboosere and Van Bavel, 2008)

The TFR in Sweden has now stabilised between 1,5 and 2,0 children per woman. Mortality reduction, reduced economic contributions from children, the increased opportunity costs of childbearing, the transformation of desired family size, the reduced impact of 'cultural props' for childbearing such as religious institutions, improved access and affordability of reliable contraception, a delay in the age of a marriage and diffusion all suggest that it is unlikely that birth rates in industrialised nations such as Sweden will rise dramatically in the coming years (Bulatao and Casterline, 2011). Thus, sub-replacement levels of fertility are expected to remain.

Sweden's total fertility rate (TFR) of 1,88 children per woman in 2014, is considerably higher than that of most European nations, such as Germany 1,47 children per woman in 2014 and Portugal, a lowly 1,23 children per woman in 2014 (Eurostat, 2016). Thus, it is expected that the population ageing process in Sweden should be a relatively gradual process during the coming decades as a result of relatively high fertility rates (by European standards). Other European nations with much lower fertility rates are likely to experience much sharper and more severe swings in population distribution towards the elderly.

2.6 - Mortality

One of the major contributing factors towards the increase in elderly as a proportion of the population in Sweden is continued declining mortality rates across all ages. The trend of declining mortality rates across all ages accelerated throughout the 20th century in Sweden. Decreased mortality rates often lead to greater life expectancy, an increased likelihood that a child will survive infancy and childhood, and an increased likelihood that working age adults will survive until retirement (leading to longer lengths of employment and greater tax contributions). McFadden (2001) attributes declining mortality rates to better medical procedures, improved living conditions, better nutrition and a reduced level of smoking amongst the population. McFadden (2001) continues by remarking that modern medical

interventions mean that many individuals are now overcoming health problems which had previously been associated with premature death, the outcome being increased life expectancy. McFadden (2001) concludes his article by commenting that no biological maximum age appears to exist; throughout the 20th century countless survival probability projections from the age of 55 have fallen hopelessly short of actual survival rates. Bengtsson (1994) summarises the challenges presented by increased mortality at elderly ages in Sweden as follows: as people become elderly, they are more likely to become ill, secondly, the elderly represents an increasing share of Sweden's population, and thirdly the Swedish welfare state contributes hugely in financial terms to health care. Bengtsson (1994) continues by arguing that as a patient's age rises, the cost of their treatments also rise and that as the number of people living beyond 80 years of age increases, so will the demand for health care. Rising costs of social care and health care for the elderly in Sweden raise a serious funding challenge.

The effects of falling mortality rates against the backdrop of lower than replacement levels of fertility is that the elderly represent a growing share of the population and are increasing likely to reach very old ages. In addition, the later in the 20th century an individual was born, the greater their chance of reaching 80 years of age or above becomes owing to having benefited from ever improving medical practices and living conditions. Based on the above, it would be reasonable to expect mean ages to have consistently risen throughout the period of this study (1970-2014), and for the elderly to have represented an ever increasing share of the population during this period.

This is partly due to the fact that today's elderly (those aged 65 or above) were born in to larger cohorts than today's cohorts are born in to. To take an example, in 2010, 115 641 live births were recorded, this is compared with 135 373 live births in 1945, this is in spite of the fact that the population has grown significantly during this period. Those born during or before 1945 represent the elderly of 2010. The reason why the number of live births was higher in 1945 than in 2010 is due to higher fertility rates (2,59 children per woman in 1945) when compared to younger cohorts who are increasingly likely to have been born during periods of sub replacement levels of fertility.

This effect coupled with increasing mortality across all ages means that the elderly are likely to represent an ever great share of the population in spite of overall population growth. This trend of increasing elderly is likely to continue until current fertility rates and the fertility rate experienced by the current elderly equalise.

Table 6 below expresses the previously discussed fall in mortality rates in Sweden for the period between 1860 and 2011. The largest fall in age specific death rates during this period was amongst infants which fell from 165.21 deaths per 1000 infants in 1874 to 2.09 deaths per 1000 infants in 2011. This evidence supports the argument of reduced infant mortality being a cause of lower levels of fertility which was made in the previous section of this literature review.

In addition, deaths at elderly ages have fallen significantly even compared to the middle of the twentieth century: in 1950, 65.81 deaths per 1000 elderly were recorded, in 2010 this figure had dropped to 43.85 deaths per 1000 elderly. Thus, those aged above 65 years of age are experiencing falling levels of mortality/an ever reducing risk of death, and whilst this trend continues, their life expectancy is expected to continue to increase (Eurostat, 2016).

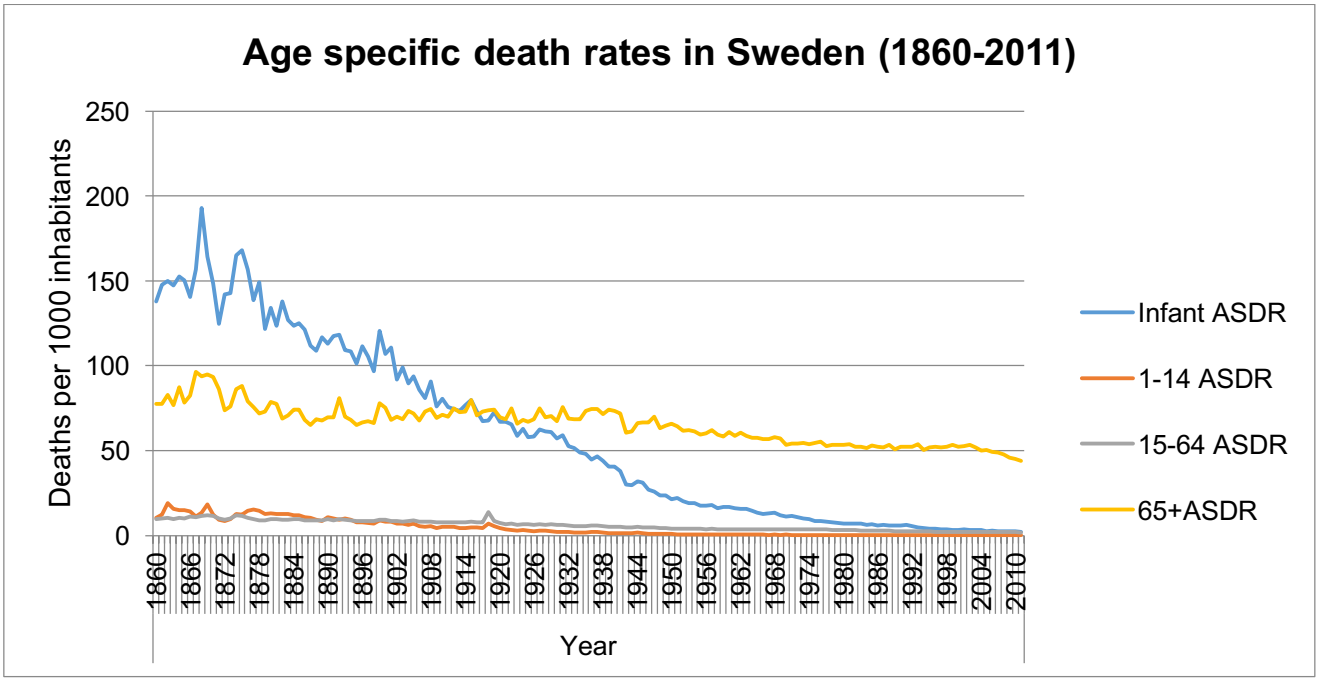


Table 6: Age specific death rates in Sweden (1860-2011) (Data taken from Human Mortality Database, 2016)

2.7 - Immigration

Immigration patterns have played a large role in defining the population structure of many industrialised nations. Some countries in the 'New World' such as the USA and Australia have inwards immigration by Europeans firmly routed in their history and culture. Sweden also has a long history of migration. Between 1830 and 1930, nearly 1,3 million Swedes left their homeland and started life afresh in the USA, Canada, South America and Australia (Migrationsverket, 2016). During this period, Sweden experienced great poverty at home and the attraction of high paying industrial jobs in the cities of the USA, low cost and high quality farmland in the Midwest and greater religion freedom all acted as pull factors to the USA (Migrationsverket, 2016).

Table 7 below displays the annual Swedish population, annual migrations to Sweden and annual emigrations away from Sweden for the period between 1875 and 2014. The table shows that since the 1930s, Sweden has experienced almost uninterrupted annual net immigration, where the number of immigrants arriving in the country has exceeded those migrating abroad (the exceptions being 1972 and 1973). The numbers of migrations to Sweden have remained high since the 1980s; particularly in recent years (since 2006 more than 95 000 people have migrated to Sweden each year).

During the 1980s, a large number of asylum seekers from Iran, Iraq, Lebanon, Syria and Turkey came to Sweden. Ethnic cleansing in the Balkans in the 1990s, led to over 100,000 people from former Yugoslavia (mainly Bosnians) seeking asylum in Sweden (Migrationsverket, 2016). In 1995, Sweden became a member of the EU, meaning that EU citizens had the right to work and live in Sweden (and reciprocally, Swedish citizens could now work and live in other EU nations without visa requirements). In 2013, the Swedish government offered permanent residence permits to all Syrians and stateless persons arriving from the civil war in Syria. Finally, 2015 saw a record 162,877 people seeking asylum in Sweden. Consequently, immigration, particularly that of asylum seekers has played an important role in the demographic changes experienced in Sweden.

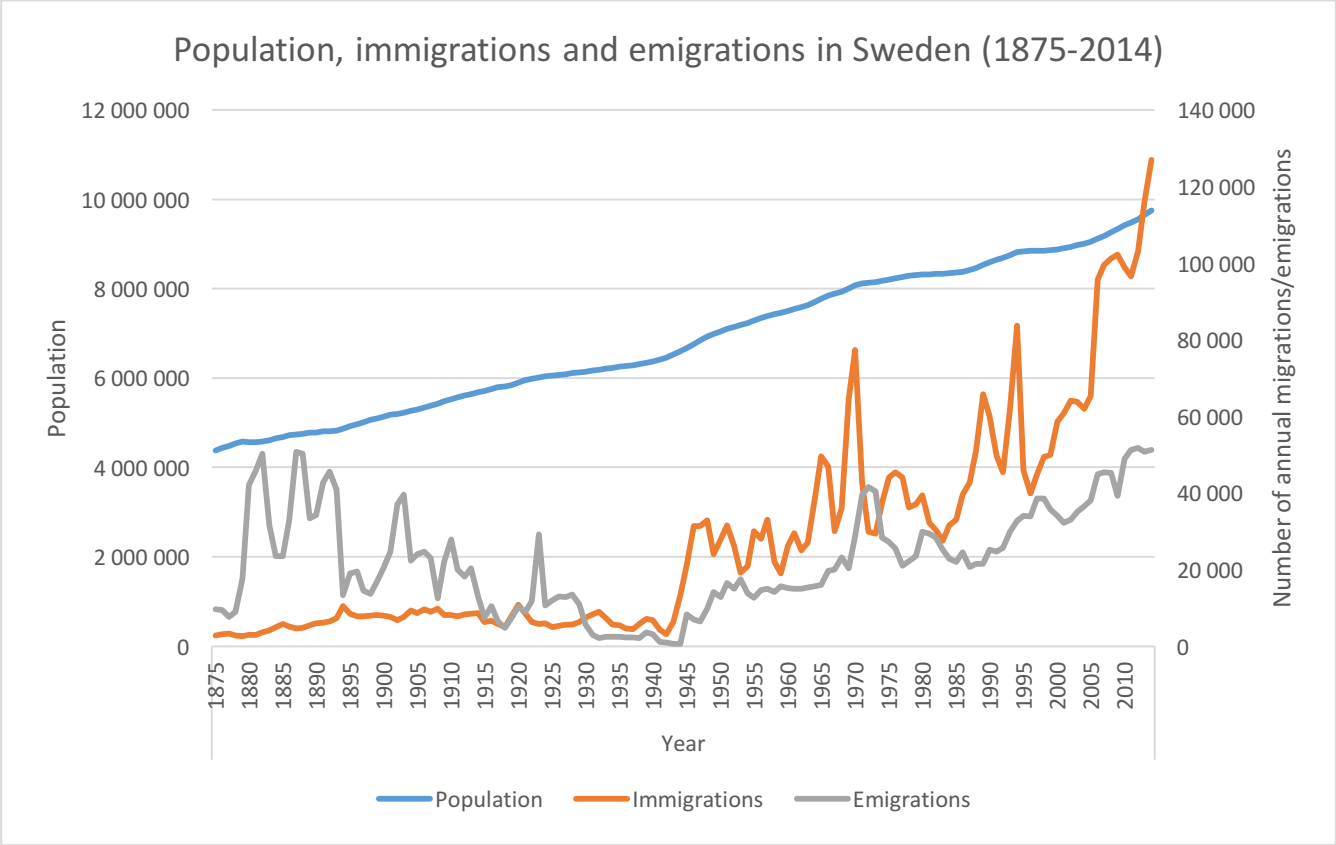


Table 7: Population, immigrations and emigrations in Sweden (1875-2014) (Data taken from SCB, 2016)

Economists such as Weil (1997) argue that immigration has the potential to forestall population ageing but at the same time vastly increases the size of the population. In his projected population under alternative United States rates of immigration calculations (see Table 8 below) for the 50-year period from 1990 to 2040, Weil argued that increasing the annual rate of immigration from its current 0,25% to 0,5% would increase the population by 18,0%, but would lower the proportion of the elderly from 19,1% to 17,7%. If the annual rate of immigration were to increase to 1,0%, the population of the USA would almost double (an increase of 91,1%) during the 50-year period to 476 million people, however, the proportion of elderly would fall to 15,3%.

Projected population under alternative rates of immigration[a]

Immigration rate (%)	0	0.25	0.5	0.75	1.0	0.25/1.0
Population in 2040: (millions)	249	294	346	406	476	353
% aged 0–19	22.7	23.3	23.8	24.4	24.8	24.6
% aged 65+	20.8	19.1	17.7	16.4	15.3	16.7

[a]This table shows the size and age structure of the population under alternative assumptions about the rate of immigration as a fraction of total population. The last column assumes an immigration rate of 0.25% from 1990 to 2019, and 1.0% from 2020 to 2040. All projections use mortality estimates from Faber (1982) and 1986 age specific fertility rates. Estimates of the age/sex composition of immigrants (both legal and illegal) come from Wade (1989).
Source: Author's calculations.

Table 8: Weil's projected USA population under alternative rates of immigration (1997)

Therefore, it is irrefutable that immigration can partially assist in reducing the effects of population ageing. However, for immigrants to single-handedly solve the challenge of population ageing, mass immigration would have to take place on a continued basis. The reason being that when the first wave of migrants whom originally relocated to solve the initial population ageing challenge themselves reached retirement age, an even larger wage of migrants would then be required to offset the effects of the initial wave of migrants becoming elderly and leaving the workforce. This is the gaping flaw in the concept that increased migration can itself solve the challenge of population ageing. For this policy to be successful, the population would have to double nearly every 40 years, it is unlikely that the provision of public services and housing could meet this huge and sudden surge in the size of the population. A major obstacle with this policy is that many individuals may simply feel too uncomfortable experiencing such high levels of continued immigration, potentially leading them to elect xenophobic right-wing political parties in to government whom oppose immigration, causing an abrupt halt to this policy. Some right-leaning economists may suggest that individuals could be invited to work and reside on a fixed-term basis which would expire when they stop working, however, this policy is unlikely to attract sufficient numbers of migrant workers as surely most migrant workers would instead opt to work and reside in a country where they can remain and be remunerated during their retirement years.

A further issue with this policy would be attracting the required number of immigrants to counteract population aging. As mentioned previously in this literature

review, population ageing is a challenge not solely affecting European countries, but exists in many parts of the world: population ageing is quickly becoming a global phenomenon. The majority of countries where fertility levels remain well above replacement levels of 2.1 children per woman are developing countries, predominantly in sub-Saharan Africa. Individuals in these countries are unlikely to be able to immediately integrate in to the Swedish labour market owing to language and skill mismatches. In addition, the hand-picking of a developing country's young and skilled, raises ethical questions as it reduces the sender country's chances of sustainable economic development and also would increase their dependency ratios.

What can be argued is that the net migration to Sweden throughout the period of this study should have partially helped to counter the effects of population ageing, particularly so if the 'healthy migrant effect' holds true for Sweden. This theory suggests that those who do migrant abroad are predominantly healthy and young, and are thus are likely to be of both working and reproductive ages. Consequently, these migrants have the possibility to increase the size of the labour force, reduce the dependency ratio, and increase fertility in the host country. This latter points appears to hold true given recent statistics from 2013 which show that foreign born women who live in Sweden tend to have more children than women born in Sweden (2,18 and 1,85 children per woman on average respectively (SCB, 2014)).

2.8 - Level of urbanisation

Bengtsson and Johansson (1994) argue that recent Swedish internal migration is typified by suburbanisation and counter-urbanisation, and is no longer purely characterised by 'rural-push' and urban-pull' factors. Suburbanisation is the growth of dwellings in areas towards the edge of cities or close to large urban areas. These areas are within commuting distance to larger cities, but themselves have a lower population density and properties here often offer a greater amount of space than urban dwellings do. These areas are often attractive to young families as they are both close to urban areas which provide greater employment opportunities for parents, whilst also offering more affordable larger housing for families. Accordingly,

it is in these areas which the author would expect population ageing to be least of a challenge as fertility rates and employment rates are both expected to be high.

2.9 - Economic conditions

Sweden like most western countries experienced a period of de-industrialisation during the second half of the twentieth century. De-industrialisation and the decline of manufacturing are likely to lead to long-term structural unemployment and early retirement (Bengtsson and Johansson ,1994). The consequences for the young are a lack of employment opportunities, especially in skilled occupations, likely leading to rapid outwards migration from these areas to other areas offering greater employment opportunities (usually urban areas). The elderly and retired whom are less likely to move than younger people usually stay behind, as once they have retired, their residential location is no longer directly affected by swings in economic performance and employment. Consequently, the proportion of elderly in de-industrialised rural areas is likely to increase, particularly in areas which are out with commuting distances to larger urban areas. Areas within commuting distance to larger urban areas do have the potential to transform from industrial areas to commuter areas however.

A further observation of Bengtsson and Johansson (1994) is that since the 1950s the Swedish economy has experienced a transformation from a goods production economy to a service economy. Increased employment in the service sector and other knowledge based industries have led to the creation of regional hubs where highly skilled labour can be found and/or is in the process of being educated. A prime example of this would be the city of Lund boasting both its university and a high concentration of businesses specialising in advanced technologies. It is likely the case that businesses have decided to establish themselves in Lund owing to the wealth of educated personnel available locally. It is likely that many individuals have re-located to take up employment in these economically successful regions from former industrial areas or areas with high levels of unemployment. This influx of working age adults to fill new job vacancies is likely to reduce the challenge of population aging in these regions whilst exasperating

it in former industrial or less economically prosperous regions. This is owing to two factors: firstly, that the influx of working age adults themselves reduce the proportion of elderly in these areas (and also in surrounding regions within commuting distance), and secondly, because these individuals are likely to have children, who themselves will then further help to reduce the proportion of elderly. The converse of these two factors applies for rural sender areas where the loss of working age adults coupled with the loss of potential young increases the proportion of elderly. It is also worth remarking at this point that in areas where there is a greater proportion of elderly, fertility rates should be lower, as a greater proportion of the local population are of an age where they can no longer reproduce.

The aforementioned 'powerhouse regions' are likely to have experienced both population and economic growth at the expense of former industrial regions (both urban and rural). An example of a region which 'lost out' due to the de-industrialisation process is Malmö. Malmö, a coastal city in the south of Skåne county, grew from the 1200s onwards, its location led it to becoming a centre for trade and commerce. During the 1800s and early 1900s, Malmö became a successful industrial region, specialising in shipbuilding (Hall, 2014). However, the decision in 1986 to close the state-owned Kockums' shipyard led to the loss of 25,000 jobs, an enormous loss of skilled jobs in a municipality of only 230,000 people (Hall, 2014). During the period of de-industrialisation in the 1980s, it is likely that Malmö will have experienced de-population as a result of increasing unemployment with young individuals moving elsewhere to take up alternative employment. High levels of unemployment and the loss of disposable income, may have resulted in couples postponing childbearing until they were in a more favourable financial position, bringing about a fall in fertility rates. Therefore, it can be expected that when a region experiences a sudden economic downturn, population aging is likely to increase as a result of a the de-population of working age individuals and also reduced levels of fertility.

Since the turn of the millennium, Malmö has undergone a rapid period of development with former industrial areas being re-generated in to residential and shopping areas. Malmö is now seen as a hub for innovation (Hall, 2014). The opening of the Öresund Bridge in 2000 delivered a fast road and rail crossing

between Denmark's capital city of Copenhagen (and also her international airport) and Malmö. This increased accessibility has attracted investment and presented new possibilities, with many individuals now able to commute easily between the two cities. Malmö's population, economy and the number of people working in the city are now growing once again.

2.10 - Rural depopulation

Rural depopulation is a worry in both developed and developing countries, particularly so in sparsely populated countries such as Sweden which also has one of the lowest population densities in Europe (Niedomsyl & Amcoff, 2010). More and more citizens desire to live in urban areas, Sweden being no exception; reasons for this include greater employment, social and entertainment opportunities. Martí-Henneberg (2005) argues that outwards migration to urban areas is the primary cause for rural areas becoming increasingly sparsely populated. In these rural areas the majority of out migrants are young adults, which has led to reduced fertility rates; and consequently, an increased share of the elderly (Niedomsyl & Amcoff, 2010).

Grounds for rural depopulation include reduced labour market opportunities in rural areas or within commuting distances of them. This problem is exasperated for dual-earner households, as two individuals may both have to commute considerable distances in order to find work. In addition, rural areas often provide fewer well-paid white collar jobs than urban areas do, thus, highly educated individuals or couples where one or both of the couple is highly educated are increasingly unlikely to dwell in a rural area, as they are unlikely to fully fulfil their earnings potential. Niedomsyl & Amcoff (2010) also highlight the reduced likelihood of having a mortgage application accepted for a rural property as banks see properties in rural areas as having a higher risk of falling in to negative equity, where the value of a property falls below what was paid for it. This challenge is then reinforced with the reality that often there are fewer smaller dwellings such as apartments in rural areas, thus, individuals and couples in rural areas are often forced to purchase a large house even if they would prefer to own a smaller residence. A final complication of rural dwelling is that children may have to travel long distances to go to school, this may be further

complicated when children start specialist high schools which may be located even further afield (Niedomsyl & Amcoff (2010).

Niedomsyl & Amcoff summarise their 2010 paper by arguing that rural depopulation in Sweden is likely to continue in the coming decades as increasing numbers of young adults move away from rural areas to urban areas, whilst too few people are re-locating or returning to rural areas to prevent depopulation. Declining public and private sectors are characteristics of economies in rural areas. The problem of poorly performing rural economies is further exasperated by reductions in the size of the working age population, bringing about a negative multiplier effect of ever reducing production and ever reducing consumption. If businesses can no longer recruit the skilled individuals they require in a rural area, they are likely to relocate to an urban area with a wider skill pool. The same also applies for start-up businesses. The most rural areas are therefore increasingly likely to have a large and growing proportion of elderly. Finally, a real concern exists over how satisfactory levels of health and social care can be delivered in some isolated rural areas.

The authors do suggest some measures to counter rural depopulation and an increasing proportion of elderly in rural areas. The first prescribed measure to tackle rural depopulation is the inwards migration of pensioners who are generally unaffected by the performance of the labour market. This is unlikely to be particularly successful however as many elderly people may feel resistant to relocating and leaving established networks of friends and family behind. It also has the potential to further exasperate population aging in rural areas!

The authors also suggest that migrants, such as refugees could be encouraged to reside in rural areas, the challenges with this policy being the aforementioned lack of employment opportunities and also reduced levels of cultural diversity than in urban areas. It is this author's opinion that if policymakers wish to prevent the depopulation of rural areas which as discussed usually increases the share of elderly, then concerted efforts must be made to improve the economic performances of these rural regions. Such measures could include relocating centralised state institutions from urban metropolitan areas to smaller towns in rural areas, these new jobs would help to attract working age adults to these communities.

The private sector could also be primed by the government offering reduced corporation tax rates in rural areas, this should encourage firms to re-locate or start-up businesses in rural areas. Perhaps the most desirable policy would be the coupling of new migrants or refugees with jobs in rural areas, as then these individuals and their families will be employed and are thus more likely to be willing to remain in rural areas than relocate to an urban area and start the search for employment afresh.

It is the decision of regional and national policymakers to decide whether depopulation should be allowed to continue or if measures should be taken to counteract it. This author strongly advocates enacting policies which attempt to reduce the depopulation of rural areas as a lack of housing and school places in Sweden's larger cities, towns and urban areas are already representing large housing and schooling challenges. The continued depopulation of rural areas would only worsen this problem whilst at the same would surely signal the death knell for historical and culturally rich rural communities.

2.11 - Unemployment in rural areas

Johansson and Rauhut in their 2013 paper argue that rural areas in Sweden are often typified by restrictive and weak labour markets and poor educational facilities, this encourages a flight of the young, particularly women. It is this lack of opportunity and unemployment in rural areas which corrodes public services and private sector employment. In their study, the authors look at the county of Västernorrland which they argue is typified by stagnation, high unemployment and net out migration of the young.

Västernorrland consists of seven different municipalities some of which contain a sizeable built up area and others which do not. The municipality of Sundsvall with its university, large service sector and relatively female friendly labour market had relatively low unemployment in 2008 (2,9%-3,3%). Meanwhile in the same year, the neighbouring former-industrial municipality of Kramfors with its lower population density, reduced education possibilities, a more "macho" labour market,

recorded a higher unemployment rate of between 3.9% and 4.3%. The authors argue that rural areas lacking an urban centre are often unattractive to young people, as they lack infrastructure, particularly centres of higher education.

Based on this report, it would be reasonable to expect population aging to be most prevalent in rural municipalities with high levels of unemployment. This is because if young adults wish to enrol in higher education, they usually have to move away from the municipality, thus increasing the proportion of the population whom are elderly. In addition, high levels of unemployment and a limited labour market reduces the likelihood that these individuals will return once they have completed their studies. Plus, individuals from other regions will not be pulled to the region owing to poor employment prospects. This continued outward flow of young people owing to unemployment and a lack of infrastructure will likely dramatically increase the share of the population which are elderly.

Urban areas with high levels of unemployment should not be as heavily affected by population aging as rural areas with high levels of unemployment as urban areas with better infrastructure do offer the young the opportunity to remain and educate themselves. This helps to increase the proportion of the population who are classed as children or working age adults.

3.0 - Methods

3.1 - Area of study

This study of regional population ageing focuses on the county of Skåne located in the south-west of Sweden. In 2014, Skåne county was home to 1 288 908 people, representing 13,22% of Sweden's gross population. The county contains 33 separate municipalities of varying size and level of urbanisation, each with separate tax raising powers and the responsibility of providing welfare services to residents. Major urban areas in the county include the cities of Malmö, Lund and Helsingborg. In terms of size, Skåne county's land mass is 11 027 km2. Table 9 below displays the location and size of each municipality.

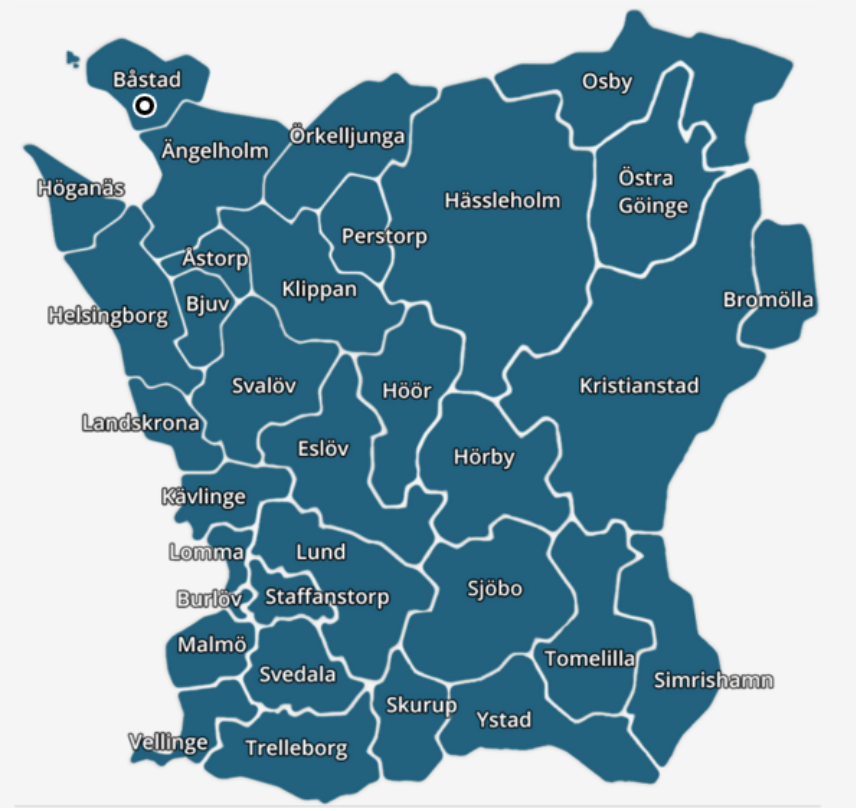


Table 9: Map of Skåne county's 33 municipalities (Region Skåne, 2016)

Table 10 below displays the number of inhabitants in each municipality in 2014. Four of the 33 municipalities contain more than half of the county's total population, namely Malmö, Helsingborg, Lund and Kristianstad. Each of the remaining 29 municipalities are home to less than 4% of the county's gross population. In addition, some of the municipalities contain very few inhabitants, for

example Perstorp with its 7174 residents represents a mere 2,26% of the number of residents in Malmö municipality. Clearly then, the municipalities differ greatly in terms of size, population and population density.

Number of inhabitants per municipality in Skåne (2014)			
Name of municipality	**Inhabitants per municipality**	**Municipality's inhabitants as a share of county**	**Cumulative**
Malmö	318107	24,68%	24,68%
Helsingborg	135344	10,50%	35,18%
Lund	115968	9,00%	44,18%
Kristianstad	81826	6,35%	50,53%
Hässleholm	50565	3,92%	54,45%
Landskrona	43574	3,38%	57,83%
Trelleborg	42973	3,33%	61,16%
Ängelholm	40229	3,12%	64,29%
Vellinge	34110	2,65%	66,93%
Eslöv	32179	2,50%	69,43%
Kävlinge	29808	2,31%	71,74%
Ystad	28771	2,23%	73,97%
Höganäs	25298	1,96%	75,94%
Staffanstorp	22994	1,78%	77,72%
Lomma	22946	1,78%	79,50%
Svedala	20248	1,57%	81,07%
Simrishamn	18905	1,47%	82,54%
Sjöbo	18415	1,43%	83,97%
Burlöv	17211	1,34%	85,30%
Klippan	16733	1,30%	86,60%
Höör	15770	1,22%	87,82%
Skurup	15167	1,18%	89,00%
Åstorp	15061	1,17%	90,17%
Hörby	14927	1,16%	91,33%
Bjuv	14894	1,16%	92,48%
Båstad	14419	1,12%	93,60%
Östra Göinge	13864	1,08%	94,68%
Svalöv	13460	1,04%	95,72%
Tomelilla	13007	1,01%	96,73%
Osby	12828	1,00%	97,73%
Bromölla	12400	0,96%	98,69%
Örkelljunga	9733	0,76%	99,44%
Perstorp	7174	0,56%	100,00%

Total	1288908	100,00%	100,00%

Table 10: Number of residents per municipality in Skåne county (SCB, 2014).

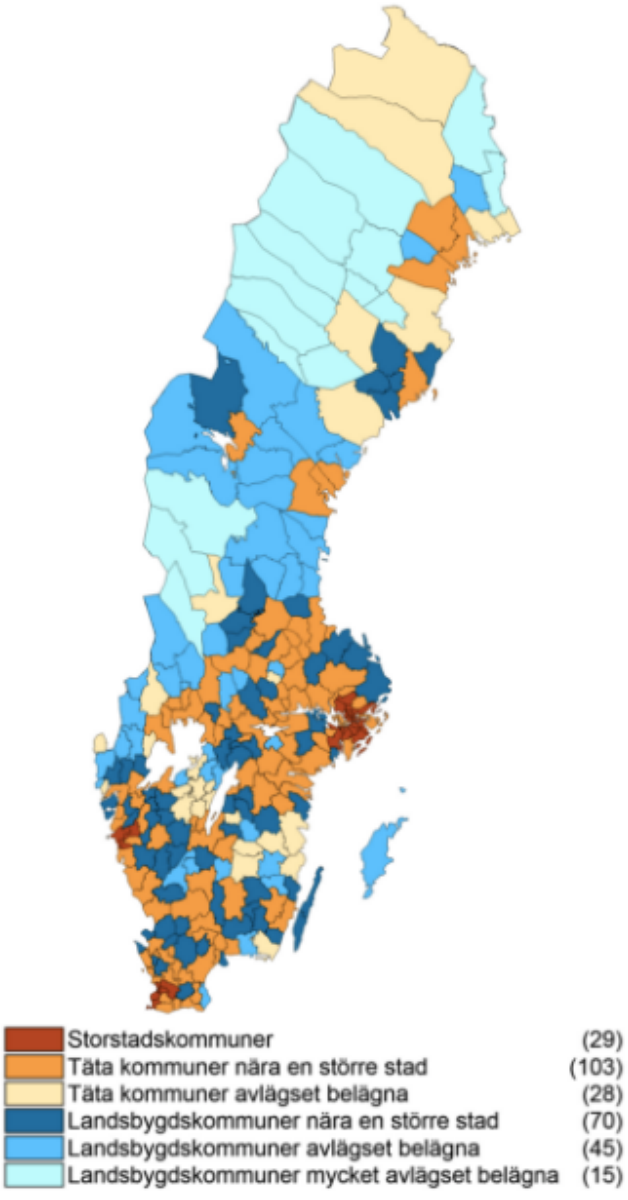
3.2 - Classification of municipalities

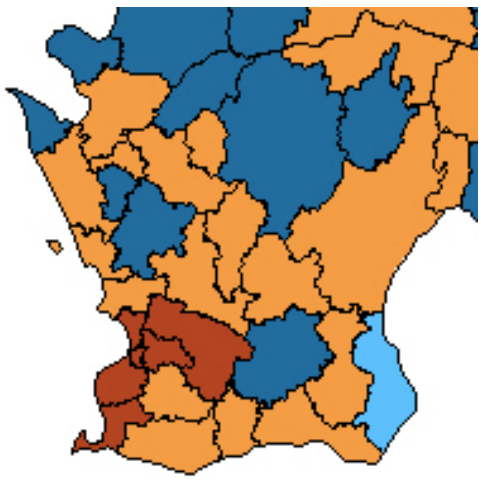
Large variations in the municipalities' sizes and numbers of residents, meant that the municipalities had to be classified in some way. Initially, the author considered sorting the municipalities by the number of inhabitants per km2. However, this method would not have been particularly effective as huge gulfs between small urbanised municipalities with a large town and rural sparsely populated municipalities would still have existed. In addition, the author would have had to classify the municipalities in to groups using some arbitrary and almost meaningless ranges for inhabitants per km2. Finally, this method would not have considered whether or not the municipality contained a town or if the municipality was within commuting distance of a larger town or city which would almost certainly influence its economic performance indicators such as median income and unemployment rate. Consequently, this concept for municipality classification was shelved.

Instead, the author decided to opt for a previously used municipality classification system set up by the Sweden based organization, Tillväxtanalys. This model has been titled *Ny inledning för kommuner I ett stad och land perspektiv (A new classification of municipalities in a town and countryside perspective).* The model classifies municipalities based on factors such as population size, population density, population distribution, if the municipality contains a town with more than 50,000 residents and also how accessible a municipality is based on information taken from the national roads database (Tillväxtanalys, n.d). In addition, this classification of Swedish municipalities is based on the principles and assumptions used by the OECD and Eurostat in their analyses. Clearly then, this classification model is highly suitable for the purposes of this study and is also very comprehensive in its classifications of municipalities.

The model classifies each municipality in Sweden in to one of the following six categories: 1) municipalities containing a large town/city; 2) densely populated

municipalities near a large town/city; 3) densely populated municipalities located remotely; 4) rural municipalities near a large town/city; 5) rural municipalities located remotely; 6) rural municipalities located very remotely. Further details on how the model assigns a municipality their category can be found on the the organisation's website (http://www.tillvaxtanalys.se/om-tillvaxtanalys/projekt-och-uppdrag/regional-analys-och-uppfoljning/ny-indelning-for-kommuner-i-ett-stad-och-land-perspektiv.html) (in Swedish). Below are two images of the classification model in action, on the left all of Sweden's 290 municipalities have been classified and the key can also be found, whilst on the right a close-up image of the classification of municipalities in Skåne county and those bordering it can be found (bordering counties are those with incomplete borders to the north and east of the county).





Tables 11 and 12: Indelning i sex typer av kommuner (Classification of six types of municipalities) (Tillväxtanalys, n.d).

Of Skåne county's 33 municipalities, 6 municipalities are classed as category 1 municipalities (municipalities containing a large town/city), 18 municipalities are classed as category 2 municipalities (densely populated municipalities near a large town/city), 8 municipalities are classified as category 4 municipalities (rural municipalities near a large town/city), and 1 municipality is classed as a category 5 municipality (rural municipalities located remotely). A full classification of the municipalities can be seen Table 13 below:

Classification of municipalities in Skåne county based on Tillväxtanalys model							
Staffanstorp	Category 1	Kävlinge	Category 2	Svalöv	Category 4	Simrishamn	Category 5
Burlöv	Category 1	Svedala	Category 2	Östra Göinge	Category 4		
Vellinge	Category 1	Skurup	Category 2	Örkelljunga	Category 4		
Lomma	Category 1	Hörby	Category 2	Bjuv	Category 4		
Malmö	Category 1	Höör	Category 2	Sjöbo	Category 4		
Lund	Category 1	Tomelilla	Category 2	Båstad	Category 4		
		Bromölla	Category 2	Höganäs	Category 4		
		Osby	Category 2	Hässleholm	Category 4		
		Perstorp	Category 2				
		Klippan	Category 2				
		Åstorp	Category 2				
		Landskrona	Category 2				
		Helsingborg	Category 2				
		Eslöv	Category 2				
		Ystad	Category 2				
		Trelleborg	Category 2				
		Kristianstad	Category 2				
		Ängelholm	Category 2				

Table 13: Classification of municipalities in Skåne county based on Tillväxtanalys model

3.3 - Definition of terms and concepts

To provide clarity, all key terms and concepts which will be discussed in this this chapter and throughout this paper will now be defined as per Toulson (2016):

- **Proportion of elderly** – The proportion of residents in a given population aged 65 years of age or older (expressed as a percentage)

- **Type of municipality –** The classification of a municipality in to one of six categories on the grounds of its population size, population density, location from other towns, accessibility and if the municipality contains a town with more than 50,000 residents as per Tillväxtanalys' model *Ny inledning för kommuner I ett stad och land perspektiv (A new classification of municipalities in a town and countryside perspective).*

- **Total fertility rate (TFR) –** The number of children that would be born to a woman if she were to live to the end of her childbearing years (49 years of age) and bear children in accordance with current age-specific fertility rates in a particular population (World Bank, 2016)

- **Proportion of foreign born residents –** Individuals registered in the Swedish population register who were born outside Sweden (expressed as a percentage)

- **Municipality median income –** The annual median declared income across all individuals in a municipality aged from and including 16 years of age upwards (measured in thousands of SEK)

- **Skåne county median income** - The annual median declared income across all individuals in all 33 municipalities in Skåne county aged from and including 16 years of age upwards (measured in thousands of SEK)

- **Proportion of unemployed -** The proportion of residents in a given population who are officially recorded as being out of work or who are enrolled in a job seeking programme (expressed as a percentage)

3.4 - Data collection

The data which has been used in this thesis is publically available register data obtained without cost from the websites of several Swedish state authorities. The data used is therefore secondary data and was originally collected for another purpose; to track historic changes in demographic and economic conditions. The advantage of using this data was that it had already been collected and was quickly accessible without cost. Naturally, the disadvantages of working with this kind of data was that a lot of work was needed to be undertaken to compile and format the data for the purposes of this particular study. The author overwhelmingly felt that register data was the most suitable type of data for this thesis.

The table below details where the data used in this thesis is sourced from. Lamentably, some of the data was missing at a municipality level for certain years of the study, these exceptions are also listed in the table. Whilst a lot of historical register data is available at a national level from Swedish state authorities, it is often the case that the data cannot be scrutinised at a municipality level, this of course does hinder regional studies such as this one as alternative data sources/reports have to be identified instead. Finally, there is no reason to expect any bias in any of the forthcoming data sources.

Summary of data sources			
Variable	**Period**	**Source**	**Name of report**
Percentage of elderly	1970-2014	SCB	Population by region, marital status, age and sex.
Type of municipality (coded)	1970-2014	Tillväxtanalys	Ny indelning för kommuner i ett stad och land perspektiv (A new classification of municipalities in a town and countryside perspective).
Total Fertility rate (TFR)	1970-2014	SCB	Total fertility rate by region and sex.

Percentage of foreign born residents	2001-2014	SCB	Foreign born persons by region, age in ten year groups and sex.
Median income	1991-2014	SCB	Sammanräknad förvärvsinkomst för boende i Sverige den 31/12 resp år (antal personer, medel- och medianinkomst samt totalsumma) efter region, kön, ålder och inkomstklass. (Summarised annual earned income for residents in Sweden on 31/12 (number of people, mean and median income and total amounts) by region, sex, age and income class).
Percentage of unemployed (those unemployed and also those enrolled in a job seeking programme)	1996-2014	Arbetsförmedlingen	Tidigare statistik, Sökande 1996 - 2015, Kommun (Previous statistics, job seekers 1996-2015, municipality).

Table 14: Summary of data sources

All of the data was used in the original format in which it was obtained from the relevant reports apart from the following exceptions: percentage of elderly, percentage of foreign born and median income. The percentage of elderly variable was calculated by totalling the number of residents in each municipality aged 65 years of age or older and dividing this by the gross number of residents in each municipality and then expressing this figure as a percentage, this process was repeated for each municipality for each year. The percentage of foreign born residents was calculated by dividing the total number of foreign born residents by the gross number of residents in each municipality and then expressing this figure as a percentage, this process was repeated for each municipality for each year. Finally, the author obtained median incomes for each municipality for each year and also the Skåne county median income for each year. In an attempt to reduce inflationary effects on historic incomes, the author calculated a variable which worked out the difference between the municipalities' median income for a particular year and the Skåne county median average income for that year. This was done by subtracting the Skåne county median income from each municipality's median income each year. This meant that median could now also be categorised if required, with the annual median income in a given municipality either being either above or below the county median income for that year.

3.5 - Limitations of study

The first limitation of this study is the area of analysis. This thesis focuses solely on the causes and consequences of population aging in one particular county, Skåne county in the south-west of Sweden. Therefore, this paper is not a national study of Sweden. Counties as well as municipalities in Sweden vary greatly in terms of their number of residents, size, population density, accessibility and location to other towns. Nonetheless, the findings of this paper and its recommendations should be of great interest to Swedish municipalities which are classified in Tillväxtanalys' model as being the same type of municipality as those investigated in Skåne county (categories 1, 2, 4 and 5 are found in Skåne county).

For example, the recommendations for a municipality with a large town or city in Skåne county, should also be applicable to a municipality with a large town or city in another Swedish county. Comparisons between Swedish municipalities and foreign municipalities are not advisable as even if the municipalities could be classified as belonging to the same type of municipality, vast differences in labour market performances, immigration policies and welfare policies could well mean that the policies recommended for Swedish municipalities are not suitable, or worse still are ineffective in slowing the challenge of population ageing in that particular country.

Another limitation of this study is the relatively short period which has been scrutinised. This thesis only analyses population aging during the 45-year period between 1970 and 2014. As mentioned previously in the literature review, population ageing in Sweden began much earlier than 1970, however, a lack of available data at a municipality level prior to 1970 meant historic study further back in time was not possible. Be that as it may, a distinct advantage of this study is that its findings are very much up-to date and of relevance to today's policymakers as the study provides data up until 2014, a mere year and a half ago at the time of writing.

Skåne's geographical location with its close vicinity to neighbouring Denmark, and the construction of the Öresund Bridge between Malmö and Copenhagen means that some residents in municipalities in the south west of Skåne county, particularly in Malmö municipality may actually commute to work on a daily basis from Sweden to

Denmark. This represents a potential snag regarding the accuracy of the median income data as in the Nordic countries, individuals who work in a particular country pay tax in that country, and not in the country where they live. This may cause the official median income figure to be suppressed, as individuals working in Denmark would be recorded as having no income in their Swedish municipality of residence, thus, inadvertently lowering the municipality's official median income figure. Lamentably, very little can be done to adjust this data accordingly as no foreign commuting adjusted income data at a municipality level was obtainable. Yet hopefully, the usage of median income instead of mean income should negate some of this effect.

An additional limitation of this study is that the impact of commuting to different municipalities has not been accounted for. Many individuals who live in municipalities close to other municipalities containing a large town or city may well commute to these municipalities on a daily basis. Thus, municipalities located close to a strong economic town, city or municipality may benefit from their location through lower unemployment levels and higher median incomes as an externality of its residents being able to be employed out with the municipality but without having to move away. Were a municipality to be situated in a remote location, these commuting patterns would not be possible and unemployed individuals would either have to remain unemployed in the hope of finding work locally or relocate to a municipality with better employment opportunities. The classification of municipalities model has been applied in an effort to better understand the commuting possibilities and constraints experienced in each of the 33 studied municipalities.

A further limitation of this study is that individuals may not report some or all of their income to the Swedish tax authorities. This may be in the form of a tacit agreement between an employee and an employer, the advantages being neither party has to pay income tax, the employer avoids making any pension contributions for that individual, meanwhile, the employee can continue to claim unemployment benefits. Regrettably, these kinds of agreements are still occasionally found in some low-paid professions, such as those in the catering industry. The impact of these agreements on this study is that the median income figures may again be slightly erroneous as a result of undeclared incomes. In addition, individuals who claim to be

unemployed, yet are actually in work may also skew the unemployment statistics. Again, there is very little the author can do to ensure all information on income is entirely correctly captured.

Moving on, data for each variable used was only taken on an annual basis; median income data on the final day of the calendar year, percentages of elderly and foreign born at a midpoint in the year, and percentage of unemployed as an average of the year's twelve calendar month's unemployment statistics. A disadvantage of working with annual data is that individuals who only work or reside in a particularly municipality for part of the year may be incorrectly recorded in the data set. This could be an issue for example if an employee resides in a certain municipality for six months of the calendar, and then relocates to another municipality. Incidences like this would skew the median income figure as the individual may be regarded as being a resident for the whole year, with their six months of income being included in the median annual income figure, yet this was only half of the money that the individual earned in that particular year, dragging down the median income figure for that particularly municipality. This would of course have a greater effect in municipalities with a small population as that particular individual would represent a greater share of the workforce than they would in a municipality with a larger population. Following on in this vein, the proportion of elderly is recorded at the mid-point of the calendar year, it could well be the case that more elderly die in the second half of the calendar year than during the first half of the calendar year, again this would be lead to anomalies with the data set.

A further limitation is the difficulty in correctly identifying the percentage of 'foreigners' in a municipality. Swedish data for 'foreign residents' merely considers residents who do not hold a Swedish passport. This could for example include children who were born in Sweden to foreign parents, and who have experienced the same education and whom have the same command of the language as a Swedish child, yet they would be reported differently in register data owing to the different nationalities of their sets of parents.

The image becomes further distorted though as some Swedish citizens may not have been educated in Sweden or have a native born's command of the

language; both of which are factors likely to negatively impact their performance in the labour market. Refugees from war-torn Syria whose claim for asylum is approved by the Swedish immigration authorities are automatically granted Swedish citizenship and a right to permanent residence for example. In terms of reported statistics, these individuals would then be classed as having the same labour market opportunities, command of the Swedish language and having undergone the same compulsory education as a child as native born Swedes have, we know this is usually not the case.

For this reason, this study has instead chosen to use the variable foreign born residents as a measure of immigrants in a municipality, as it is a better indicator of whether or not an individual was raised in Sweden. The author would have liked to exclude Danish and Norwegian citizens from the foreign born individuals' data, this is because both nations' culture and language is very akin to that of Sweden, and are thus more likely to find employment than other foreign born residents. Unfortunately, no citizens of a particular country could be excluded from the data set.

One final limitation of this study is that no data on mortality rates were analysed. This is because the author believed any differences in mortality rates between neighbouring Swedish municipalities in would surely be negligible.

3.6 - Model

The research question of what are the determining factors and consequences of population ageing? (A regional case study of Skåne county, Sweden, 1970-2014) will be answered by running the collected register data in the following statistical model in the statistical software package STATA:

Model: proportion of of elderly (dependent variable) **=**
β1 +
β2type of municipality (independent coded variable) +
β3total fertility rate (independent variable) +
β4proportion of foreign born residents (independent variable) +
β5proportion of unemployed (independent variable) +

β6difference between annual median Skåne county income and municipality's annual median income (independent variable)

This model will be applied to each of the 33 municipalities in Skåne county annually between 1970 and 2014, and will provide the author with a total of 1485 observations to analyse (33 municipalities * 45 years). The intention then being to either confirm or reject the five hypotheses as laid out in the hypothesis of this thesis, on the basis of identifying if any of the five independent variables in the model can be proven to be statistically significant determinants of proportion of elderly.

Finally, having also captured data on proportion of youth unemployed (the percentage of individuals aged between 16 and 24 who are unemployed or who are enrolled in a job seeking programme), the author did consider adding this variable to his statistical model, however, he decided against this as there was a large risk of this variable causing collinearity with the proportion of unemployed variable.

4.0 - Results

4.1 - Descriptive statistics

This results section begins with Table 15 below which displays the overall percentage point changes in the proportion of elderly in each municipality between the initial observation in 1970 and the final observation, 44 years later in 2014. The municipalities have been colour coded to identify which category of municipality they are. The results have also been ranked with municipalities experiencing the largest positive increases in proportion of elderly found furthest left on the x-axis.

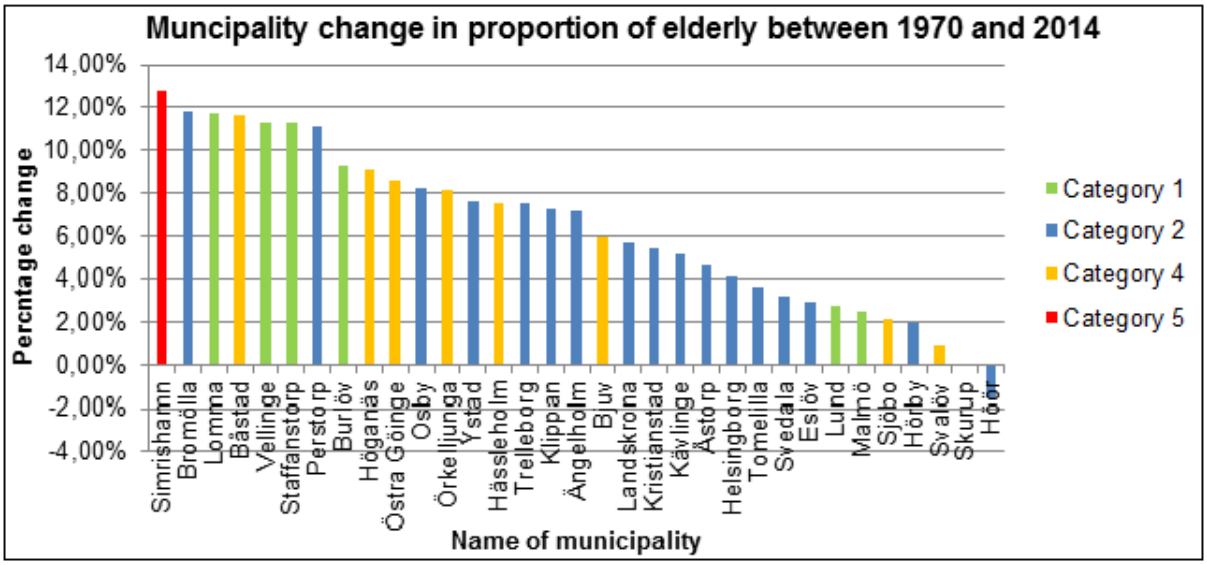


Table 15: Municipality changes in proportion of elderly between 1970 and 2014.

From Table 15 above, one can observe that the municipality that has experienced the greatest increase in proportion of elderly is Simrishamn, a category 5 municipality (rural municipality located remotely), with an increase of 12,78 percentage points (pp) in a mere 45 years. Thirty-two from the thirty-three municipalities underwent an increase in their proportion of elderly, the only exception being Höör municipality, a category 2 municipality (densely populated municipality near a large town/city), which experienced a 1,58 pp decrease in its proportion of elderly.

Table 16 below provides a summary of the municipality changes in proportion of elderly between 1970 and 2014 using the same data as used in Table 15. This

data shows that the categories of municipalities which experienced the largest average changes in proportion of elderly were category 5 at 12,48 pp, followed by category 1 at 8,14 pp, next, came category 4 at 6,77pp pp, and finally category 2 at 5,35 pp. The range of changes in proportion of elderly in the 33 municipalities for the period was 14,36 percentage points.

However, two points should be considered when analysing this data, firstly, that these figures are not the overall proportion of elderly in each municipality, merely, the changes in each municipality's overall proportion of elderly between 1970 and 2014, it could well be that certain municipalities already had high proportions of elderly in 1970, and this may be why the proportion of elderly in certain municipalities did not grow as much as in other municipalities which simply 'caught-up' with those that had originally had a relatively high proportion of elderly. Secondly, only one municipality in Skåne county was classified as a category 5 municipality, this should be considered when reflecting on findings for category 5 municipalities throughout this thesis.

Table 16: Summary of municipality changes in proportion of elderly between 1970 and 2014

Category of muncipality	Number of munciaplities	Average change	Minimum change	Maximum change	Range
Category 1	6	8,14pp	2,55pp	11,72pp	9,17pp
Category 2	18	5,35pp	-1,58pp	11,82pp	13,40pp
Category 4	8	6,77pp	0,96pp	11,65pp	10,69pp
Category 5	1	12,78pp	12,78pp	12,78pp	0,00pp
Total	33	6,43pp	-1,58pp	12,78pp	14,36pp

Table 16: Summary of municipality changes in proportion of elderly between 1970 and 2014

Table 17 below displays the proportion of elderly at a municipality level initially in 1970 at the start of this data series (again with the municipalities colour coded accordingly), followed-up by the proportion of elderly increase at a municipality level between 1970 and 2014 (coloured in black), giving a total stacked column for each municipality which represents their proportion of elderly in 2014.

The first noteworthy result from this table is that category 5 municipality Simrishamn which as was discovered in Table 15 experienced the largest increase in

elderly between 1970 and 2014, is also the municipality with the largest proportion of elderly at 31,83%. Therefore, nearly one in three individuals living in Simrishamn municipality is classed as elderly! Accordingly, one would expect that the working age population in this municipality to be much smaller than that in other municipalities which reported a lower share of elderly.

Interestingly, three of the four municipalities which reported the lowest proportion of elderly are category 1 municipalities (municipalities containing a large town/city), namely, these are Burlöv with 17,93%, Lund with 15,79% and lowest of all Malmö at 15,38%.

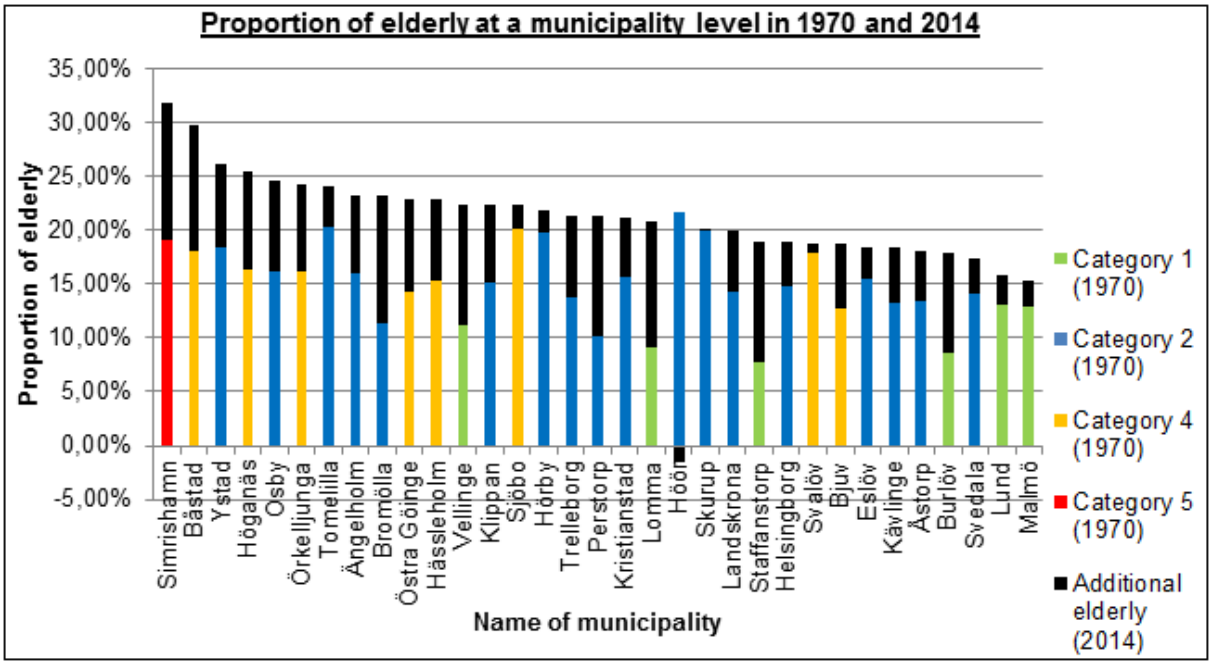


Table 17: Proportion of elderly at a municipality level in 1970 and 2014.

Table 18 displayed below shows a summary of the proportion of elderly in 2014 at a municipality level with municipalities again grouped. For 2014 at least, the table shows as predicted in hypotheses 1 that urban municipalities containing a large town/city (category 1 municipalities) experienced lower proportions of elderly than those which did not. Table 18 demonstrates that in 2014, category 1 municipalities contained the lowest average proportion of elderly at 18,54%, this was followed by category 2 municipalities (densely populated municipalities near a large town/city) with 21,12%, next came category 4 municipalities (rural municipalities near a large

town/city) with 23,14%, and finally the single category 5 municipality (rural municipality located remotely) highest of all at 31,83%. Thus, for proportion of elderly in 2014 at least, the following statement holds true, the further a municipality is from a large town/city is and the more rural a municipality's population is, the greater the municipality's proportion of elderly.

Table 18: Summary of proportion of elderly in 2014 at a muncipality level

Category of municipality	Number of municipalities	Average proportion of elderly	Minimum proportion of elderly	Maximum proportion of elderly	Range
Category 1	6	18,54%	15,38%	22,39%	7,01%
Category 2	18	21,12%	17,33%	26,16%	8,83%
Category 4	8	23,14%	18,77%	29,77%	11,01%
Category 5	1	31,83%	31,83%	31,83%	0,00%
Total	33	21,47%	15,38%	31,83%	16,45%

Table 18: Summary of proportion of elderly in 2014 at a municipality level

Comprehensive descriptive statistics regarding TFR (1970-2014), proportion of foreign born (2001-2014), unemployment (1996-2014) and median income (1991-2014) at a municipality level can be found in the appendices of this thesis.

4.2 - Multivariate analysis

The first step taken by the author with the original 1,485 observations (33 municipalities * 45 years) was to drop any observations which contained missing responses for any of the six variables. Only observations recorded between 2001 and 2014 contained complete information on all six of the variables, this left a remaining 462 observations (33 municipalities * 14 years) for analysis.

Model 1

Model: percentage_of_elderly = $1 + \beta 2$type_of_municipality + $\beta 3$ total_fertility_rate + $\beta 4$percentage_of_foreign_born_residents + $\beta 5$ percentage_of_unemployed + $\beta 6$

difference_between_annual_median_Skåne_county_income_and_municipalitys_annual_median income

The results of this regression can be observed in Table 19 below:

NB: The reference category for type of municipality in this model is category 1 (municipalities containing a large town/city):

proportion of elderly	**Co-efficient**	**Standard error**
Variable		
category of municipality		
2	0,0116802**	0,0042942
4	0,0260105**	0,0050429
5	0,0896556**	0,0088890
total fertility rate	0,0017766	0,0061985
proportion of foreign born	-0,1943742**	0,0358618
difference in median county and municipality incomes	-0,0001200	0,0001035
proportion of unemployed	0,5872366**	0,0890514
_cons	0,1655331**	0,0117981
Number of observations: 462		
Rsquared: 0,4062		
Adjusted Rsquared: 0,3971		
F Value: 44,37		
NB: ** = statistically significant at a 95% level of significance		

Table 19: Summary findings of regression

Using the results from the above regression, each hypothesis will now either be confirmed or rejected.

H1: Municipalities which contain a large town or city experienced lower proportions of elderly than those municipalities which do not.

The results of the regression indicate that in this data series, category 1 municipalities did indeed have the lowest proportion of elderly when compared to other categories of municipalities. Category 2 municipalities experienced a 0,011 point (1,1%) increase in proportion of elderly when compared to category 1 municipalities. Meanwhile, category 4 municipalities experienced a 0,026 point (2,6%) increase in proportion of elderly when compared to category 1 municipalities

(note that this is larger than the increase for category 2 municipalities). Finally, the sole category 5 municipality experienced a 0,089 point (8,9%) increase in proportion of elderly when compared to the category 1 municipalities. This was the largest point increase amongst all three categories of comparison.

As the results for category of municipalities 2, 4 and 5 were all statistically significant at a 95% level of significance, hypothesis one can be confirmed for the 33 municipalities in Skåne county between 2001 and 2014.

H2: Total fertility rate (TFR) and proportion of elderly are negatively correlated: municipalities with lower fertility rates experienced larger increases in proportion of elderly

The data in Table 19 discloses that an increase in TFR of 1 unit, (which would be a considerably large change in fertility rates by recent European standards) would actually lead to a slight increase of 0,0018 in proportion of elderly. However, the co-efficient for this variable was not statistically significant at a 95% level of significance. Thus, this hypothesis cannot be confirmed.

H3: Municipalities with larger proportions of foreign born residents will have a lower proportion of elderly than municipalities with lower proportions of foreign born residents

The findings from the regression show that across all of the 33 municipalities studied, a 1 percentage point increase in proportion of foreign born leads to a 0,194 point fall in proportion of elderly. This finding is statistically significant at a 95% level of significance. Consequently, if all other variables remain constant, increasing the number of foreign born residents can reduce the proportion of elderly in a municipality's population. Therefore, hypothesis three can be confirmed.

H4: Municipalities with higher than average annual median incomes experienced lower proportions of elderly (as a greater proportion of their populations are at working ages and are thus likely to earn more than retirees)

Data from the regression showed that a one unit increase (1000 SEK) in annual median income against the county average median income would reduce proportion of elderly by 0,00012 point. However, this result was not statistically significant relationship at a 95% level of significance. Thus, hypothesis four cannot be confirmed for this data series.

H5: There is a positive relationship between unemployment level and share of elderly (owing to the flight of the young and consequently reduced levels of fertility)

Table 19 shows that a 1 percentage point increase in the level of unemployment in a municipality would lead to a 0,587 point increase in the proportion of elderly, if all other variables remained constant. This result is statistically significant at a 95% level of significance. Thus, for this data series, a positive relationship between unemployment and share of elderly does exist and therefore hypothesis five can be confirmed.

4.3 - Robustness checks

In this part of the results, various robustness checks will be carried out on the data.

Firstly, to check if multicollinearity existed in the data series, a variance inflation factor (VIF) test was carried out. Ordinarily, if a vif score is equal to or greater than 10, then collinearity may exist in the data. The results of the vif test are presented in the table below:

proportion of elderly	**VIF**	**1/VIF**
Variable		
category of municipality		

2	3,16	0,316688
4	3,23	0,310010
5	1,60	0,623605
total fertility rate	1,20	0,831508
proportion of foreign born	2,69	0,371300
difference in median county and municipality incomes	2,41	0,415564
proportion of unemployed	1,86	0,538455
Mean VIF	2,31	

Table 20: Summary of results of VIF Test

All of the variables recorded a VIF score of lower than 10, therefore, collinearity is unlikely to be an issue between any of these variables. In addition, none of the tolerance values found in the 1/VIF column have a value lower than 0,1, thus, none of the variables are deemed to be a linear combination consisting of other independent variables (IDRE, 2016).

Next, to see if heteroscedasticity could be an issue with the data, a Breusch-Pagan test was carried out. The null-hypothesis for homoscedasticity at a 95% level of significance cannot be rejected, as the result for this test was greater than the value of 0,05 (0,5211). Therefore, it can be implied that heteroscedasticity is likely to be present in this data set.

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity	
Variables fitted values of proportion of elderly	
chi2(1)	0,41
Prob > chi2	0,5211

Table 21: Summary of results of Breusch-Pagan test

A White's Test for heteroscedasticity was also carried out. As the result of this test is lower than the value of 0,05 (0,0000), the null-hypothesis for homoscedasticity at a 95% level of significance can be rejected (Pedace, n.d). This again shows heteroscedasticity is likely to be evident.

White's test for Ho: homoskedasticity	
against Ha: unrestricted heteroskedasticity	
chi2(29)	89,45
Prob > chi2	0,0000

Table 22: Summary of results of White's Test

The skewness and kurtosis of the observations compared to normal distribution was also tested, as Pr(Skewness) was lower than 0,05, the null-hypothesis that the observations are normally distributed can be rejected. In addition, the Pr(Kurtosis) figure of 0,0201 shows that the kurtosis is significantly different from normal distribution at a 5% level of significance (STATA, 2016).

Skewness/Kurtosis tests for Normality				
Observations	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
462	0,0113	0,0201	10,76	0,0046

Table 23: Summary of results of Skewness/Kurtosis tests for normality

Finally, a summary of the skewness and kurtosis is presented. The skewness figure of 0,289852 shows that the distribution of observations is not symmetrical, yet this relatively low score suggests that skewness is not an issue. The kurtosis count of 3,617 is greater than above desired count of 3 for a bell shaped distribution, so the distribution is likely to be steeper and have thinner tails than for a normal distribution.

Summary	
Variance	0,000659
Skewness	0,289852
Kurtosis	3,617828

Table 24: Summary of results of Skewness/Kurtosis tests for normality

In an attempt to reduce the levels of heteroscedasticity in the data set, separate regressions on categories of municipality were undertaken as the author feels that the outliers in the sole category 5 municipality could well be a reason for such a wide distribution of results. Three separate regressions will now be conducted: one for category 1 municipalities, one for category 2 municipalities and

one for one for category 4 municipalities. As only 14 observations were gathered for the category 5 municipality, this was deemed too few to run a reliable regression and report findings on. Unfortunately, very few changes can be made to the data set to try and reduce the level of heteroscedasticity as all results are findings of historic register data, where naturally outliers can be expected to be found.

The results of the three additional regressions, the results of the robustness checks on them and whether or not the original five hypotheses could be confirmed for each regression can be found in the table 25 below:

	Cat 1 muni's		**Cat 2 muni's**		**Cat 4 muni's**	
	Co-efficient	**Standard error**	**Co-efficient**	**Standard error**	**Co-efficient**	**Standard error**
Regression						
Variable						
total fertility rate	-0,0220252**	0,0083493	-0,0048267	0,0071097	-0,0251950	0,0143808
proportion of foreign born	0,4539253**	0,0566645	-0,2544087**	0,0392203	-0,1839391	0,0998225
difference in median county and municipality incomes	0,0017822**	0,0001630	-0,0008196**	0,0001140	0,0008509**	0,0003397
proportion of unemployed	0,1207174	0,1355949	0,6769823**	0,0974486	0,3225670	0,1941304
_cons	0,0966094**	0,0118941	0,194123**	0,0135532	0,2553883**	0,0267657
Number of observations:	84		252		112	
Rsquared:	0,7094		0,3423		0,1203	
Adjusted Rsquared:	0,6947		0,3317		0,0874	
F Value:	48,22		32,14		3,66	
NB: ** = statistically significant at a 95% level of significance						
Hypotheses						
Hypothesis 1	N/A		N/A		N/A	
Hypothesis 2	Confirmed		Not confirmed		Not confirmed	
Hypothesis 3	Not confirmed		Confirmed		Not confirmed	
Hypothesis 4	Not confirmed		Confirmed		Not confirmed	
Hypothesis 5	Confirmed		Confirmed		Not confirmed	
VIF Test	**VIF**	**1/VIF**	**VIF**	**1/VIF**	**VIF**	**1/VIF**
Variable						
total fertility rate	12,00	0,083341	1,72	0,581038	1,38	0,726322

proportion of foreign born	11,34	0,088177	1,65	0,604536	1,28	0,780386
difference in median county and municipality incomes	4,21	0,237804	1,29	0,773798	1,14	0,880246
proportion of unemployed	2,32	0,431121	1,07	0,937461	1,10	0,911523
Mean VIF	7,47		1,43		1,22	
Breusch-Pagan / Cook-Weisberg test for heteroskedasticity						
Variables fitted values of proportion of elderly						
chi2(1)	3,96		3,00		0,40	
Prob > chi2	0,0467		0,0834		0,5266	
White's test for Ho: homoskedasticity						
against Ha: unrestricted heteroskedasticity						
chi2(29)	30,47		85,24		22,88	
Prob > chi2	0,0066		0,0000		0,0623	
Skewness/Kurtosis tests for Normality						
Pr(Skewness)	0,0516		0,4906		0,0044	
Pr(Kurtosis)	0,0564		0,0713		0,3904	
adj chi2(2)	6,83		3,76		7,95	
Prob>chi2	0,033		0,1529		0,0188	
Summary						
Variance	0,0001563		0,0004563		0,0008767	
Skewness	0,5064078		0,1037339		0,6738261	
Kurtosis	4,0755930		3,5964190		3,2638950	

Table 25: Summary of results of regressions and robustness checks.

Noteworthy remarks from these regressions are as follows:

Category 1 municipalities

Results from the Breusch-Pagan test for heteroscedasticity show that the null-hypothesis for homoscedasticity at a 95% level of significance can be rejected for category 1 municipalities, as the result for this test was lower than the value of 0,05 (0,0467). Therefore, it can be implied that heteroscedasticity is unlikely to be present any longer in this data set. A result of 0,0066 for the White test for homoskedasticity means that the null-hypothesis for homoscedasticity at a 95% level

of significance can also be rejected. Significant findings could be found to confirm hypotheses 2 and 5 for category 1 municipalities in Skåne county between 2001 and 2014.

Category 2 municipalities

The Breusch-Pagan test for heteroscedasticity show that the null-hypothesis for homoscedasticity at a 95% level of significance cannot be rejected for category 1 municipalities, as the result for this test was greater than the value of 0,05 (0,0834). Therefore, it can be implied that heteroscedasticity is likely to be present any longer in this data set. A result of 0,0000 for the White test for homoskedasticity means that the null-hypothesis for homoscedasticity at a 95% level of significance can be rejected. Significant findings could be round in to confirm hypotheses 3, 4 and 5 for category 2 municipalities in Skåne county between 2001 and 2014.

Category 4 municipalities

The high scores of 0,5266 in the Breusch-Pagan test for heteroscedasticity, means that the null-hypothesis for homoscedasticity at a 95% level of significance cannot be rejected, and that heteroscedasticity is likely to be present in this data set (and was probably the cause for high scores of heteroscedasticity in the original regression). A result of 0,0623 in the White's Test means that the null hypotheses for homoscedasticity at a 95% level of significance cannot be rejected. As no significant findings arose from the regression, none of the five hypotheses could be confirmed for category 4 municipalities in Skåne county between 2001 and 2014.

5.0 - Discussion and conclusion

5.1 - Explanation of results

The aim of this study was to gain a greater understanding in to the causes and consequences of population aging in Skåne county between 1970 and 2014. The author feels that this aim has been overwhelmingly achieved.

Both the descriptive statistics and the multivariate analyses in chapter 4 reveal that the proportion of elderly rose between 1970 and 2014 in all but one municipality in Skåne county, yet the rate at which the proportion of elderly rose in the 33 municipalities was far from uniform.

The results of this study unmistakably show that municipalities that are remotely located and sparsely populated contain higher proportions of elderly than those containing a large town or city. The findings from Table 18 in chapter 4 which details average proportions of elderly in 2014 revealed that category 1 municipalities contained the lowest proportion of elderly at 18,54% of their population, this was followed by category 2 municipalities at 21,12%, next came category 4 municipalities at 23,14%, and finally the single category 5 municipality at 31,83%. Clearly then, average proportions of elderly are significantly different depending on the demographic, geographical, and economic conditions of a municipality. A generalisation that can be drawn is that the further away a municipality is from a large town or city and the lower its population density, the greater the proportion of elderly is likely to be.

These findings have for the first time cast light on to the specific causes and consequences of population aging at a municipality level in Skåne county. For the period between 2001 and 2014, the following three hypotheses which agree with existing research found in chapter's 2 literature review were confirmed and found to be statistically significant:

H1: Municipalities which contain a large town or city experience lower proportions of elderly than those municipalities which do not;

H3: Municipalities with larger proportions of foreign born residents have a lower proportion of elderly than municipalities with lower proportions of foreign born residents;

H5: There is a positive relationship between unemployment level and share of elderly.

Surprisingly and in contrast to the a priori arguments discussed in the literature review, the results of the study found no statistically significant relationship between variables in the following two hypotheses, and thus was unable to confirm them:

H2: Total fertility rate (TFR) and proportion of elderly are negatively correlated: municipalities with lower fertility rates experienced larger increases in proportion of elderly;

H4: Municipalities with higher than average annual median incomes experienced lower proportions of elderly (as a greater proportion of their populations are at working ages and are thus likely to earn more than retirees)

Possible reasons why these two hypotheses were unable to be confirmed could be owing to the relatively small number of observations analysed in the multivariate analysis (462), the relatively short period regressed in the multivariate analysis (14 years), and also the distinct possibility that vast differences in TFR and annual median income were unlikely to be found in a relatively short data set for 33 relatively akin municipalities in terms of their levels levels of fertility and income.

Finally, whilst three other separate regressions were conducted for municipality categories 1, 2 and 4, as the number of observations in these regressions were so few, the author instead chose to focus on the findings for the overall analysis of the 33 municipalities in Skåne county which contained a much greater number of observations, meaning its findings are much more likely to be

reliable. Amendments to the study which could be taken to arrive at specific category of municipality policy recommendations can be found subsequently in this chapter.

5.2 - Limitations of results

The primary limitation of this paper was that the multivariate analysis only considered 14 years of observations across the 33 municipalities. As was stated in the literature review, the population ageing process in Sweden began during the 1950s, so the findings of the study would be much more solid had a longer data series been available to scrutinise and run regressions on. However, the descriptive statistics do offer an overview of the changes in proportion of elderly going back to 1970. The author was very much bound by the register data that was available, and all efforts were made to try and create as long a data series as possible. The author does feel that all relevant variables were included in the model. Finally, the usage of the municipality classification model infers that the findings of this study can be generalised and be applied to municipalities across the whole of Sweden.

5.3 - Suggestions for future research

This study could be extended by conducting a comprehensive analysis of population ageing and its causes and consequences across all 290 municipalities in Sweden. The model used in this study where municipalities were categorised in to one of six types of categories based on factors such as population size, population density, population distribution, accessibility and if the municipality contained a town with more than 50,000 residents could again be used for this study. This potential study could offer even more reliable findings than this thesis as the number of observations would rise dramatically. A complication would be however, the time required to source and format the data for so many municipalities.

Other suggestions for future research could involve studying the same municipalities over a longer period of time, however, difficulties in obtaining the desired historic data may make this unachievable. One final suggestion for future

research would be to apply this model to other developed countries and compare the findings between similar types of municipalities in different countries.

5.4 - Policy recommendations

First and foremost, this study shows that the proportion of elderly is increasing in all categories of municipalities, not just in rural and remote municipalities. Shifts in the breakdown of age-structure towards elderly are still ongoing and do not appear to have peaked. Thus, the recommendations made in this section of the paper should be enacted by policymakers as a matter of urgency in order to slow, and ultimately reverse the current trend of increasing proportions of elderly and falling proportions of working age populations amongst the population of Skåne county.

The results of this study endorse the theory that increasing the proportion of foreign born does have a significant effect in reducing the proportion of elderly. Therefore, municipalities which are most severely affected by a high and rising proportion of elderly, should very much consider adopting policies aimed at increasing the proportion of foreign born residents residing in their municipalities. These individuals could be for example skilled workers (and their families) from aboard taking up employment and filling skills gaps in the labour market.

As a response to continued conflict around the globe, Sweden has homed significant numbers of asylum seekers during the previous decade. Municipalities with high proportions of elderly should be encouraged to welcome these individuals and their families. The immediate demographic effect would be a drop in the proportion of elderly at the benefit of a larger working age population. As was referenced in the literature review, statistics show that foreign born women experience higher fertility rates than native born Swedish women, thus, the children of these foreign born residents could further reduce the proportion of elderly. Increasing the number of foreign born residents would also increase both economic activity and consumer spending in the area, benefiting local businesses. A desirable side-effect of this policy would also be reduced pressure on housing in largely urban municipalities, particularly those containing large cities.

A further area for policy recommendation is in the labour market. This study discovered a significant positive relationship between proportion of unemployed and proportion of elderly. Consequently, in municipalities with weak labour markets and high levels of unemployment, all efforts must be made to boost the local economy and reduce unemployment, a policy strongly advocated by Johansson and Rauhut (2013). Measures to achieve this could include reducing the rate of corporation tax for organisations setting up business in municipalities with high levels of unemployment. Entrepreneurship funds encouraging local individuals to start up their own business should also be made available, these businesses would hopefully then grow and increase staff levels, again reducing levels of unemployment. As the state is a relatively large employer in Sweden, a highly suitable policy would be the decentralisation of state-ran institutions away from large cities in urban municipalities to smaller towns in other municipalities, where the private sector is not as strong and such a large supplier of jobs. This change would help to lower the unemployment rate by bringing new jobs to these areas; it would also encourage an inwards flight of migration of skilled working age individuals whom along with their children would significantly reduce the proportion of elderly.

The author feels passionately that reducing unemployment in rural and remote municipalities should be regarded as a key method of reducing proportion of elderly in these areas. The initial recommended policy of increasing the number of foreign born residents is likely to fail unless the local labour market can support these individuals. Otherwise, foreign born residents (including asylum seekers) will simply relocate to other municipalities which offer better economic and employment prospects. Reducing the levels of unemployment also reduces the consumption of the state benefits whilst at the same time increases the tax base, this directive was a key recommendation made by Bengtsson and Scott (2011) in their paper on population aging and the future of the welfare state. Increasing the number of foreign born residents would also increase the size of the workforce, a further recommendation made by the same authors.

The age-breakdown of the population is still in a state of change with the overall proportion of elderly still growing, and mortality amongst the elderly continuing

to fall. Policy changes must be enacted now in order to prevent a future funding crisis amongst health, social and pension costs. Significant costs and shifts in policy change are associated with the policy recommendations made in this paper, however, without serious policy changes, future generations will inherit a society exemplified by an ever declining proportion of working age adults, a wholly unsustainable economic model and a highly indebted economy.

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Appendix ii – Tables and Figures

TFR

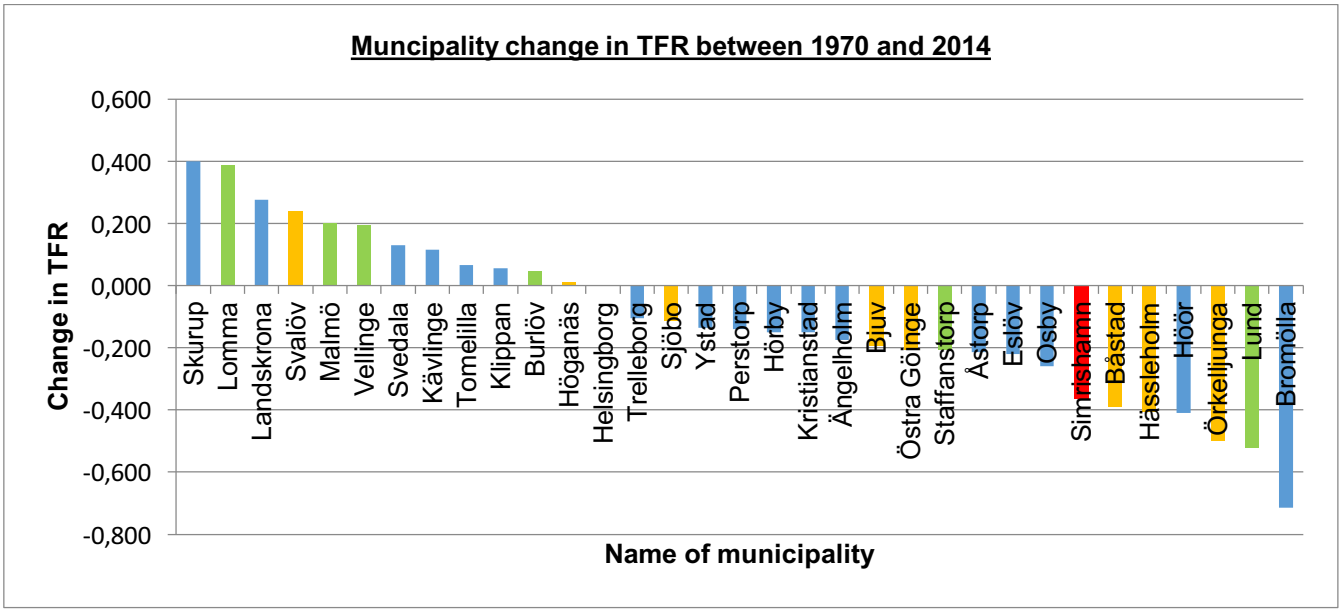

Table 26: Municipality change in TFR between 1970 and 2014

Table 27: Summary of municipality changes in TFR between 1970 and 2014					
Category of municipality	**Number of municipalities**	**Average change**	**Minimum change**	**Maximum change**	**Range**
Category 1	6	0,018	-0,520	0,390	0,910
Category 2	18	-0,091	-0,715	0,400	1,115
Category 4	8	-0,195	-0,500	0,240	0,740
Category 5	1	-0,365	-0,365	-0,365	0,000
Total	33	-0,105	-0,715	0,400	1,115

Table 27: Summary of municipality changes in TFR between 1970 and 2014

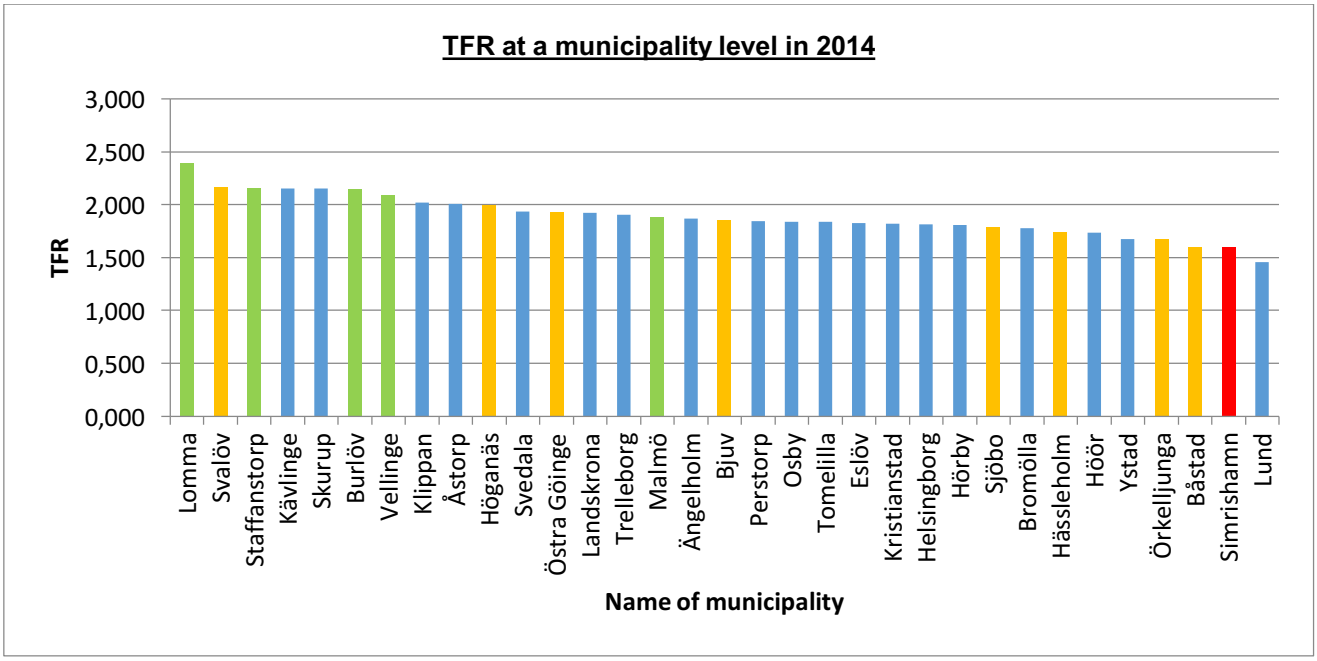

Table 28: TFR at a municipality level in 2014

Table 29: Summary of TFR in 2014 at a municipality level

Category of municipality	Number of municipalities	Average TFR	Minimum TFR	Maximum TFR	Range
Category 1	6	2,021	1,455	2,390	0,935
Category 2	18	1,886	1,675	2,155	0,480
Category 4	8	1,844	1,605	2,165	0,560
Category 5	1	1,605	1,605	1,605	0,000
Total	33	1,892	1,455	2,390	0,935

Table 29: Summary of TFR in 2014 at a municipality level

Proportion of foreign born

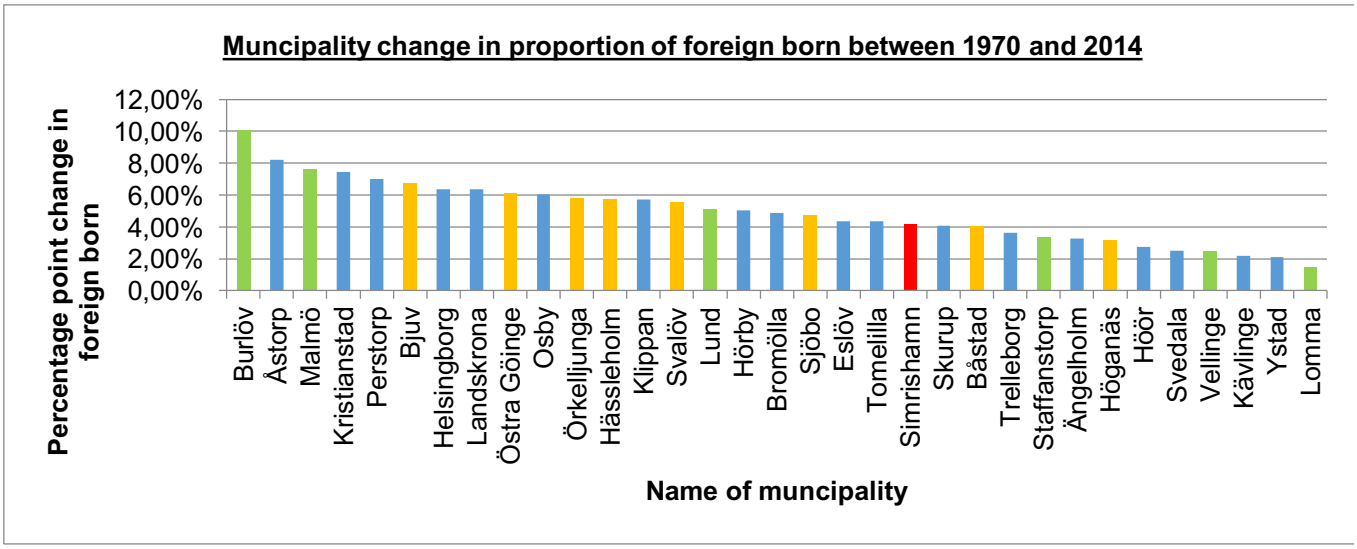

Table 30: Municipality change in proportion of foreign born between 1970 and 2014

Table 31: Summary of municipality changes in proportion of foreign born between 1970 and 2014					
Category of municipality	**Number of municipalities**	**Average change**	**Minimum change**	**Maximum change**	**Range**
Category 1	6	5,02%	1,45%	10,11%	8,66%
Category 2	18	4,79%	2,10%	8,21%	6,10%
Category 4	8	5,24%	3,18%	6,74%	3,56%
Category 5	1	4,20%	4,20%	4,20%	0,00%
Total	33	4,92%	1,45%	10,11%	8,66%

Table 31: Summary of municipality changes in proportion of foreign born between 1970 and 2014

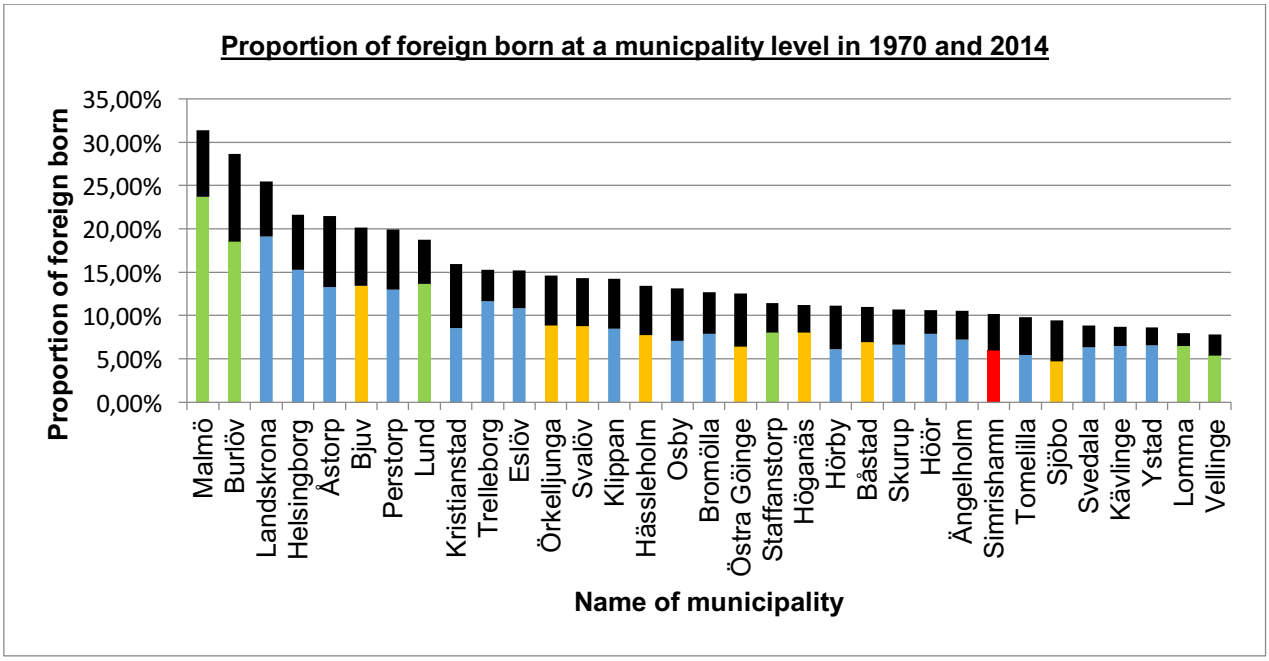

Table 32: Proportion of foreign born at a municipality level in 1970 and in 2014

Table 33: Summary of proportion of foreign born in 2014

Category of municipality	Number of municipalities	Average change	Minimum change	Maximum change	Range
Category 1	6	17,67%	7,85%	31,37%	23,52%
Category 2	18	14,11%	8,64%	25,48%	16,84%
Category 4	8	13,35%	9,42%	20,18%	10,76%
Category 5	1	10,19%	10,19%	10,19%	0,00%
Total	33	14,46%	7,85%	31,37%	23,52%

Table 33: Summary of proportion of foreign born between in 2014

Unemployment

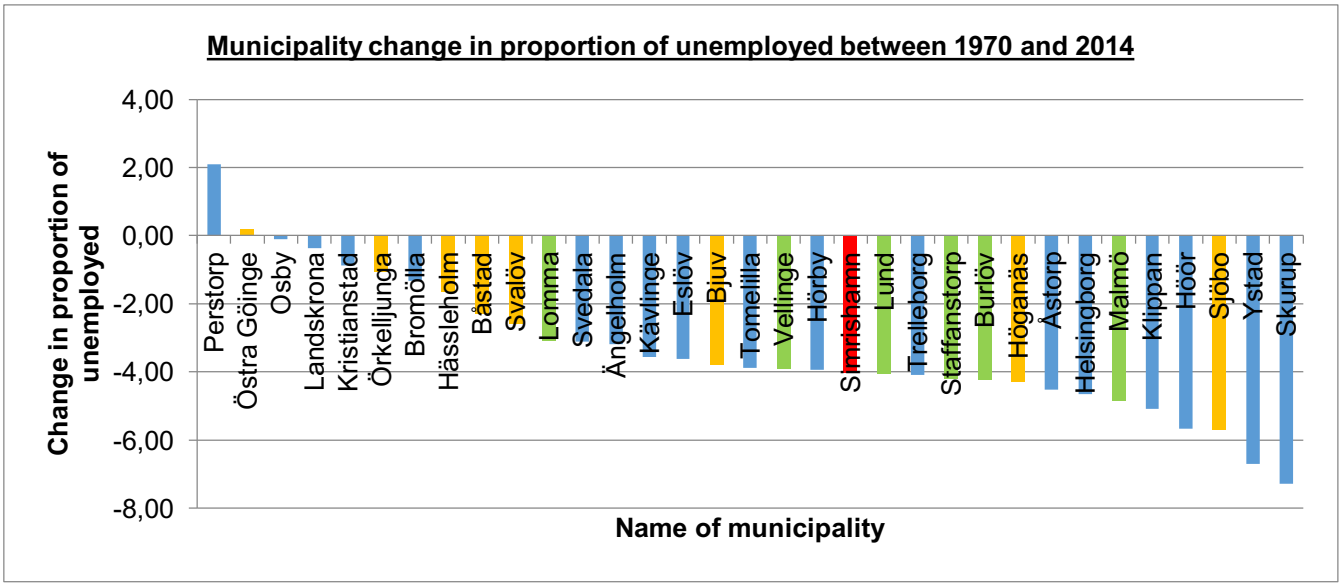

Table 34: Municipality level change in proportion of unemployed between 1970 and 2014

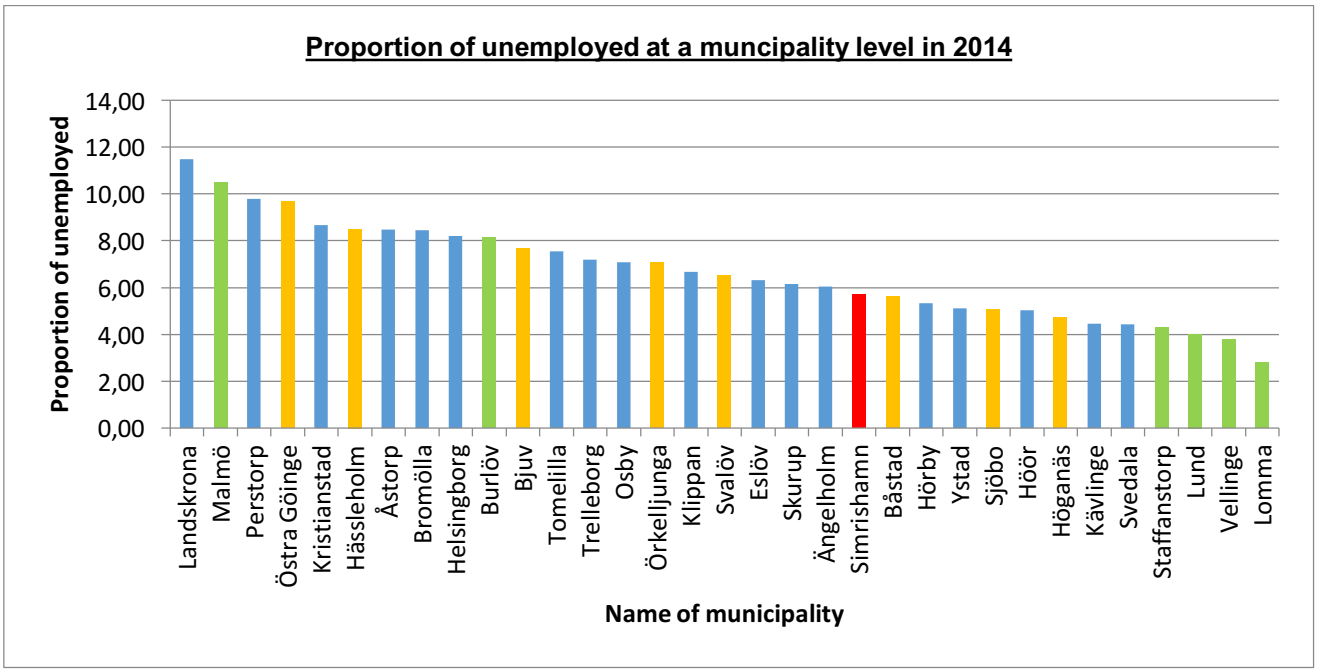

Table 35: Proportion of unemployed at a municipality level in 2014

Table 36: Summary of proportion of unemployed in 2014 at a municipality level					
Category of municipality	**Number of municipalities**	**Average proportion of unemployed**	**Minimum proportion of unemployed**	**Maximum proportion of unemployed**	**Range**
Category 1	6	5,59	2,80	10,48	7,69
Category 2	18	7,02	4,43	11,48	7,05
Category 4	8	6,86	4,73	9,68	4,95
Category 5	1	5,72	5,72	5,72	0,00
Total	33	6,68	2,80	11,48	8,68

Table 36: Summary of proportion of unemployed in 2014 at a municipality level

Median income

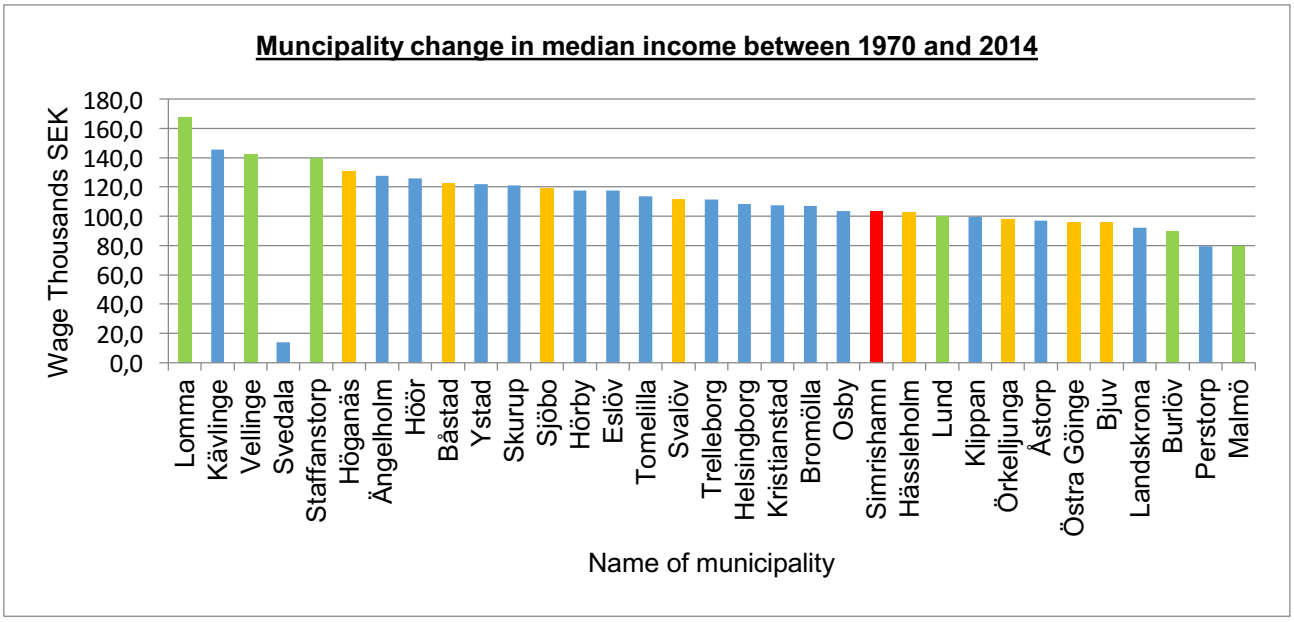

Table 37: Municipality change in median income between 1970 and 2014

Table 38: Summary of municipality changes in median income between 1970 and 2014					
Category of municipality	**Number of municipalities**	**Average change**	**Minimum change**	**Maximum change**	**Range**
Category 1	6	119,7	79,6	167,5	87,9
Category 2	18	113,2	79,7	145,8	66,1
Category 4	8	109,7	96,0	130,7	34,7
Category 5	1	103,3	103,3	103,3	0,0
Total	33	113,2	79,6	167,5	87,9

Table 38: Summary of municipality changes in median income between 1970 and 2014

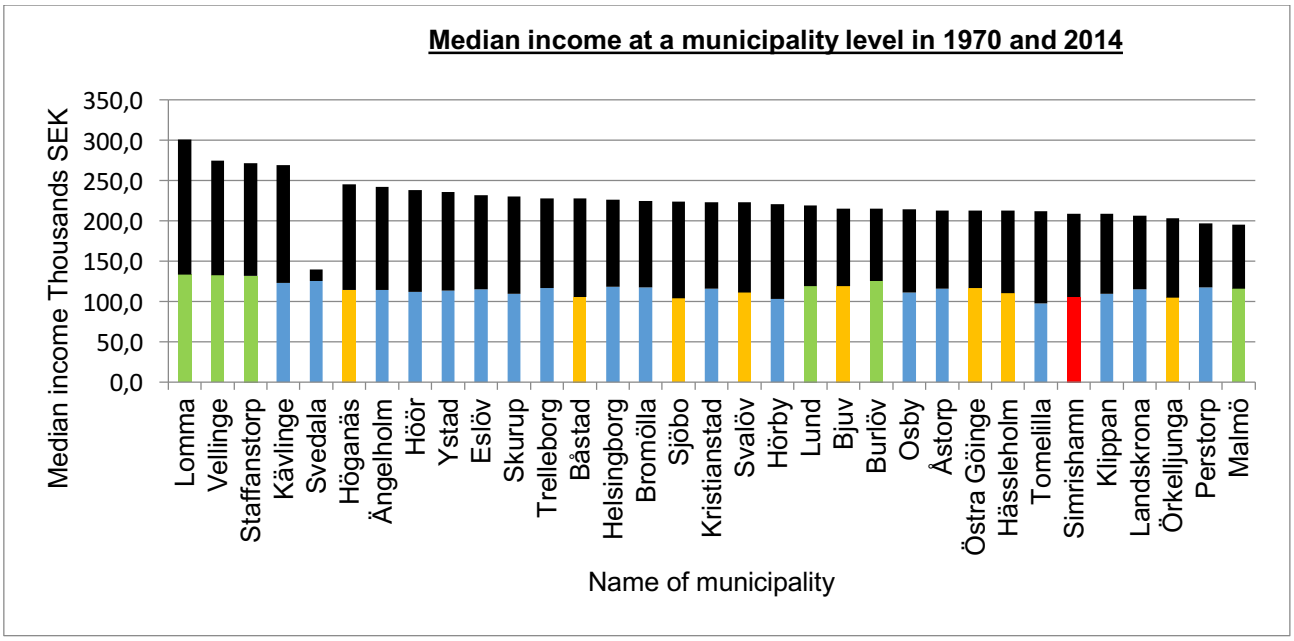

Table 39: Median income at a municipality level in 1970 and 2014

Table 40: Summary of median income in 2014 at a municipality level					
Category of municipality	**Number of municipalities**	**Average median income**	**Minimum median income**	**Maximum median income**	**Range**
Category 1	6	246,0	195,3	300,7	105,4
Category 2	18	227,1	196,7	269,1	72,4
Category 4	8	220,4	203,1	245,1	42,0
Category 5	1	209,1	209,1	209,1	0,0
Total	33	228,3	195,3	300,7	105,4

Table 40: Summary of median income in 2014 at a municipality level