

The Demographic Challenge to the Nordic Countries

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Nordic co-operation

takes place among the countries of Denmark, Finland, Iceland, Norway and Sweden, as well as the autonomous territories of the Faroe Islands, Greenland and Åland.

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is a forum of co-operation between the Nordic governments. The Nordic Council of Ministers implements Nordic co-operation. The prime ministers have the overall responsibility. Its activities are co-ordinated by the Nordic ministers for co-operation, the Nordic Committee for co-operation and portfolio ministers. Founded in 1971.

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Contents

Executive Summary	10
1. Introduction	17
Background.....	17
Norden in a contextual perspective	18
The aim of the study.....	18
The structure of the report	18
2. Theories of demographic development.....	19
Introduction.....	19
Fertility	19
Mortality and life expectancy	21
Migration.....	21
Implications of demographic change.....	23
Summary	25
3. Age structure	26
Introduction.....	26
National trends.....	26
4. Fertility	30
Introduction.....	30
Regional fertility patterns	31
Immigrant's fertility	34
Summary	35
5. Mortality and life expectancy	36
Introduction.....	36
National trends in life-expectancy.....	36
Regional patterns in life-expectancy.....	39
Mortality.....	41
Summary	44
6. Domestic migration and mobility.....	45
Introduction.....	45
Domestic migrations.....	45
Commuting.....	49
Gender.....	49
Ethnicity.....	50
Education.....	51
Summary	52
7. International migration	53
Introduction.....	53
Analysing migration flows.....	53
Nordic trends.....	54

National trends.....	56
Some regional aspects.....	59
Summary	61
8. Demography and economic performance.....	62
Introduction.....	62
Ageing.....	62
Depopulation.....	63
Labour shortage	64
Missing labour and the lack of adjustment	64
Mismatch problems.....	66
Immigration	67
Theories on the economic benefits of immigration.....	67
Empirical evidence.....	68
Uncertain causality	70
What does theory say?	70
Which indicators to use	71
What is the result?	72
The regional perspective on demography and economic performance.....	73
Summary.....	76
9. Policy implications.....	78
Introduction.....	78
Problems and policies.....	78
Fertility	79
Mortality and life-expectancy	79
Internal migration and mobility	79
International migration	80
Demographic changes and their economic implications	81
Dilemmas and goal-conflicts	82
Summary.....	83
10. A Nordic typology.....	85
Developing typologies	85
Potential integrated impact	85
Gendered regionality.....	89
Out-migration patterns.....	89
Females and education.....	90
Multivariate clusters.....	93
Significant correlations	94
Clusters	94
Two clusters.....	95
Seven clusters.....	96
Principal component and factor analysis.....	97
11. Scenarios.....	102
Population projection	102
Changes in the ‘dependency ratio’	104
Vulnerabilities.....	107

12. Future demographic challenges	112
The demographic trends.....	113
The challenges	114
More than just demography.....	115
Are there any solutions.....	117
Does one size fit all	118
Some final remarks	120
Appendix A. The status of the Nordic municipal population 2006.....	121
Appendix B: A specification of models	140
Appendix C: A map over the Nordic regions	
References	146

Preface

According to the UN's World Population Prospect (2007) the European population (inclusive of Russia, Belarus and the Ukraine) will be 664 millions in 2050. As a percentage of the total global population Europe will constitute some 6 percent in 2050 confirming the overall decline from 11 percent in 2007 and 21.6 percent in 1950.

The European population will over the next 40 years grow older and the labour force in general will shrink. At the regional level however considerable disparities will emerge, some regions will experience a dramatic loss of people while others will experience population growth partly due to the existence of a younger and more fertile population and partly due to immigration from other European regions and other parts of the world.

Demographic development and the nurturing of the human resources contained with the labour force will thus be a vital strategic issue for European and Nordic regional development policy in the coming decades. The challenge for all European regions will be to maintain a satisfactory level of both welfare and economic development despite these demographic trends.

The overall question posed by this report then relates to how individual Nordic regions can best position themselves in a broader European and Nordic context in relation to future demographic development and how national and regional policies can be designed to cope with these demographic challenges seen from a regional development perspective. The report provides a comprehensive study of a large number of national and international studies supplemented with new statistical analyses at the regional and local levels in the Nordic countries.

The report has been funded by the Nordic council of Ministers, the Senior Official Committee of Regional Policy and will provide an initial contribution to the overall discussion of the demographic challenges seen from a Nordic regional policy point of view.

This report is the result of work undertaken by Daniel Rauhut (project manager), Rasmus Ole Rasmussen, Johanna Roto, Sara Östberg and Per Francke. Daniel Rauhut has written chapters 1, 2, 4, 7, 8 and 12; Per Francke has written chapters 3 and 5, and Sara Östberg chapter 6. Rasmus Ole Rasmussen and Johanna Roto have written chapters 10 and 11, chapter 9 was written by Per Francke and Daniel Rauhut, and the Executive Summary was written by Daniel Rauhut and Rasmus Ole Rasmussen.

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Stockholm, January 2008

Executive Summary

Demographic ageing is not a phenomenon that suddenly has emerged. During the 20th century, fertility has fallen sharply in most of the countries of the Western World while life expectancy has increased as people generally live longer. One indication of this is the higher median age in the population. This trend was pointed out by a number of demographers as far back as the 1940s. We would like to stress moreover that there is no clear-cut evidence, theoretically or empirically, that any particular demographic development will lead to a certain economic development. There is no unified or general theory of fertility, mortality and migration. Instead, different theories and models are used when they are analysed. The theoretical approaches to fertility, mortality and migration are quite different in terms of their explanatory power. All are, however, important in selecting indicators and in arguing for certain analyses. Any population decline could then conceivably have either a positive or a negative impact on economic development. The key factor then is *the ability to adjust* to the new situation. The Nordic countries have however generally been rather good at doing this historically.

The question of whether there really are now serious demographic challenges to be faced must be raised while also providing an outline of what these potential challenges actually entail. The population projection made in this study shows that the total population of the Nordic countries will increase by 5.5 million inhabitants up to 2020, from 24.8 million to 30.3 million, with an annual growth rate of approximately 0.4%. In general, the fastest growing regions are located in the most densely populated areas in the capital and big city regions. The Nordic regions currently showing a negative population development will, by 2020, have decreased and this decrease in general will smooth.

Two of the areas that remain the subject of much debate are depopulation and immigration. Historical occurrences of population decline with a possible depopulation potential have probably, most typically, been a small area phenomenon in Europe and have been a rare phenomenon in the Nordic countries. To what extent the demographic processes we are experiencing today will actually lead to depopulation is unclear. Immigration can mitigate the bottle-necks in the labour market, but immigration can neither change the population structure, nor solve the deficits looming in the public purse. Immigration can only offer a short-term solution, while the problems ahead remain structural and as such require long-term solutions. Prominent scholars in the field argue that the relative success of immigration in the USA is unique. If the USA is an exception then it can be rightly questioned whether the American experience can be easily transferred to the Nordic countries.

The ageing population is often explained by low fertility levels, higher average life expectancy and the out-migration of young people that aggravates the problem and creates depopulation and other related problems. When analyzing population development the different cohort sizes have a significant impact on the future development. The logic here is quite simple as large cohorts will naturally reproduce large cohorts and *vice versa*. As such then current developments cannot simply be explained by low fertility rates and the out-migration of young people alone. Long-term changes in the economy and in prevalent social conditions have, and will, continue to be of great importance for the age structure development.

Convergence at the national level has taken place across the Nordic countries during the period 1960-2004 in respect of the periodical TFR. At a regional level Finland shows a regional divergence in the TFR during the period 1991-2004, while Denmark and Norway show a regional convergence for the same period. In Sweden there is a regional convergence for 1991-1999, and a divergence for 1999-2004. The latter divergence is related to a 'baby-boom' in the larger cities. The analysis also indicated that the TFR is higher in smaller regions in Denmark and Finland, while no indication of size-effect is visible for Norway. In Sweden the size effect has diminished: from a higher fertility level in smaller regions to a state where no size effects of significance are visible.

The differences in fertility between different nationalities of foreign-born women are significant, but even women from countries with a very high TFR adjust rapidly to the low Nordic fertility level. The higher fertility can be explained by an over-representation in fertile ages and that foreign-born women are married or co-habiting to a larger extent than native women. When the age-specific fertility patterns are analysed foreign-born women actually have a *lower* fertility than native women.

The Nordic countries are in many ways world leaders when it comes to high life-expectancy levels and low mortality levels. There exists, however, a certain level of uneven development in the Nordic countries. The differences between men and women as well as regional differences seem to be converging but this development will not continue if social differences are polarized over time while socioeconomic and educational factors remain the main contributors to changes in life-expectancy and mortality. In future growing problems with obesity will pose new demographic challenges as this, in a long term perspective, will affect life-expectancy and mortality. A similar development was noted during the 1960's when cardiovascular diseases grew among men due to unhealthy lifestyles and obesity will probably have the same development effect in the future.

Internal migration within the Nordic countries remains dominated by movements from peripheral regions to the metropolitan areas. Young adults dominate domestic inter-municipal mobility. Every second domestic migrant is aged between 20-35 years. The composition of domestic migrants is fairly similar in all Nordic countries and is rather sustainable over time. The ongoing out-migration of young people to regional and national centres however aggravates the problem of keeping population numbers stable. Many international studies show that the cost and benefits of migration are gendered. Women gain less from migration compared to men in terms of career and income.

Sweden has been the prime country of destination for immigrants in the Nordic area and today continues to attract almost half of all immigrants to the Nordic countries. In general, the typical immigrant to a Nordic country is a native Nordic citizen who is returning home, or is a Nordic citizen moving to another Nordic country. Immigrants from neighbouring countries to Norden (e.g. Germany, Poland, the U.K. and Russia) are placed in the third largest group of immigrants.

While the net migration rate is negative for native citizens in the Nordic countries, and has been so over time, the net migration rate for foreigners is positive, and has been so over time. A majority of the immigrants settle down in the metropolitan areas and in the major cities, which means that they are not spread evenly over the Nordic regions.

A number of *intrinsic goal-conflicts or dilemmas* in respect of the policy implications emerge from this. Is it possible to have a high female labour force participation rate and at the same time a high fertility rate? Is it socially sustainable to import foreign labour while domestic labour with an immigrant background is rejected by the labour market? When discussing migration, should the short- or long-term effects of migration be prioritised? These few examples alone illustrate the intrinsic goal-conflicts or dilemmas in the policy implications and thus how difficult it is to deal with them.

The issue of 'labour shortage' does not refer to being short of labour or to the fact that the necessary amount of labour does not exist. It simply means that given the offered wage level no teacher or assistant nurse is willing to accept the jobs offered. The major problem however appears to be a rather different one, namely, that of matching problems in respect of the labour market. We identified some of the most interesting causes of matching problems: (1) Geographic mobility is low and flows sometimes in the wrong directions. (2) The insider-outsider dilemma is particularly related to the phase of establishing oneself on the labour market. The best way to get a job is to have a job and if a person fails in this, their position in the social security system will be just as weak. (3) Locking in processes to a certain profession or employer (or both!) leading to health problems, long-term sickness and early retirement. (4) Exclusion from the labour market, often experienced by persons who have an immigrant background together with labour over the age of 50, single mothers and young adults etc. (5) A

segmented labour market, with three segments, does not improve the matching process. The first segment is attractive, the second is attractive when needed, and the third is unattractive. Even if there is a shortage of labour, the labour in the third segment will not be called for.

To resolve the issue of matching problems on the labour market mobility in general has to be increased to reduce the bottlenecks that develop. The current situation is not sustainable from a social perspective. These are problems which challenge the welfare institutions of the Nordic countries independently of the issue of demographic change. It is however obvious that demographic change is likely to make the situation even worse, though it should be reiterated that these demographic changes are not the cause of the problems *per se*.

'Labour shortage' is a pricing problem. If wages are raised in the sectors where 'labour shortage' exists the vacancies will be filled though the price elasticity will change (decrease) the demand for such services. The result will be a structural transformation of the economy where the expensive factor commodity – in this case labour – will be substituted for other factor commodities through institutional, organisational and/or technological changes.

There is no consensus on either the implications of, or how to solve, or at least mitigate, these implications. First, our *knowledge is rather limited* in respect of the causality between demographic change and economic performance. In the Nordic countries the population has been gradually ageing since the mid-18th century. Nobody can however argue that the last 250 years have been a stagnant economic period in the Nordic countries! A lot more research is thus needed to fill the knowledge gaps regarding the relationship and causalities between demographic change and economic performance. The second point deals with how to deal with these *challenges*. These demographic challenges are only to a minor extent really *demographic*. If central institutions, such as the labour market and the welfare systems/models, are dynamic, they will be able to adjust to whatever challenges lie ahead.

There is no universal solution to these challenges. All Nordic countries have a large number of persons in the labour force who are on long-term sick leave and a relatively high number of persons retiring early. Persons with an immigrant background also have a higher relative unemployment rate than natives. Getting these groups back into work will then have a significant impact on the economic dependency ratio. Another partial solution is to solve the mismatch problems on the labour market and minimise unemployment. Widening the labour market regions, creating a more flexible labour market and enforcing 'zero tolerance' on all kinds of discrimination could also provide partial solutions here. The raising of fertility also constitutes an important partial solution. Furthermore, given that a number of specific conditions are addressed, labour immigration can also contribute here.

It is of the utmost importance however to distinguish between long-term and short-term problems in relation to the issue of labour supply. Situations of long-term labour shortage have led to labour being replaced through technological, institutional and organisational changes historically, leading to productivity improvements. As a result they have resulted in increased growth, and the creation of an economic surplus through economic growth is a condition of welfare. Short-term labour shortage is a constantly recurring problem. If the distinction between long-term and short-term labour supply problems is not made, the risk of an attempt being made to solve long-term problems with short-term measures, and *vice versa*, becomes very high. If this does occur, the challenges now faced – demographic or otherwise – may become even more troublesome.

Policy measures – municipalities or functional regions?

In the report most of the demographic components have been presented and discussed either at a national or a municipal level. It is quite clear, however, that none of these administrative levels is suitable in relation to outlining policies which aim to deal with problems generated by mismatches in the demographic components.

At the national scale the level the generalization is too high to really reflect the inertia generated by physical and socio-economic distances between municipalities and regions. At best the national characteristics of these various demographic parameters may serve as an initial indicator in respect of the demographic status. It is nevertheless important to be aware of the extent to which 'good' national figures however actually disguises marked regional differences. Positioned very differently in relation to mortality and fertility, the Nordic countries are nevertheless exposed to more or less similar regional differences in these parameters, and, as such, are able to take advantage of the experiences gained in respect of the policy measures already undertaken elsewhere in Norden.

With the rise in short and medium distance mobility lives are very seldom now confined to distances delimited by municipal boundaries. Places of work are generally situated in municipalities different to places of residence. Additionally, choices of residence turn out to be very different in various age groups, partly reflecting differences in economic performance, but increasingly also due to specific choices regarding surroundings, related to where in the life-cycle people are. Such choices are, for instance, reflected in the contemporary discussion regarding 'the creative class', emphasizing how different attractions need to be offered by municipalities in order to become 'preferred place' of residence.

Another component stressing how individual municipalities are not an adequate base unit for policy is the increasing role of second homes. The use of second homes is changing, from vacation activities over short periods of time, to more seasonal or even semi-permanent usage, depending partly on accessibility, but increasingly also on where in the life-cycle the owners are situated. This leads to increasing functional interaction between municipalities with different demographic characteristics, as the choice of second home site often contrasts with the characteristics of the 'home' municipality.

In consequence, municipalities characterized by one set of demographic challenges are often found situated next to municipalities with different characteristics, tied together by functional relations as described above. Consequently, policies in relation to demographic changes cannot be viewed simply as individual municipal problems, but should instead be reflective of the increasing level of functional regional relations, where differences in population characteristics are often evened out through two sets of mobility. On the one hand through the day-to-day mobility between homes and work places. And on the other, via the mobility determined by choices reflecting differences in life strategies during the various stages of life. As such then, isolated policy measures at the municipal level, without taking the functional relations into consideration, may even in the best-case scenarios be wasted, and in worst-case scenarios they could often be counter-productive.

The ongoing municipal reform processes in the Nordic countries reflect the broader need to adjust administrative boundaries to these realities though the size of the municipalities is, only to a certain extent, reflective of the demographic parameters involved. Consequently, differences in welfare burden due to differences in demographic characteristics need to be addressed through specific policy measures in relation to demographically-based functional regions.

Consequently, the basic challenge seems to be that of the identification of these functional demographic relations, and, based on that, a need to focus on policies where demographic changes at the municipal level are not seen as discrete occurrences but increasingly as life-cycle characteristics within a functional regional structure, where the municipalities are allotted a specific role. By means of such a regionalization it would be possible not only to identify the determining processes, but also to develop scenarios where different political measures could be tested.

Two different types of regionalization could be anticipated, primarily based on physical distances and dominant interaction patterns. The first type would be based on relations determined by daily commuting distances, while the second would be based on longer distances and would therefore be related to less frequent – for instance seasonal – relations, which could be described as centre-periphery relations.

An initial step in respect of the first type of regionalization would be founded on the identification of different basic types of demographic interactions between municipalities. Such interactions could serve as indicators of functional relations, and could be analysed based on already existing and accessible data. For instance, on dominant migration patterns, major commuting relations, second home relations, and systematic changes in age structures. Interaction frequencies could serve as a preliminary measure of coherence, assuming that the coupling of interaction patterns would be a useful indicator. This would also enable an initial contribution to be made to the identification of types of dominant interaction patterns, for instance, in respect of the labour market, life-cycles, generational shifts etc., with these types being described according to their functionality. The limitation of such an analysis, however, is that the measures would be based on total volumes of persons commuting or moving, not on individual behaviour and the background to such individual choices. The volume data – the quantitative analysis – indicates the main patterns, but a more precise understanding of the patterns of behaviour would require analysis of the qualitative characteristics.

The next step then would be to undertake an in-depth analysis of the interaction patterns in selected representative regions within the identified types. On the one hand, based on more detailed data, for instance in relation to age groups, socio-economic characteristics, labour market relations etc., and on the other, on supplements of web-based surveys aiming at the identification of the decisive factors in relation to individual choices. The latter would be important when looking into the durability of the classes, and consequently also important when building scenarios relating to the implication of the various policy measures.

In connection with the second type of regionalization, i.e. regions based on longer distances and less frequent interaction, the first step would be to include components similar to the analysis described above. Such an analysis would – as with that described above – show the quantitative characteristics of the dominant migration patterns, in addition to some of the characteristics in connection with commuting, second home ownership and similar relations, to the extent registrations currently exist. Many of the relations connecting centre and periphery regions are not however formally registered, particularly in relation to the frequency of second homes usage or the frequency of visiting family and relatives. Case studies focussing on a number of selected representative cases, undertaken by means of web-based surveys and interviews, would thus be important when analysing this type of regionalization.

An important question in respect of both types of regionalisation would be the short-term versus long-term durability of the classes, i.e. to what extent they remain stable over time. In this connection time series data would be crucial in order to see patterns of change in the regionalization process over time, and to determine the major factors prompting these changes. Another part of the analysis would focus on possible shifts between different classes, as well as shifts in the individual municipalities' position within a functional region.

With a proper Nordic typology of functional demographic regions, combined with an in-depth understanding of the functionalities of the different regions, scenario building will enable an in-depth understanding of the possible consequences of different policy measures. As a starting point the analysis of policies would focus on the consequences of municipal and regional reforms, changes in welfare parameters and in the division of authority between administrative levels. Moreover, the typology would also allow more complex modelling of interactions, for instance in relation to the ongoing discussions in respect of the consequences of climate change, to take place.

There are obvious benefits to be gained through the exchange of experiences with both proactive and reactive policy measures in dealing with these demographic challenges in the context of demographic functional regional relations. In addition to identifying the major demographic dynamics at work, experience of, and the prospects for, ongoing and planned municipal changes are also highlighted.

A project addressing these questions would include:

- A) Identification of demographic functional regions in the Nordic countries, based on available register data and encompassing the most important demographic components.
- B) Development of a typology representing both the dynamics between the major regional demographic components and the notion of Nordic diversity.
- C) Initial workshop(s) with stakeholders on different administrative levels with a focus on:
 - a. The adequacy and policy relevance of the developed typologies in relation to stakeholders on both the national and municipal levels;
 - b. Identification of regions for in-depth analysis.
- D) In-depth analysis regions representing the identified types and including all Nordic countries and self-governing areas.
 - a. Detailed quantitative analysis based on extended register data;
 - b. Qualitative analysis of the major dynamic components;
 - c. Consultancy with stakeholders in selected regions;
 - d. Characterization of regional dynamics and analysis of differences in policy measures within and between the Nordic countries.
- E) Workshops with stakeholders on different administrative levels, but centred on representation from the selected regions. The workshops will be divided into two groups, one focussing on regions characterized by urban centre dynamic, and the other focussing on regions characterized by centre-periphery dynamics. In both cases the core of the workshops will be on:
 - a. Experiences with policy measures addressing the demographic challenges and dynamics in the different regions;
 - b. Outlining requirements for scenario building.
- F) Scenario building on prospects for demographic changes in 10 to 40-year perspectives
 - a. Development of a series of scenarios defined by the requirements conceived in the previous workshops;
 - b. Test of the scenarios based on time series.
- G) Third round of workshops: embracing future demographic challenges
 - a. Recommendation regarding policies in relation to future demographic changes;
 - b. The role of municipal reforms in relation to proactive demographic policies;
 - c. Interaction between the national, regional, and municipal policy approaches to existing, and future, demographic challenges.

1. Introduction

Background

In the latest revision of the UN World Population Prospects Europe is expected to see a lowering of its share of the world population to 6 per cent as compared to 11 per cent today and almost 22 per cent in 1950. The total fertility rate is also assumed to fall in Europe, creating relatively more elderly persons, a relatively smaller labour force and a relatively lower share of children and young adults (UN 2007). Only three major areas in the world, however, are considered to see a continued population increase until 2050: Western Asia (*i.e.* Middle East, Turkey and sub-Caucasus), Northern Africa and India (Rauhut 2004).

At a regional level, European developments however show many differences. Some regions will experience a decreasing population, due to ageing and the out-migration of young adults, while other regions will continue to experience a population increase, with a relatively young population, a relatively high fertility and an in-migration of, especially, young persons (ESPON 2007).

Developments in Europe are related to what is happening in other parts of the world, not only in economic terms but also as regards demographics. Globalisation matters, also when it comes to the development in economic-demography. Europe's relatively small population can maintain a relatively high welfare level since globalisation enables an international division of labour, with the result that production can be allocated to geographical areas in the world with the most favourable comparative advantages. One example of this is that labour intensive production can be allocated to countries where labour is cheap, while specialised and capital intensive production is placed in Europe.

The implications of this development undoubtedly however have an influence on demographic development. Migrants from all parts of the world want to move to the relatively wealthy countries. As such, long-distance migration flows to Europe can be understood in the perspective. In addition, fertility in Europe is, however, influenced by the relative wealth of this continent: the higher education and wealth, the lower demand for children and *vice versa*. Thus, it must be remembered that Europe does not show a homogenous demographic development. That Europe and its regions remain an integrated part of the global economy is a basic condition for the relative wealth of Europe, while its labour force remains competitive in terms of competence and wage levels.

At a regional level in Europe, the potentials of individual regions may be closely linked to the issue of demographic change for their future economic, social and demographic development. In the future it can be expected that regional development policies will take demography into account to a greater extent than is the case today.

Extensive knowledge is currently available on demographic trends at the national level, while, in a Nordic perspective, only fragmented knowledge exists at a regional level. Relatively little knowledge however exists regarding the impact ageing, labour immigration and fertility have on regional development. In the public debate the focus tends to remain on the perceived aggregated threats of demographic development – decreasing population levels, labour shortage, increased dependency ratio and the increasing number of immigrants who have not managed to establish themselves on the labour market etc. Little attention is however paid to the opportunities and potentials created by demographic change. Europe, as well as the Nordic countries, faces several interconnected demographic challenges, while demographic development does not necessarily need to be negative.

Norden in a contextual perspective

The Nordic countries show many similarities in respect of demographic developments as compared to the countries of continental Europe. When it comes to the total fertility rate it is possible to identify a North European (Denmark, Finland, Norway, Sweden and the UK) fertility trend, an East European (Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Romania and Slovakia), a South European (Greece, Italy, Portugal, Slovenia and Spain) and a West European (Austria, Belgium, France, Germany, Netherlands and Switzerland) fertility trend (ESPON 2005). Although life-expectancy is much higher in Sweden and Norway than in the other Nordic countries, life-expectancy at birth is still very high in the Nordic countries as compared to most European countries (ESPON 2005).

The Nordic countries attract immigrants from all parts of the world. The migration flows to the Nordic countries are however relatively limited as compared to those to Central, South and Central Europe (Edvardsson *et al.* 2007, ESPON 2005, 2006). Even if migration from the New EU Member States to the Nordic countries has occurred, the number of immigrants is still relatively modest as compared to other countries, e.g. Ireland, the UK, Germany and France (Edvardsson *et al.* 2007).

Similarities between demographic developments in the Nordic countries and in Europe in general also exist. One such area is the settlement patterns of immigrants: a majority of the immigrants settle in the metropolitan areas and large cities (Vandermotten *et al.* 2004, 2005, Edvardsson *et al.* 2007).

The aim of the study

This project is an exploratory study, aiming at the identification and prioritisation of the demographic challenges in the Nordic regions with respect to ongoing globalisation. The project will have a 'state-of-the-Art' character and will focus on what we *do* know, what we do *not* know and what we *need* to know about demographic development. Scenarios and maps will be used to describe the major trends in respect of demographic development. Three major problems will be discussed:

- i. What are the challenges? This question refers both to the demographic components creating the demographic challenge and where the challenges occur spatially,
- ii. Propose a Nordic regional typology for the demographic challenges,
- iii. Propose criteria and indicators for demographic scenarios in the Nordic regions.

The structure of the report

In chapter 2 the central theories on fertility, mortality, life expectancy and migration are presented together with some of the theoretical implications of demographic changes. Chapters 3 to 7 deal with the development of age-structure, fertility, mortality, life expectancy, domestic migration, mobility and international migration in the Nordic countries. Demography and economic performance is dealt with in chapter 8, both at a national and a regional level. Central aspects, such as ageing, depopulation, labour shortage and immigration, are discussed in this chapter together with a discussion on the causality between demography and economic performance. In chapter 9 the policy implications of the demographic development is discussed, with the focus on the dilemmas and goal-conflicts as they constitute, at least in part, the emerging demographic challenges. Chapter 10 develops two different typologies for the Nordic regions using a multivariate cluster model – one with two types and one with seven types. A principal component and factor analysis is also made in this chapter. The results from chapter 10 are used in chapter 11 to develop a basic demographic scenario. The whole study is summarised in chapter 12, which also includes a discussion on what the demographic challenges in the Nordic countries really entail.

2. Theories of demographic development

Introduction

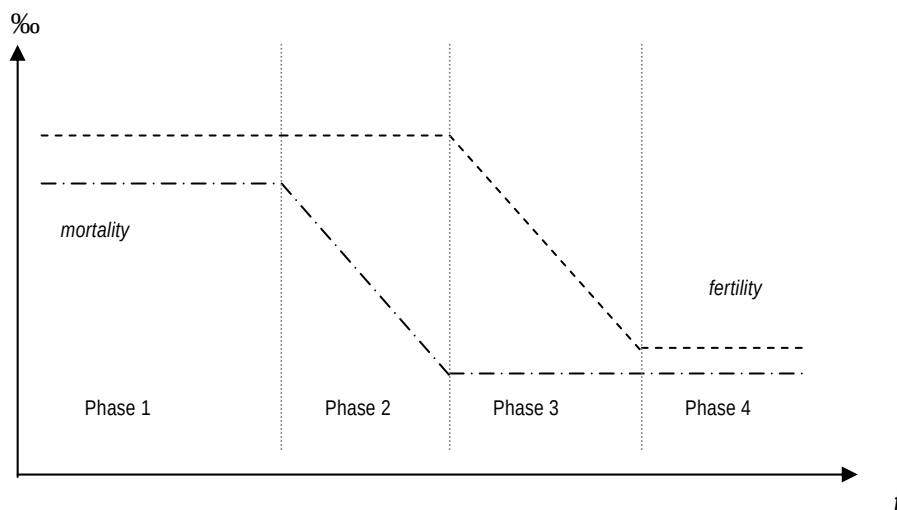
Fertility, mortality and migration are analysed in demography via different theories and models, indicating that a unified and general theory of these demographic processes does not yet exist. Although the theoretical approaches to births, deaths and migration are quite different in terms of explanatory power, all are important in respect of the selection of indicators and in arguing for certain analyses. Population increase is, historically, predominantly a function of natural population increase in pre-industrial society with small migratory movements. Today, with higher mobility, low fertility rates, and in many cases natural population decreases, population development with regard to size and structure has increasingly become dependent on external migratory movements.

In this chapter some of the theories on fertility, mortality and life-expectancy as well as those on migration have been outlined. It is, however, necessary to be aware of implications on natural population development as migration has an impact both on TFR and the age and gender structure. This will be outlined at the end of this chapter, together with a discussion on ageing, depopulation and the rise in single person households.

Fertility

Demographic transition has been a central ingredient in the analysis of natural population development from agricultural society through to the industrial era and up to the post-industrial society of today. Relations between the crude birth and death rates here are of utmost importance in explaining the various stages of the demographic transition (figure 2.1) – especially with regard to Europe – in the development and transformation of the population in differing countries and regions. In the *first phase*, both birth and death rates were high and the population increase/decrease was highly dependent on variations in death rates. The development in births is the central *explanandum* in the model of fertility decline and this is thus essential in the model of the demographic transition (See e.g. Leibenstein 1954, 1957, 1974; Becker 1960, 1965, 1993; Schultz 1974). The ‘population explosion’ occurred during the *second phase* of the demographic transition, when death rates started to decrease while birth rates

Figure 2.1 An illustration of the demographic transition



remained at a high level. In the *third phase* birth rates began to drop and population increase slowed while in the *fourth phase* both birth and death rates stabilised at a lower level.

The theory of demographic transition has been criticised. One of the major criticisms is that it fully focuses on the natural population change only, i.e. fertility and mortality, while migration is ignored. Already in the 19th century, i.e. the agricultural society era, migration did play an important role in population changes. The massive emigration from Sweden in, especially, the 1880s imposes a bias on the theory of demographic transition if it is tested on Swedish data. Other criticism worth mentioning here is that the theory of demographic transition cannot explain regional variations. Different regions within one country can be in different phases of demographic transition, but on aggregated data this will not be visible since the theory appears to be a generalisation. Finally, the theory of demographic transition aims to explain the transition from an agricultural to an industrial society. The phase, however, where both fertility and mortality are low occurs in a post-industrial economy (Bengtsson & Ohlsson 1993).

The interesting part for this study is the variations in birth rates that are the dominant factor with regard to natural population development. The value of having many children has fundamentally changed together with the change in the economic structure from an agrarian to an industrial and subsequently to a post-industrial society. In the pre-industrial period children were useful and welcome additions to the workforce. In industrial and post-industrial society children cost in a twofold way: (a) there are direct costs for schooling and maintaining children up to the time when they leave the household and (b) there are indirect costs when the mother (in rare cases the father) has to give up their employment to stay at home and to take care of the child. With the ongoing rationalisation process of modern society, the changing function and societal value of children has become apparent and a reduction of births is the consequence (Van de Kaa 1987).¹

Death rates today are relatively stable but birth rates fluctuate in many parts of Europe and are so low that the result will be natural population decline. The strategic variable in post-industrial society is thus fluctuations in birth rates and not in death rates in analyses of natural population variations. At regional levels the *age structure* of course has a major influence on these variations and it is of the utmost importance to differentiate between the crude birth rate and the total fertility rate (TFR) and consequently also between crude death rates and the age-specific death rates. Population increase/decrease is thus not only dependent on the TFR but also on the age structure of women – a precondition for natural population growth is also dependent on the number of women in the childbearing ages (ESPON 2005).

The ongoing rationalisation process does not only lead to the reduction of fertility but also leads to the postponement of the first birth. Women consciously avoid childbearing and ‘children-dependency’ in early adulthood in order to improve their career possibilities, to invest in higher education and to enjoy a more independent lifestyle. The average age of women having their first baby has increased markedly over recent decades. The rise in the female labour force participation rate and in investment in higher education has resulted in higher family incomes while also having two contradictory effects with regard to childbearing – an *income effect* and a *price or substitution effect*. The income effect should result in higher fertility as households with higher incomes have more money to spend on children than households with lower incomes. The price or substitution effect, however, implies that higher incomes also result in an increase in the relative price of children, something which, in its turn, reduces the demand for children and increases the demand for other commodities (Becker 1960, 1965, 1993, see also Cigno 1994, 2001).²

In line with the income and substitution effects there is a difference between quality and quantity elasticity. Higher incomes result in an increased demand for children but also in an

¹ Modern contraceptives are instruments – not the cause – of the reduction in the birth that is more economic and social in character

² A central ingredient in Becker’s theory is that the demand for children is treated in the same way as the demand for consumer durables.

increased demand for children of 'better quality'. This also means higher expenditures on raising children and this has a negative effect on fertility development while hampering the quantity effect (Overbeck 1974). This explains the variations between different types of households and in various types of societies: the impact of quality and quantity elasticity is different in regions characterised by different economic structures – quantity elasticity is higher in agricultural regions than in urban and post-industrial ones with higher income levels. This is also in line with the theory of demographic transition.

In reality the substitution effect seems to have had a greater impact on childbirth than the income effect, at least in recent decades. Investment in higher education also has a decreasing effect of its own: having invested in a higher education, one is more oriented to capitalising on one's investment in human capital, even if the return is not as high, *ex post*, as it was supposed to be, *ex ante*. Education and working life should consequently also be included in the utility functions that differ between various categories on the labour market. This also means that the same income increase/decrease or the same income levels have different effects on TFR depending on the satisfaction with working life.

The theoretical construct of a total fertility rate expressing how many children a female will bear in her life is therefore a very useful indicator in analyses of natural population development. In addition to indicators of fertility it is also necessary to measure the social environment to explain regional differences in fertility. The possibility to combine work with maternity is an important factor in lowering the indirect costs of a child (ESPON 2005).

Mortality and life expectancy

The development of mortality is conceptualised in the model of epidemiological transition, which can be seen as a part of the model of demographic transition (see Phillips 1994, Rockett 1999). It explains the decline of several diseases (mainly infectious diseases), the increase of other diseases (such as cancer, heart diseases) and the overall decline of mortality. The main factors in the fight against epidemics were better nutrition and the improvement of the public infrastructure (water, waste and sewage). The advances made in medicine have moreover led to a significant increase in life expectancy, and particularly to a decline in infant mortality, which was essential to explaining this increased life expectancy. The decline in mortality in lower age groups was followed by a fall in morbidity, i.e., the frequency of disease and poor health. This fall is related to the successful treatment of an increasing number of diseases. 'The Mortality Revolution, like the Industrial Revolution, marks the onset of major technological change, with the Mortality Revolution reflecting a breakthrough in the technology of disease control. Both revolutions occur largely independently from each other, the later occurrence of the Mortality Revolution being due chiefly to the later development of the medical *vis-à-vis* the physical sciences,' according to Easterlin (1996, p.80f).

According to other researchers, the decline in mortality has to be attributed largely to the rising standard of living. Ohlsson states, 'during the first half of [the 20th century], the increase in living standards combined with advances in medicine have successfully overcome the infectious diseases resulting in a significant fall in mortality among children and young people. After 1950, the decline in mortality among old people has been the main reason for the increase in life expectancy.' (Ohlsson 1995, p.7. See also Ohlsson 1996, 1998). The improved standard of living is directly related to good economic growth (Schön 2000). The fact that mortality has gone up among old people in Sweden (as well as in the Nordic countries) can be attributed to the considerable improvement in the standard of living of pensioners after Second World War (Ohlsson 1995, 1996, 1998).

Migration

The *neoclassical macro-economic* theory on migration focuses on labour markets and wage differentials in the country of origin and in destination countries, and the process of economic development can explain the development of labour migration (e.g. Lewis 1954, Ranis & Fei 1961, Harris & Todaro 1970, Todaro 1976). Wage differentials induce persons, especially

workers, to move from low wage countries to high wage countries, resulting in a decreased wage differential between the two countries (Massey *et al.* 1993).

In *neoclassical micro-economic* theory individuals are assumed to undertake cost-benefit calculations, not only about deciding whether or not to move, but also where to move. The decision on when and where to move includes variables such as wage differentials, unemployment rates, travel costs, efforts in adapting to a new country, psychological aspects of leaving friends and family etc. (Sjaastad 1962, Todaro 1969, 1976, 1989, Burda 1993). Individual characteristics (education, experience, training, language skills etc) produce different outcomes regarding the decisions to migrate and where to migrate (Schoorl 1995).

According to the *new economics of migration*, families and households, rather than individuals induce migration (Lauby & Stark 1988). The aim of migrating is not only to maximise income, but also to minimise risks (Stark 1984, 1991, Katz & Stark 1986, Taylor 1986). In the absence of collective and social insurance, as well as inefficient markets, a diversification of household resources through migration will create a diversification of risks. The family members abroad will bring in remittances to the family or household. Economic development will not necessarily reduce the pressure on international migration, since a second distinguishing characteristic of migration, according to the new economics of migration theory, is relative deprivation. The need for risk diversification and minimisation is dependent on the perceived functioning of markets and the perceived level of relative deprivation (Stark & Levhari 1982, Stark & Taylor 1989, 1991, Stark & Yitzhaki 1988, Stark, Taylor & Yitzhaki 1986).

Dual labour market theory stresses that the intrinsic demand for labour in modern industrial societies creates a constant need for workers at the bottom of the social hierarchy (e.g. Piore 1979). The labour market is divided into two sectors, one with formal and secure high-skilled jobs, and the other with informal low-status, insecure and low-skilled jobs as well as low wages, poor work conditions etc., (Doeringer & Piore 1971). When natives leave the bottom of the social hierarchy, and thereby leave the low paid, low status jobs lacking in social mobility opportunities, somebody must fill these vacancies. Only immigrants are willing to accept these jobs since they want to improve their social status in their country of origin rather than at destination (Piore 1979). The need for labour at the bottom of the social hierarchy induces migration, international as well as national and regional (Massey *et al.* 1993).

Thus far only voluntary migration, in the form of the economically motivated movement of workers, has been discussed. The politically induced *movement of refugees* is usually seen as involuntarily migration. In most cases the classification of economic and political migrants is an oversimplification, since the political and economic causes of migration often stem from the same factors. Moreover, freedom of choice has many gradations, which makes it difficult to accurately determine how 'voluntary' a voluntary movement is and how 'involuntary' an involuntary one is (e.g. Kunz 1981, Zolberg *et al.* 1989). Underlying predisposing factors (e.g. extreme inequalities between countries and political instability) and structural constraints (e.g. border controls) influence reactive migration, while immediate precipitating events (e.g. war, ethnic conflicts, and violations of human rights) and enabling circumstances (e.g. individual resources) undoubtedly influence the volume and destination of migration (Richmond 1993).

The factors initiating migration can be quite different from those that perpetuate migration over time and space. Schoorl points out that the direction of migration is a relatively neglected research field (Schoorl 1995). Former colonial bonds, family reunion, migrant networks and former migration usually trigger continued migration (e.g. Castles & Miller 1993).

In *network theory*, migrant networks are usually defined as sets of interpersonal ties that connect migrants, former migrants and non-migrants in areas of origin and destination through kinship, friendship and shared community origin (Boyd 1989, Massey *et al.* 1993). Network connections can be regarded as a form of social capital which people can use to gain access to foreign employment. When the number of migrants reaches a critical threshold, the expansion of the network will reduce the costs and risks of migration, which causes the likelihood of migration to rise. This will cause additional migration, which further expands the networks and so on (Hugo 1981, Taylor 1986, Massey & García España 1987, Massey 1990, Gurak & Caces 1992).

Institutional theory points out that the flows of immigrants become more institutionalised and independent of the factors that originally induced them when private institutions,

entrepreneurs and voluntary organisations develop to satisfy the demand for moving to certain countries. The process of the institutionalisation of migration is difficult for governments to regulate since a part of the immigration is illegal (Massey *et al.* 1993).

Once started, the migration process alters circumstances both at origin and destination, which often increases the probability of future migration. This phenomenon is termed *cumulative causation* (Massey 1990b). There are six major socio-economic factors potentially affected by migration in a cumulative fashion: the distribution of income, the distribution of land, the organisation of agriculture, culture, the regional distribution of human capital, and the social meaning of work (Stark, Taylor & Yitzhaki 1986, Taylor 1992).

Network theory, institutional theory and the theory of cumulative causation suggest that migration flows need stability and a structure over space and time to enable an identification of international migration systems. According to *migration systems theory*, these systems are characterised by a relatively intense exchange of goods, capital and people between some countries and less intense exchanges between others. Migration systems are characterised by a core receiving region (one country or a group of countries) and a set of countries linked to it/them by unusually large flows of immigrants (Fawcett 1989, Zlotnik 1992). Multi-polar systems are possible and when economic and political conditions change, systems will evolve. Countries will drop out or join a migration system as a response to social, economic or political change (Massey *et al.* 1993).

Implications of demographic change

Before leaving those issues connected to the theories and theoretical reasoning around demography and demographic changes a few words should be said on some of the implications of these demographic changes.

The population in the Nordic countries has been ageing gradually for a very long period of time. Recurrent episodes of concern over the alleged problems of emerging demographic structures were shown in the last century. Today the national debates on ageing usually focuses on fertility and mortality issues, but migration needs to be taken in to account to a greater degree when ageing is discussed. A second marked trait is that ageing is usually discussed at an aggregate level, although lower geographical units may be more useful in an analysis of ageing.

A study on ageing in the Nordic peripheries showed that one of the problems causing ageing was the very low fertility rate. The major cause was, however, the out-migration of relatively young persons (Foss & Juvkam 2005). This out-migration creates a biased age-structure and, as a consequence of young females migrating, the fertility rate drops. The result is that the regional population base in the periphery becomes narrower.

A net out-migration of young adults in the peripheral and rural parts automatically increases the share of the other age-groups. A long-term effect of this is that the regional population base becomes even narrower. This, in turn, leads to an even more biased age structure (ESPON 2005, Foss & Juvkam 2005). This development easily develops into a vicious circle.

Migration is strongly concentrated to the stage in the life-cycle where the individual starts/finishes education, enters the labour market and/or establishes themselves with families (Foss & Juvkam 2005). Migration trends seem to imply accelerating depopulation and ageing in sparsely populated rural and peripheral regions and in regions lagging in economic and labour market performance (ESPON 2005).

Depopulation is often a function of low fertility rates, natural population decrease and net out-migration. For many depopulating areas this results in the establishment of vicious circles that erode the pre-conditions for endogenous growth and development (ESPON 2005). However, the major cause of negative regional population development, which in the worst case may lead to depopulation, is migration, and especially the out-migration of young adults (Edvardsson *et al.* 2007).

It is not surprising to find a higher TFR in rural and sparsely populated areas than in big cities and regional service centres. The *gender structure* is skewed and the female labour force

participation rate is low in relation to the metropolitan areas and the regional service centres. The female labour force participation rate is almost as high as the male participation rate in the latter case. In rural and sparsely populated areas the average age of those women having their first baby is lower than in the metropolitan areas and the regional service centres. This results in more space for a second and third child as compared to areas where the corresponding average age is higher. To a great extent these observations seem to be a relic of the pre-industrial society, where children were both a production and a security factor while in today's societies, children are more like consumption products (see e.g. Becker 1960, 1965, 1993, Cigno 1994, 2001).

The share of 'singles' or one-person households has been increasing steadily in recent decades, not only in the Nordic countries, but over most parts of Europe.³ The proportion of 'singles' or one-person households are significantly higher in the post-industrial than in the industrial and agrarian age. One explanation for this is that the incidence of life-long marriage has dropped over time as a consequence of the rise in divorces. Parallel to this there has been a sharp rise in non-marital cohabitation. This looser relation also results in a rise in the share of 'singles' since many of these relations are not as long-lived as traditional marital cohabitation. Furthermore, for this category the substitution effect seem to be higher than for married or cohabiting people. The obvious significant negative correlation between the share of singles and childbirth is then, in accordance with this reasoning, not surprising (Edvardsson *et al.* 2007).⁴

According to the *relative income hypothesis*, the size of a cohort has a significant impact on a number of economic and related activities throughout society. A large cohort – e.g. the 'baby boomers' in the 1940s and 1960s – will have fewer children, higher mortality and morbidity rates, and a higher divorce rate than persons born in a small cohort – e.g. in the 1950s and 1970s – and *vice versa*. Persons in a large cohort will also have lower relative incomes and a higher risk for unemployment over their life-cycle than persons born in a small cohort due to the relatively higher competition for the jobs. This relative competition also results in a higher educational level for persons born in a large cohort, and a lower educational level for persons born in a small cohort (e.g. Easterlin 1987).

Analyses of cohort-size and fertility and cohort-size and higher education have provided evidence for the *relative income hypothesis* on Swedish data (e.g. Ohlsson 1986, 1987). From the *relative income hypothesis* it has been deduced that larger cohorts will have a higher propensity to migrate and a higher geographical mobility than smaller cohorts (and *vice versa*), but no empirical evidence for this has been found (Bengtsson 1989). The relative size of a cohort will have an impact on the society as a whole, particularly economically (Easterlin 1987, Broomé & Ohlsson 1989).

The *relative income hypothesis* is rather ambiguous to interpret. One example of this is that larger cohorts will demand a relatively higher educational level than smaller cohorts and that large cohorts will have relatively fewer children than smaller cohorts, and *vice versa*. Cohort-size is the determinant of educational demand and the demand for children. There are however causalities, which are ignored by the *relative income hypothesis* between educational level and fertility: the higher the education, the lower the fertility.⁵ It is then rather difficult to determine

³ The rise in the share of 'singles' is not however simply an effect of changed values, urbanisation and higher female labour force participation. Instead, much of the rise in the share of 'singles' is a function of the ageing process with its implications for household structure: there has been a long-term rise especially in the share of widows. This has, however, no consequences for migration.

⁴ In metropolitan areas and university regions, the share of 'singles' is higher than in industrial or rural areas especially in the childbearing ages. The 'single' gap has, however, diminished in recent decades as a consequence of societal transformation across all regions. The fact that rural families have always been larger than urban ones is partly a consequence of a higher share of 'singles' in urban areas, especially the metropolitan ones (see e.g. Johansson, 1999).

⁵ This is so *particularly* for women. The higher education and income a woman has, the higher is the opportunity cost of having children – resulting in a lower fertility (Becker 1960, 1993). The relative income hypothesis is however based on the behaviour and incomes of men only (Easterlin 1987)

whether it is the cohort-size or the educational level that leads to lower fertility for larger cohorts' relative smaller ones.⁶

Summary

There is no unified and general theory of fertility, mortality and migration. They are analysed in demography by different theories and models. In terms of explanatory power the theoretical approaches to fertility, mortality and migration are quite different. All are, however, important in selecting indicators and in arguing for certain analyses.

The differences in the population structure are thus not only a function of the differences in fertility rates. It is rather migratory movements that cause regional differences in age structure. Migration intensities are highest in ages 20-30, which have differing impacts on in- or out-migration regions. This also means that the 'population crisis' can take quite different shapes in various parts of a country or within the EU. In some regions, low fertility rates have traditionally dominated, while in other parts the problems have been connected with out-migration and lopsided age structures – out-migration of younger women in particular. There is thus a connection between natural population development and migration – a fact that is often neglected or downgraded in the analyses of the 'population crises'.

⁶ The same can be said regarding the causality between cohort-size and probability to migrate; there is no direct causality, but this is not the same as saying that there is no indirect causality. The causality can be indirect through a higher risk for unemployment and lower relative incomes, on the one hand, and a higher probability to migrate, on the other. Again, the focus on men in the *relative income hypothesis* skews analyses on migration.

3. Age structure

Introduction

The populations of the Nordic countries are getting older and as life expectancy levels increase and mortality decreases at the same time as fertility levels are low this accelerates the process. Looking at the population structure by age in the Nordic countries, the development is rather cohesive across all the countries concerned though some differences remain (see figure 3.1). One common trend is that the population in urban areas is younger while in rural and sparsely populated areas it is older. In addition there are also gender aspects to this development as women constitute the majority of the internal migrants in the Nordic countries, something that has implications for the age structure (Neubauer *et al.* 2007). However the development of the population age structure is rather complex and cannot simply be explained by migration, higher life expectancy and low fertility rates. The effect of different cohort sizes is also crucial in determining the underlying factors behind Nordic population development (ESPON 2005).

National trends

In general the Nordic countries share the same trend, the population is getting older as average life expectancy rises and fertility rates decline. When comparing the Nordic countries as a whole to the EU27 the Nordic countries have more elderly people and more young people but in the category of 'young adults' the Nordic countries are under the EU27 average (See figure 3.1). Furthermore, in the Nordic countries national differences are also evident. In Iceland the percentage of young people is rather pronounced in comparison to the other Nordic countries. For the other countries the differences are not that large as in the case of Iceland but, in general, the population is getting older. In this context when comparing Iceland and the other countries, the rather high percentage of young persons in the population at present will change in the long term following the logic of large cohorts reproducing large cohorts. Studying the population structure in general for the Nordic countries and comparing this to EU27 the most challenging and perhaps most distinctive feature for the Nordic countries is not covered. In the European context the Nordic countries are sparsely populated with low population density and this creates new demographic challenges. This becomes clearer as globalization imposes new structural and economic changes on society where urbanization is accelerating.

When studying the national trends the most noticeable development is found in the rural and sparsely populated areas. Although there is an overall trend towards an older population in the rural and peripheral areas there are differences. This development is most evident in Finland and Sweden where there are significant problems with an aging population and also depopulation in these areas. For Norway and Denmark similar patterns emerge though the development here is not so pronounced (Neubauer *et al.* 2007). When comparing Finland and Sweden with Denmark, which is a more densely populated country, we find that in some municipalities in Finland and Sweden 30 percent of the population is older than 65 years. Studying the same numbers in Denmark the picture is different where about 15 percent of the population in Denmark was over 65 in 2004 (Edvardsson *et al.* 2007). When studying figure 3.2 below these patterns are clearly shown while in addition another pattern emerges where first of all the metropolitan regions are over represented in respect of young people and this coincides with cities with Universities where young people also are in majority.

Figure 3.1 Age-structure in the Nordic countries 2005. *Norden* refers to Nordic average.

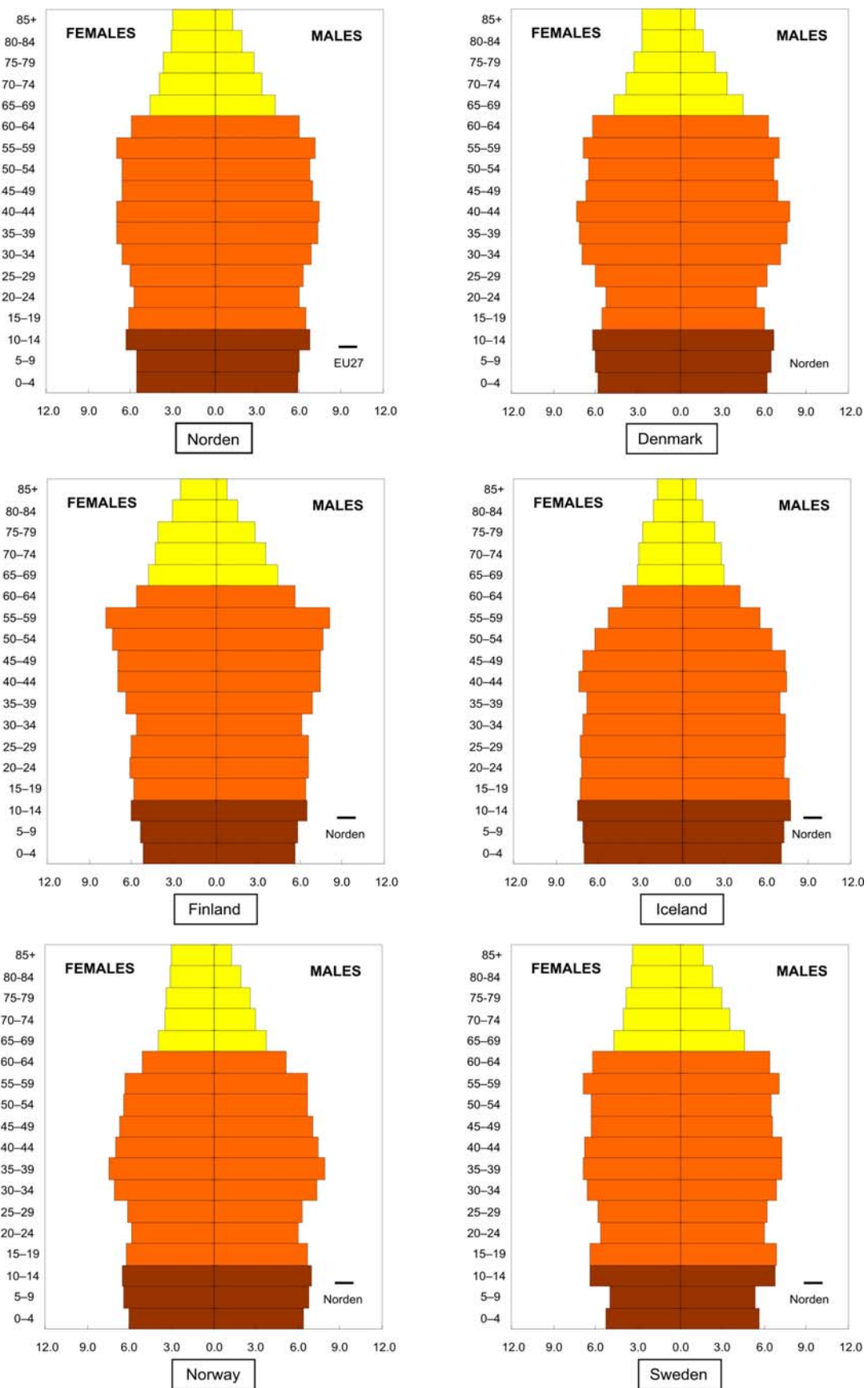
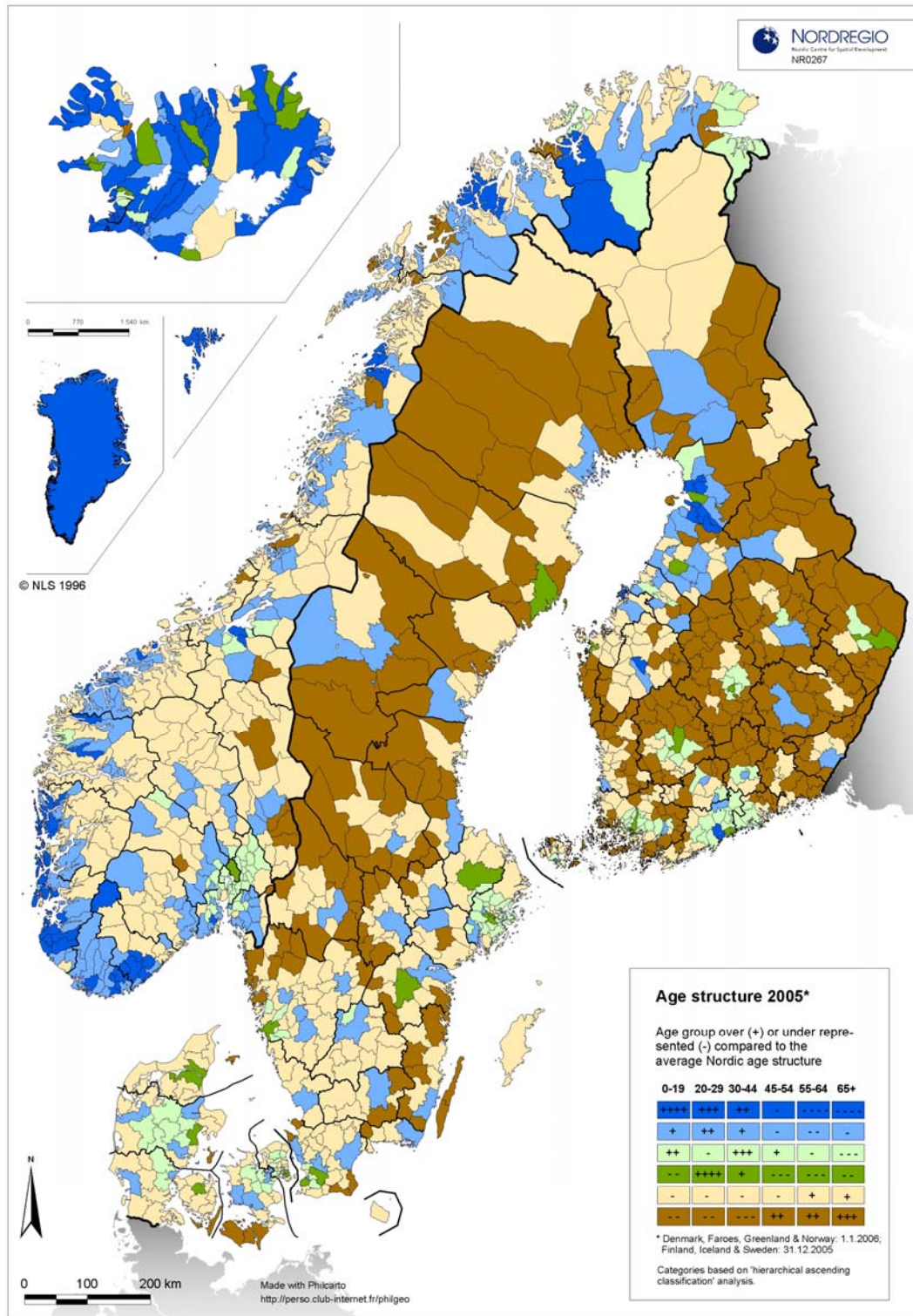


Figure 3.2 Population structure by age in the Nordic countries 2005



This development is further accelerated and pronounced by out-migration from the rural and peripheral areas and when analyzing the migration from these areas to the metropolitan regions young people are the most active movers. The issue of depopulation has been studied in ESPON 1.1.4. The results clearly show that geographical peripheries are associated with under representation in the reproductive life stages. Among young people access to education and

employment constitute pull effects offered by the metropolitan regions. The ESPON 1.1.4 study shows that this loss is especially strong in Finland (ESPON 2005). Following the out migration of young people another issue is aggravated and this has direct effects on the age structure. As young people represent the fertile part of the population this has resulted in fertility rates drastically declining in these regions (Edvardsson *et al.* 2007). Interestingly there are regions in the Nordic countries with a reproduction level above the national average but even if there is potential for a population increase and a rejuvenation of the population, this is often hindered by the out-migration of young adults (Foss & Juvkam 2005).

In connection with this development, gender aspects are also proving to be important as young women constitute the majority of these internal migrants. When analyzing the statistics in the Nordic countries regarding the percentage of men and women in the regions and cities, women are proving to be more urban as the percentage of women in comparison to men is higher for urban and metropolitan areas. This difference is larger in Sweden and Finland than in the other Nordic countries and this follows the overall trend with Sweden and Finland having an older rural population (Neubauer *et al.* 2007).

As the internal mobility and migration of young adults create problems the persons immigrating to the Nordic countries however are also young adults (Neubauer *et al.* 2007). But their effect on local and regional age structures is the same as for native persons. This is the case because of an adjustment effect where the persons migrating to the Nordic countries adjust themselves to local conditions. This is evident when studying the migration and fertility levels of these persons. Immigrants follow the same pattern as native people after settling into society, they migrate to metropolitan areas (Edvardsson *et al.* 2007). The same pattern is identified among women and their fertility rates as they often – before migrating to the Nordic countries - have higher fertility levels but these adjust over time (Andersson 2004, SSB 2002).

This development of course affects local economies by overseeing a decrease in the available labour force. This development was noticed by the OECD in a report that states that the problems of areas with population decline are profound. Furthermore the report acknowledges that these areas have not yet succeeded in developing new occupational structures and labour markets enabling them to grasp the opportunities created by the new globalized economy as agriculture and traditional manufacturing industries continue to dominate and well educated persons continue to move away from these areas. These facts are the main causes behind the rather stable population structure (OECD 2005). These factors constitute the main reasons for slow economic growth as the population structure over time cannot be considered sustainable in these areas. As the population and age structure is variable this has implications for local labour markets as the problem of labour force shortage becomes evident when young people migrate from these places (Neubauer *et al.* 2007).

When analyzing the age structures in the Nordic countries and its ongoing development, the aging population is often explained by the low fertility levels, higher average life expectancy and the out migration of young people which aggravates the problem creating depopulation among other things. New research has however been able to add a new perspective to this development. When analyzing population development the different cohort sizes have a significant impact on future development. The logic here is quite simple as large cohorts will naturally reproduce large cohorts and *vice versa*. Therefore the current development cannot solely be explained by the low fertility rates and the out-migration of young people. Long term changes in the economy and in the social conditions are, and will continue to be, of great importance for age structure development (ESPON 2005).

4. Fertility

Introduction

The trend towards fertility decline and the growing negative population change began in Europe during the 1960s and 1970s and low TFRs were established at a low level during the 1980s and 1990s. The Nordic countries follow this general trend. The ‘renewed’ interest in population decline and depopulation is related to the recent fertility decline that took place from the middle of the 1960s to the middle of the 1970s in most countries. After a major fall in fertility rates, fertility tended to remain stable or to decline more slowly. There are not yet any European examples of enduring upward shifts – instead the TFR changes seem to be of a short term and temporary character. The total fertility rate has been in focus when natural population development is discussed, although the age and gender structure both have a significant impact on the natural population development.

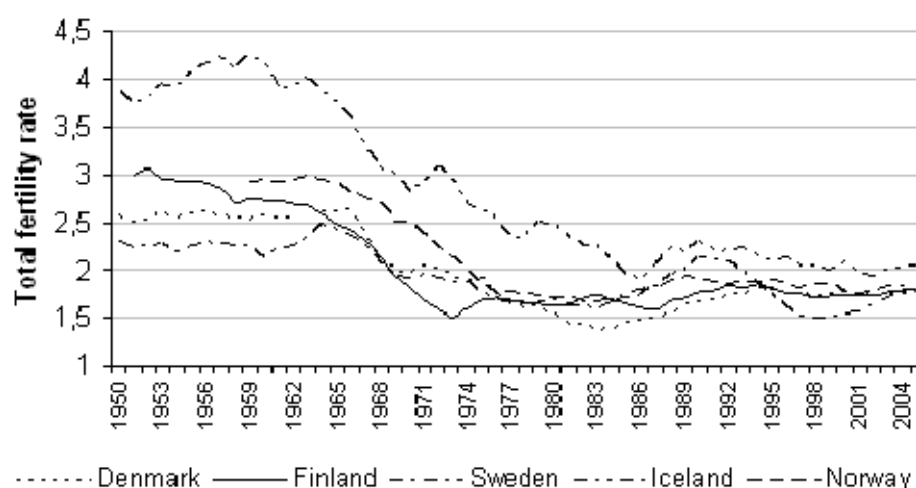
The fertility decline is, however, not a unique phenomenon for the 1960s and 1970s – it is linked to a long-term demographic development, dating back at least a couple of centuries. This period includes what is known as *the demographic transition*; a major and lasting shift from high to low mortality and fertility that was most pronounced in the nations of Europe, North America, Japan, Australia and New Zealand. Increments in human longevity culminated in an unparalleled rise in life expectancy during the first sixty years of the twentieth century. Fertility declined dramatically in the countries of transition; on the order of 50 percent between 1870 and 1940. The former century as a whole by and large saw a continuation of this tendency, although significant fluctuations occurred with the world economic crises in the 1930s and World War II. Developments since the middle of the 1960s have in many countries brought an end to almost two decades of the post-war ‘baby-boom’ taking fertility levels back to the long-term downward trend.

The most distinctive difference between the fertility decline of 1870-1940 and that since 1960 is that fertility fell well below replacement level (ca. 2.1) in most European countries. However, the courses of decline differed and the fertility levels varied substantially among the countries in the decades following the steepest decline, pointing towards the likelihood of much differentiated demographic prospects in the years to come (ESPON 2005).

National trends

Denmark shows a stable development in the national TFR during the period 1950 to 1967 (see figure 4.1). After that TFR drops from 2.6 to 1.38 between 1964 and 1983. Since 1983 a steady increase in the TFR has taken place; since 1990 the TFR fluctuated between 1.72 and 1.8 (Edvardsson *et al.* 2007). The TFR increase occurs parallel to an improvement in the business cycle in Denmark (Andersson 2004b). The TFR in *Finland* dropped from 3.08 in 1952 to 1.49 in 1973. Since the late 1970s only small fluctuations have taken place in the Finnish TFR. *Iceland* displays a TFR cut in half within approximately 20 years: in 1964 TFR was 3.99 in Iceland, while it had dropped to just below 2 in 1985. Only small fluctuations have taken place since then. *Norway* had a TFR on 3 in 1964, but this dropped to 1.66 in 1984 (Edvardsson *et al.* 2007). Since then the TFR in Norway has fluctuated around 1.8. Sweden experienced a ‘baby boom’ in the 1940s, in the 1960s and in the late 1980s/early 1990s. The trend in the TFR for Sweden shows, however, a declining development (SCB 2002). This is also shown in figure 4.1 below, which gives the impression that a convergence in the TFR for the Nordic countries has taken place over time. Since 1965 the development of the TFR for Denmark, Finland and Sweden seems to be quite similar; the TFR for Norway seems to show a similar development as

Figure 4.1 The total fertility rate (TFR) in the Nordic countries 1950-2005



Data source: Eurostat and national statistics offices

that of Denmark, Finland and Sweden after the mid-1970s; the TFR for Iceland seems to show a similar development to that of the other Nordic countries from the mid 1980s onwards.

The result in table 4.1 shows that not only has the standard deviation (std) between the Nordic countries decreased over time, but also the coefficient of variation (C.V.). This can only be interpreted as there having been a convergence in the TFR between the Nordic countries. This result also confirms the findings of previous studies (ESPON 2005, Edvardsson *et al.* 2007).

Table 4.1 Some measures with regard to convergence/divergence in the national TFR development in Denmark, Finland, Norway and Sweden 1960-2005

	Mean	Std	C.V.
1960	2,9	0,766029	0,264148
1965	2,836	0,53873	0,189961
1975	2	0,382296	0,191148
1985	1,69	0,172772	0,102232
1995	1,858	0,133679	0,071948
2005	1,852	0,113446	0,061256

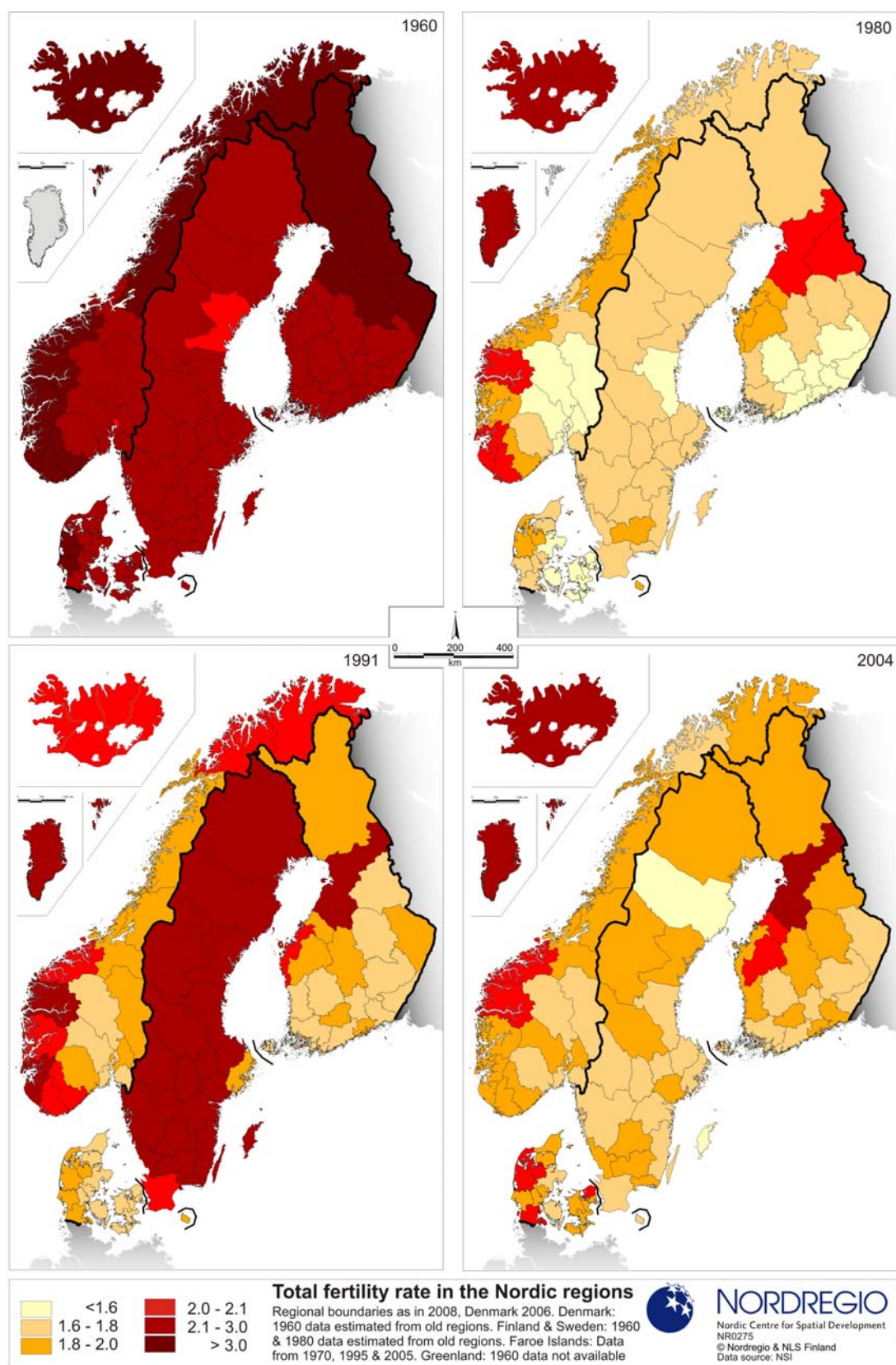
It is a well-known fact that national TFRs in Europe have been converging and have even altered after 1960. Compared to other European countries, however, the Nordic countries still have a relatively high fertility level. (ESPON 2005). Countries with a well-developed welfare system (child care, paid paternal leave) also tend to have the highest fertility rates (Vogel 2003). As was shown in this chapter, this has resulted in a diminishing gap in the regional TFRs while the regional gaps – except for Denmark – have almost been closed (Cf. Johansson 2000). That Denmark has a different fertility development has also been observed in other studies (Andersson 2004b).

Regional fertility patterns

In a regional perspective the regional total fertility rate has undergone dramatic changes in the Nordic countries: in 1960 Västernorrland (Sweden) and Oslo (Norway) were the only regions with a regional TFR *below* the replacement rate (approximately 2.1 children/woman) – in 2004

Iceland and Pohjois-Pohjanmaa (Finland) were the only two regions with a TFR *above* the replacement ration.

Figure 4.2 Total fertility rate (TFR) in the Nordic regions 1960, 1980, 1991 and 2004



In order to examine the convergence/divergence processes at a more disaggregated level, a comparison between the coefficients of variance have been undertaken for some years between 1991 and 2004 by Edvardsson *et al.* (2007). The coefficient of variance (C.V) is a better measurement than the standard deviation as the mean value is changing over time and is independent of the size of the mean value. The results are presented in table 4.2.

Table 4.2 The regional TFR development in Denmark, Finland, Norway and Sweden 1991 to 2004. The size effect estimates to what degree large regions have higher or lower TFRs than the national TFR. (100=neither nor).

Country	National TFR	Average reg. TFR	Std	C.V.	Size effect
DK 1991	1,68	1,76	0,148	0,084	95,4
DK 1995	1,81	1,89	0,135	0,071	95,8
DK 1999	1,74	1,82	0,123	0,067	95,6
DK2004	1,78	1,88	0,141	0,075	94,7
FI 1991	1,79	1,82	0,139	0,075	98,4
FI 1995	1,81	1,86	0,165	0,089	97,3
FI 1999	1,73	1,78	0,158	0,088	97,2
FI 2004	1,80	1,86	0,162	0,87	96,8
NO 1991	1,92	1,93	0,151	0,78	99,5
NO 1995	1,87	1,88	0,145	0,077	99,5
NO 1999	1,85	1,87	0,139	0,074	98,9
NO 2004	1,83	1,83	0,112	0,061	100
SE 1991	2,12	2,19	0,098	0,045	96,8
SE 1995	1,74	1,76	0,057	0,032	98,9
SE 1999	1,50	1,51	0,057	0,038	99,3
SE 2004	1,75	1,76	0,105	0,060	99,4

Source: Edvardsson et al. (2007)

Table 4.2 shows that significant variations exist between differing years and between the various countries. The highest fertility level can be found in Iceland (not shown in table 4.1) which in 2004 had a TFR as high as 2.19 – the highest in Europe at the national level. The TFR in Norway, both with regard to the national as well as regional, show a steady decline between 1991 and 2004. Finland shows a stable development – with small fluctuations only – in both the national as well as regional TFR. The national and regional development of the TFR in Denmark shows an increasing trend, but with fluctuations. Sweden, however, shows a marked decline in both the national and regional TFR between 1991 and 1999, and a marked increase between 1999 and 2004. For the whole period the national and regional TFR show a decreasing trend in Sweden (Edvardsson *et al.* 2007). These results for Denmark, Norway and Sweden support the results from previous studies (e.g. Andersson 2004b).

When the coefficient of variation (C.V) is analysed, the results show that there is no common pattern in the variations between the Nordic countries concerning neither their stability nor their development. Sweden shows the lowest regional variation and Finland the highest. The analysis of the coefficient of variation also shows that Denmark has experienced a development toward regional convergence, especially so during the 1990s. Finland, on the other hand, went through a process of divergence at the beginning of the 1990s but shows a stable C.V after 1995. A converging development is indicated in Norway as the C.V shows a continuous decrease. The gap in Sweden between the national and regional TFRs was closed in the mid-1990s. The C.V analysis indicates that a regional convergence took place during 1991-1995, but it also indicates that a process of regional divergence in the TFR took place between 1995 and 2004 due to the sharp rise in TFR in the metropolitan areas in particular. The tendencies towards increasing divergence are thus not a consequence of a rise in traditional high fertility regions – instead it is a result of a ‘baby boom’ in the big city areas that has, at

least partly, altered the ranking between the Swedish regions concerning the level of TFR (Edvardsson *et al.* 2007).⁷

Edvardsson *et al.* (2007) also analyse what role regional size plays. At the beginning of the 1990s the TFR was higher in the smaller regions, i.e. the value was below 100 in table 4.2. In Sweden the size effect has changed over time: in 1991 the TFR was higher in smaller regions and lower in larger regions, but neither small nor large regions are over- or underrepresented in respect of TFR-levels in 2004. The same development can be seen concerning Norway where the size effect has been almost 100 since the beginning of the 1990s. Denmark, on the other hand, still has higher TFRs in the rural areas than in the metropolitan or big city areas and this difference was further accentuated between 1999 and 2004. This description is also valid for Finland.

The relationship between fertility, and both total and natural population changes was investigated by regression analyses for 1991 and 2004 by Edvardsson *et al.* (2007). The results indicate that significant relations between these variables only existed in a few cases. The exceptions that are significant at 95%-level are found in Finland and are related to the connection between TFR and natural population change 1991 and 2004. Denmark shows almost the same connection in 1991 between TFR and natural population 2004 (significant at 90%-level). Sweden, on the other hand, demonstrates a negative correlation between TFR and total population change 1991 at the 95%-level, a fact that more or less illustrates the effect of ageing and/or a high share of fertile women in the population than the effect of a low TFR.. The negative correlation between TFR and both total and natural population development in many cases underlines this: The prime driver for neither total population change nor natural population change is to be found in the TFR (Edvardsson *et al.* (2007). The findings confirm the results of other studies at the European level, namely, that the prime driver behind population development at the regional level is instead migration – internal as well as international (e.g. ESPON 2005 Copus *et al.* 2006).

Immigrants' fertility

The fertility rate of immigrants to Iceland is not discussed due to the very small actual numbers involved.⁸ The share of the foreign-born population in Sweden is about 10 per cent of the total population of Sweden. At the same time, foreign-born women stand for approximately 20 per cent of the fertility product in Sweden (SCB 2004). This seemingly higher fertility rate among foreign born women is, however, a statistical illusion. This higher fertility rate can be explained by their over-representation in fertile ages and by the fact that foreign born women are married or cohabiting to a larger extent than native women. When the age-specific fertility patterns are analysed foreign born women actually have a *lower* fertility rate than native women. Furthermore, the differences in fertility between different nationalities of foreign-born women are significant, but even women from countries with a very high TFR adjust rapidly to the low Swedish fertility pattern (Andersson 2004). If the effect of immigration on the age-structure of the population is dependant on the immigrants' fertility, as empirical evidence suggests, immigration will not lead to any major changes in the age-structure in Sweden (Bengtsson & Scott 2005).

⁷ From being one of the regions with the lowest TFR at the beginning of the 1990s Stockholm County has today one of the highest TFR and the lowest rates are to be found in the northern part of Sweden – Västerbotten, Norrbotten and Gotland's county – the latter a peripheral island in the middle of the Baltic Sea (RTK 2006).

⁸ In 2005, about 4 per cent of all females and about 5 per cent of the males living on Iceland were foreign citizens (Statistics Iceland 2007). The net immigration of non-Icelandic female citizens per 1000 inhabitants were 7.3 and for men it was 17.9 in 2005 (Statistics Iceland 2006). This very low immigration of foreign women to Iceland may explain why there is no separate statistic published on the fertility of the immigrated women (Cf. Statistics Iceland 2005).

Data from Norway shows that in 1997/1998 first generation immigrant women had a total fertility rate of 2.4 children, while the total fertility rate for native women was 1.8. If the immigrant women had no children at all the national total fertility rate would drop by 0.05 children per women. The conclusion drawn by SSB (2002) is that the total fertility rate among immigrant women has little influence on total fertility in Norway. The longer the immigrant women stay in Norway the more they adjust to the lower fertility rate in Norway. The total fertility rate of second generation women from immigrant families in Norway is very close to the national fertility rate (SSB 2002).

Statistics Finland (2004) finds the fertility of women from e.g. Germany and France living in Finland to be lower than the fertility rate of native Finnish women, while the fertility of women from e.g. Somalia and Iraq living in Finland is significantly higher than the fertility of native Finnish women. Estonian women living in Finland have about the same fertility rates as native Finnish women. The conclusion that can be made from the Statistics Finland (2004) data is that although the fertility of women in some immigrant groups is higher than the fertility of native Finnish women, the immigrants' fertility patterns has little influence on total fertility in Finland.

We find it unlikely that the fertility rate of immigrant women in Denmark should deviate from the results found in Sweden, Norway and Finland; although we have not found any study analysing this, we assume that (a) the fertility rate for women belonging to different immigrants groups in Denmark will vary – for some groups the fertility will be higher than for native Danish women and for some groups it will be lower – and (b) that the total fertility rate among immigrant women has little influence on total fertility in Denmark.

Summary

This chapter has analysed periodical TFR. Iceland has only been analysed at a national level. The findings indicate that a convergence at a national level has taken place between the Nordic countries 1960-2004. At a regional level Finland shows a regional divergence in the TFR during the period 1991-2004, while Denmark and Norway show a regional convergence for the same period. In Sweden there is a regional convergence 1991-1999, and a divergence 1999-2004. The latter divergence is related to a 'baby-boom' in the larger cities.

The analysis also indicated that the TFR is higher in smaller regions in Denmark and Finland, while no indication of size-effect is visible for Norway. In Sweden the size effect has diminished: from a higher fertility in smaller regions to a state where no size effects of significance are visible.

When the fertility patterns in the Nordic regions are compared to the theory of demographic transition the large differences in fertility rates indicate that all Nordic regions have not yet entered the fourth phase.

The differences in fertility between different nationalities of foreign-born women are significant, but even women from countries with a very high TFR adjust rapidly to the low Nordic fertility level. The higher fertility can be explained by an over-representation in fertile ages and by the fact that foreign-born women are married or cohabiting to a larger extent than native women. When the age-specific fertility patterns are analysed foreign-born women actually have a *lower* fertility than native women.

5. Mortality and life expectancy

Introduction

Overall Nordic life-expectancy has grown steadily with few exceptions during the 20th century. Rising welfare levels and better living conditions, due to economic growth and better healthcare, have helped to reduce mortality. People's lifestyles and socioeconomic status are the two largest factors behind the change in life-expectancy. The traditionally large gap between women and men is decreasing as male life-expectancy accelerates while life-expectancy for women is also increasing but at a slower rate. One other positive development is the decreasing infant mortality rates which, in the Nordic countries, are lower than in the rest of the world.

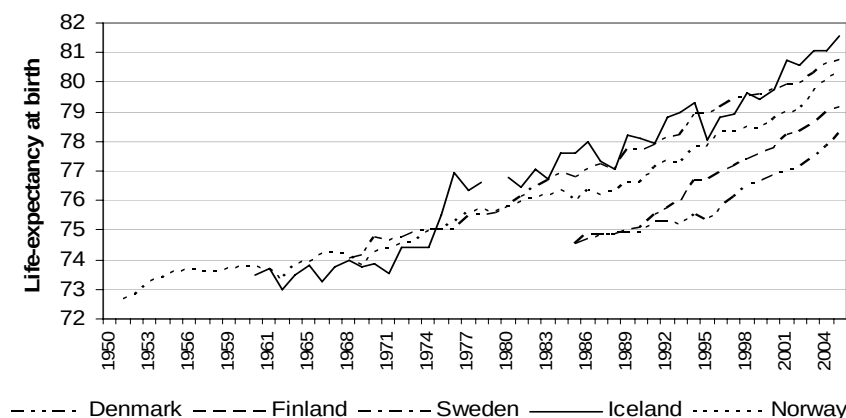
Developments in relation to life-expectancy and mortality are however slightly uneven across the Nordic countries. The most eye-catching differences between the Nordic countries relate to Danish women and the Finnish men. These two groups experience lower life-expectancy levels than most European countries due to high mortality rates. In both cases the consumption of tobacco and alcohol are the reasons behind an overall unhealthier lifestyle which in turn means a higher mortality rate. Regarding life-expectancy and mortality, socioeconomic factors are one of the major contributors to the development and this in turn affects the lifestyle of people. These differences in life expectancy levels and mortality levels are particularly pronounced between persons with different educational levels.

Comparing the Nordic countries, regional differences can be found. In general, the life-expectancy levels are traditionally higher in the south compared to those in the north and differences can also be found between urban and more rural areas where life-expectancy is higher outside the urban centres. Coastal areas also seem to have higher life-expectancy levels. In general the regional differences often correspond to the socioeconomic development level in the region in question.

National trends in life-expectancy

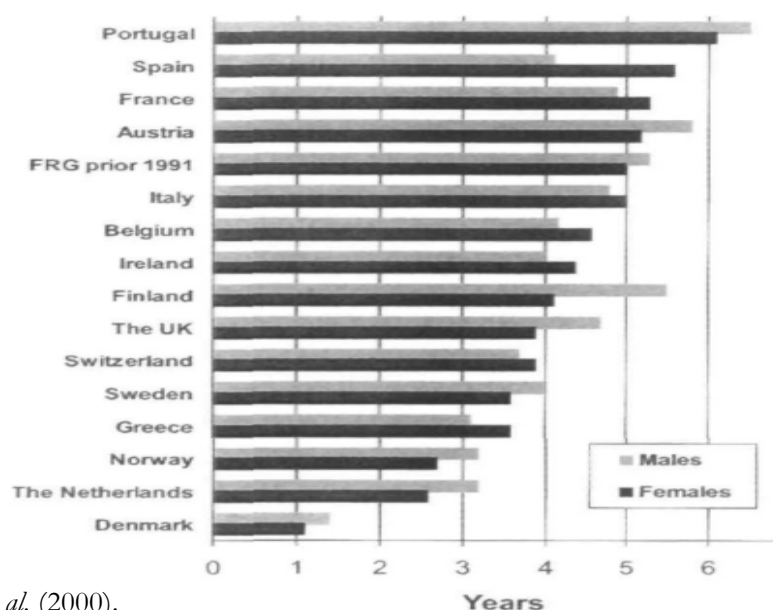
One of the most prominent features of life-expectancy in the Nordic countries is the case of Denmark. In figure 5.1, a clear Nordic division is evident where Sweden, Norway and Iceland have in general experienced a similar level of development over the last 50 years, whereas Finland and, in particular, Denmark has had a lower level of life expectancy. Looking at developments from 1980 onwards Denmark shows little or no development during the years 1985 to 1995.

Figure 5.1 Life expectancy at birth in the Nordic countries (Data source: National statistics offices)



This development is rather unique in comparison with Western European countries and only countries in Eastern Europe show similar tendencies (Juel *et al.* 2000). There is one outstanding feature in respect of Danish life-expectancy and that is that the mortality rate in the age group 35-75 is higher than in the rest of Western Europe. In this age category the female part of the high mortality rates is rather unique as seen in figure 5.2. Studies of the issue conclude that Danish women in general have a higher mortality rate and this is partly due to overall higher tobacco consumption among Danish women. However this seems to be a transitional phenomenon relating to high mortality rates among Danish women born during the period in between the two world wars (Jacobsen *et al.* 2004).

Figure 5.2 Increase in life expectancy (years) in a 20 year period (ca. 1975-1994) in 16 Western European countries by sex



Source: Juel *et al.* (2000).

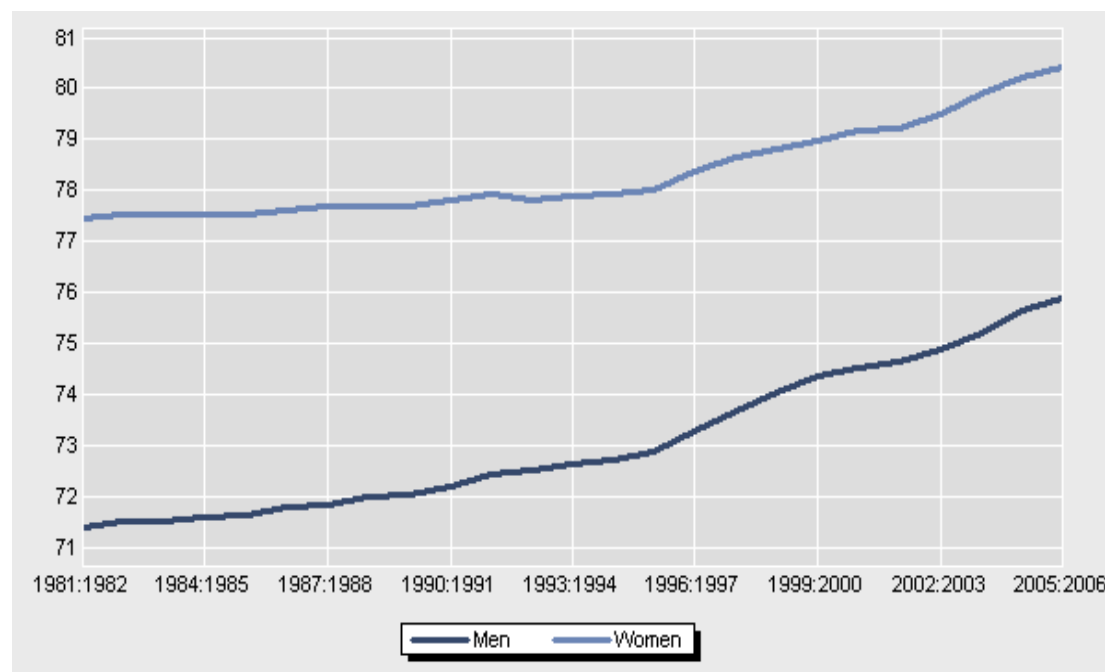
Since 1995 Danish development has started to converge with the overall Nordic development, however Denmark is still a few years behind. In the Danish life-expectancy trends the women stand out but there are also trends showing a social polarisation of life-expectancy in Denmark. This trend has been ongoing since 1981 and is not unique for Denmark as it follows a general European trend. The cause behind this trend can be found in the difference in lifestyles between highly educated persons and persons with low educational levels. In general, those persons with a higher level of education are less risk-exposed as their tobacco and alcohol consumption is more limited. Therefore the least favourable group in Denmark is women with a low level of education. This situation is not uniquely Danish as this is in fact a widespread societal fact that people with low levels of education experience lower life expectancy levels (Brønnum-Hansen *et al.* 2007).

Looking at the trend for the most recent years, a steady increase can be noticed from 1997 and onwards as seen in figure 5.3. But looking back at figure 4.1 the Danish life-expectancy level is still at a low level as compared to the other Nordic countries. The average Danish life-expectancy of 78 years is at the same level as for instance Iceland and Sweden was at the beginning of 1990's.

In Sweden the life-expectancy level has in a Nordic perspective been rather stable. As in the other Nordic countries better health due to better medical and healthcare services and an overall higher level of welfare is the main contributor to the positive development of life-expectancy. One significant variable is however extremely low in Sweden and that is infant mortality. As in Denmark, socioeconomic conditions affect life-expectancy where the persons with a high level of education and income have higher life-expectancy. Once again the

educational level proves to be the pivotal variable explaining differences in life expectancy. The other more significant trend is that the gender gap in life-expectancy is narrowing. From 1950 onwards men have had higher mortality rates due to cardiovascular disease-related mortality and, overall, an unhealthy lifestyle. This has now changed and is affecting the gender gap in life-expectancy in Sweden, men are living healthier lives and their mortality due to cardiovascular related diseases has decreased (SCB 2007).

Figure 5.3 Life expectancy at birth in Denmark 1981-2006



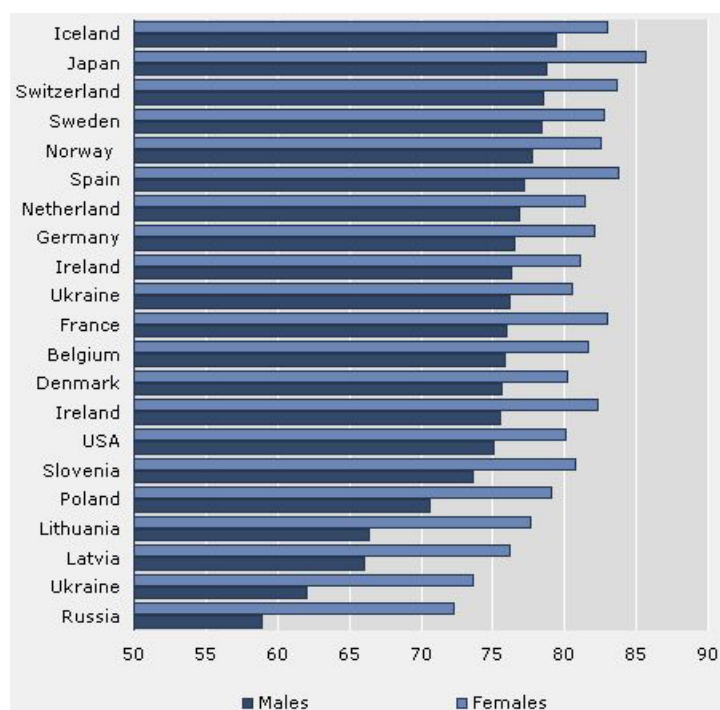
Source: Statistics Denmark

In Norway the life-expectancy level is similar to the Swedish development. As in Sweden, socioeconomic differences can be seen as well as the narrowing gender gap in life-expectancy. Infant mortality is on a par with that of Sweden being extremely low (Statistics Norway 2003). In the same way that Sweden and Norway show similarities, Denmark and Finland do also to some extent. But as the Danish mortality level among women is rather high in a Nordic and European perspective the situation is somewhat the opposite in Finland. In Finland it is the men that have high mortality rates. The causes behind the lower level of life-expectancy are the same in both Finland and Denmark as the level of alcohol and tobacco consumption is the main factor behind higher mortality rates. Finnish men in comparison with Swedish men during the 1970's and onwards were struck by cardiovascular diseases twice as often and this is due to an overall more unhealthy lifestyle (Martelin *et al.* 2004). As in the other Nordic countries there are differences in life-expectancy according to socioeconomic factors but in Finland they are larger than in the other Nordic countries. The causes behind these differences are similar to those in the other Nordic countries and in Finland this trend is ongoing and will likely increase in the future (Koskinen *et al.* 2006). This is however a trend that was identified during the last 50 years and it is now evident that Finland and Denmark's life-expectancy levels are converging with the other Nordic countries as seen in figure 5.1 though in 2004 it was undoubtedly the case that Finland was on the same level as Sweden was ten years earlier.

If Finland experienced a rather low life-expectancy among men from a Nordic perspective Iceland is firmly placed at the other end of the Nordic scale. In fact men in Iceland have the highest life-expectancy level in the world as can be seen in figure 5.4. Icelandic men have a life-expectancy of almost 80 years whereas Danish men are nearly four years behind. In general

Icelandic life-expectancy is high in a Nordic perspective and the same trend as in the other Nordic countries can be observed where female life-expectancy and male life-expectancy are converging due to male ‘leapfrogging’ (Statistics Iceland 2006b).

Figure 5.4 Life expectancy in selected countries of the world, 2005-2006 (Iceland), 2004 or 2005 in the other countries



Source: Statistics Iceland (2006b)

The results in table 5.1 show that the standard deviation (Std) between the Nordic countries in respect of life-expectancy at birth has fluctuated over the last 20 years, ending up a little lower in 2005 than in 1985. In addition the coefficient of variation (C.V) shows small changes, and the value for 2005 is a little lower than in 1985. This can only be interpreted by the fact that there has been neither a convergence nor a divergence in the life-expectancy at birth between the Nordic countries. This result is in line with the findings in figure 5.2 where the life expectancy at birth in the Nordic countries is illustrated; the graphs for life expectancy at birth run parallel in the figure for the period 1985 to 2005.

Table 5.1 Some measures with regard to convergence/divergence in the development of the national life-expectancy at birth in Denmark, Finland, Iceland, Norway and Sweden 1975-2005

	Mean	Std	C.V.
1985	75,884	1,359423	0,017914
1995	77,362	1,405016	0,018162
2005	79,998	1,305956	0,016325

Regional patterns in life-expectancy

In general, for the Nordic countries, patterns of regional differences can be identified. These differences can be found between urban and rural areas, between inland and coastal areas, and between north and south. The underlying factors here are differences in socioeconomic

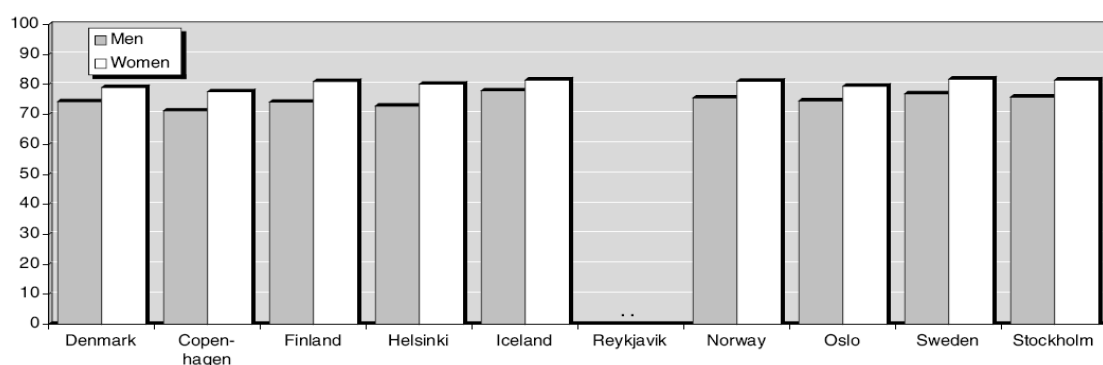
conditions in different parts of the country concerned which is closely related to lifestyles and working conditions.

In Sweden there is a clear difference between the north and the south and this pattern has been evident for many years with little change over time. The difference between the north and south is explained mostly by socioeconomic differences and educational levels which are clearly linked to living conditions and healthy lifestyles. One other possible factor is that rural areas with long transportation distances to adequate healthcare facilities can influence the level of life-expectancy as the northern parts of Sweden are more sparsely populated than the south. However the patterns in regional differences are not only linked to the north-south divide or to population density as differences also exist between urban and rural areas. The major cities generally have a lower life-expectancy level or are in line with the national average. This is particularly the case among men where men in urban areas have a life-expectancy level lower than the national average. This is obvious in the Malmö metropolitan region in the south of Sweden and is explained partly by health related issues relating to the higher level of tobacco consumption. For women the situation is rather different as women in the two other major cities in Sweden, Stockholm and Gothenburg have a lower than average life-expectancy level. The general trend in metropolitan areas in Sweden is that there are larger variations in life-expectancy between men and women than in general for Sweden. Historically there have been differences between urban and rural areas but these have changed from time to time where the life-expectancy levels were lower in the urban areas at the beginning of the 20th century this changed towards the end of the century to produce the current situation. However the now ongoing trend is that the differences between urban and rural areas are being reduced (SCB 2007).

In Finland the western coastal parts along with Åland have a higher life-expectancy than northern and eastern Finland in particular. The western parts and Åland have life-expectancy levels that can be compared with the highest ranking countries in the world. The difference can be as much as four years. The largest differences can be found among Finnish men. Looking back at the national life-expectancy level of Finnish men, it is clear that men in Finland have a lower level of life-expectancy than men in the other Nordic countries. Among women the differences are evident but not as striking as between Finnish and other Nordic men. The regional differences in life-expectancy are closely linked to the existence of differing socioeconomic conditions which in Finland's case are, in general, less homogeneous as compared to other European countries where the educational level is crucial in that people with a high level of education have a higher life expectancy level. The difference between highly educated men and men with a low level of education can be as much as six years. A similar pattern is evident among women, however the difference is smaller. Nonetheless the issue of poorly educated persons having lower life expectancy levels and higher mortality levels is something common to all the Nordic countries. The predicted development is that the regional differences in Finland will decrease due to reduced regional disease risk-factors. Although regional differences will decrease the socioeconomic differences in life-expectancy will increase if no measures are taken as there are clear links to unhealthy lifestyles and socioeconomic status (Koskinen *et al.* 2006).

The situation in Sweden where the metropolitan regions have lower life-expectancy is in fact not only limited to Sweden but is evident among the other Nordic countries as well as can be seen in figure 5.5. In all the Nordic countries this is the case however no separate data exists for Reykjavik. The differences seem to be slightly higher in Denmark and Copenhagen than in the other Nordic countries. The smallest differences can be identified in Sweden and this corresponds to the identified trend by Statistics Sweden and their prediction for the future levelling of differences between urban and rural regions. Furthermore there is no clear difference between men and women in general.

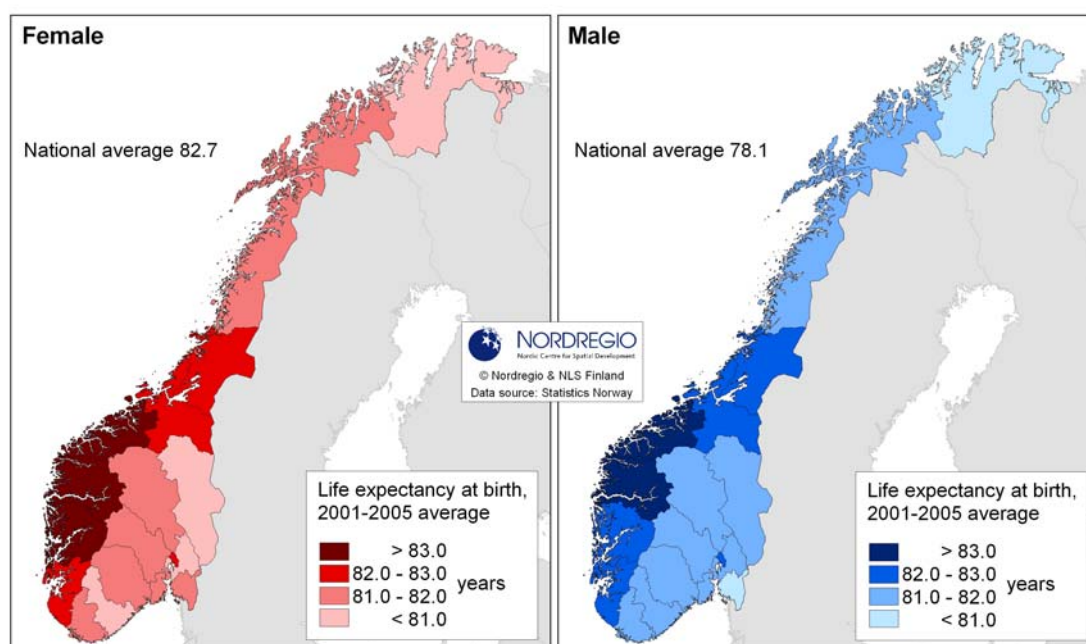
Figure 5.5 Life expectancy at birth in the Nordic countries and the capitals 1996-2000



Source: NORDSTAT 2005

In Norway the situation seems to be slightly different and the relationship between life-expectancy and urban and rural regions is a bit different. Looking at figure 5.6 rural areas and more sparsely populated areas have lower levels of life-expectancy than the southern and western parts of Norway (Statistics Norway 2003). This regional difference is, as can be seen in the figure above, smaller in Norway than in the other Nordic countries.

Figure 5.6 Life expectancy for males and females 1996-2000 in Norway



Mortality

The general trend and development in respect of mortality is rather heavily linked to changes in societal welfare, and overall economic growth. As differences in life-expectancy are to a large extent explained by socioeconomic factors so is mortality and of course mortality and life-expectancy follow each other. Therefore economic development has increased the level of welfare and has induced fundamental changes in the factors behind mortality. During the 20th century when, for instance, antibiotics were introduced this dramatically reduced mortality and life-expectancy levels rose as this rendered people and society less susceptible to

epidemics. Economic development and rising living standards have however brought on new problems of their own. In the later part of the 20th century other types of health-related diseases arose, such as cardiovascular diseases related to changing lifestyles and increasing tobacco consumption (SCB 2007). One aspect that has effected mortality levels dramatically during the 20th century is the steadily decline in infant mortality and in this respect the Nordic countries are at the forefront of global developments. Nevertheless, future challenges undoubtedly await the Nordic countries as they will all have to face up to the problem of differences in mortality rates according to socioeconomic and primarily educational levels. This problem will become increasingly pronounced as educational levels and the healthiness of people's lifestyles are closely linked. People with a higher level of education are more risk prone and are more likely to exhibit less healthy behaviour (Brønnum-Hansen *et al.* 2007).

When looking at the development of Sweden from 1950 onwards a clearly identifiable difference emerges between men and women in respect of mortality. In the 1960's male mortality levels suddenly started to rise after several years of decline while this development was not mirrored among women. The change in trend was due to more men dying because of cardiovascular diseases. This is directly connected to the healthiness of lifestyles. Ten years after the increase in male mortality rates the general development trend turned positive again due to lower alcohol and tobacco consumption and the adoption of healthier lifestyles. In a study on the health of middle age men in Stockholm it was concluded that better healthcare services accounted for 30% of the decrease in mortality among men in Stockholm. This difference between men and women is to a large extent explained by an overall healthier lifestyle and better eating habits. This has resulted in the situation today where the decrease in male mortality is higher than that in female mortality and the tendency is that the mortality levels will narrow the gender gap (SCB 2007).

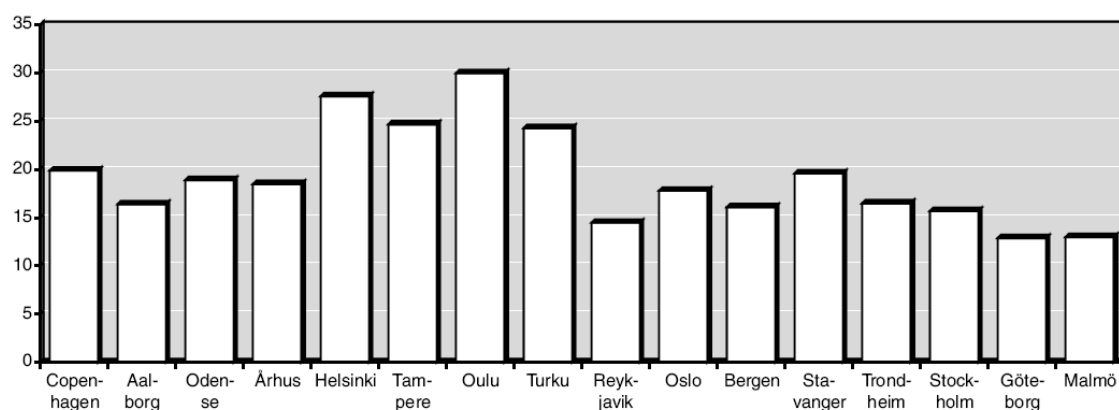
The development and trends identified in Sweden correspond to those in Finland. However men in Finland have a higher mortality rate than those in Sweden while the causes are largely related to bigger health issues relating to the higher level of tobacco and alcohol consumption in particular (Martelin *et al.* 2004). As noted previously, differences between socioeconomic groups are larger in Finland than in the other Nordic countries. These differences are also most apparent among men. Looking forward the differences between men and women are shrinking however there are no such tendencies in the differences between socioeconomic groups and in the future such differences may even become more pronounced. In this context the differences between persons with different educational levels is the most evident socioeconomic factor (Koskinen *et al.* 2006). As in the other Nordic countries infant mortality in Finland is steadily declining.

In Denmark the situation is rather the opposite of that in Finland as women are the ones with, in a European perspective, the exceptional high mortality rate. Differences in mortality are generally explained by unhealthy lifestyles and socioeconomic factors and these are, in turn, linked to other explanatory factors. Differences in welfare and healthcare systems between countries as well as labour market and job-related situations affect mortality rates. Danish women have higher mortality levels than those in the other Nordic countries and this was particularly evident during the 1980's. The differences between Denmark and the other Nordic countries can be explained, in part, by unhealthy lifestyles though other factors seem to be equally important (Jacobsen *et al.* 2004). In a study on the subject of why Danish women die so young in comparison to other European countries and to the other Nordic countries in particular, one of the main arguments was that Danish women are exposed to higher levels of stress in their daily lives. The higher stress factors related to job insecurity, unemployment and the tougher conditions for mothers as they receive less support in their parental role from society (Helweg-Larsen *et al.* 1998). Furthermore as in the case of Finland, Danish women in particular exhibit large differences in mortality levels in relation to their level of education (Brønnum-Hansen *et al.* 2007).

Looking at the regional differences in mortality levels in figure 5.7, the most remarkable feature is the rather uneven level among Finnish men. That Finnish men, in a Nordic

perspective have a high mortality level is evident when looking at figure 5.7 as well as the inter-city differences where more northern cities have higher mortality rates. In other Nordic countries mortality levels are more stable within the countries concerned. Figure 5.7 also indicates that Finnish mortality rates among men in cities are rather high in an overall Finnish comparison. In an inter-Nordic comparison between cities there is a rather large difference between the city with the lowest mortality rate, Malmö and the one with the highest rates, Oulu as there is a difference of fifteen percentage units between them.

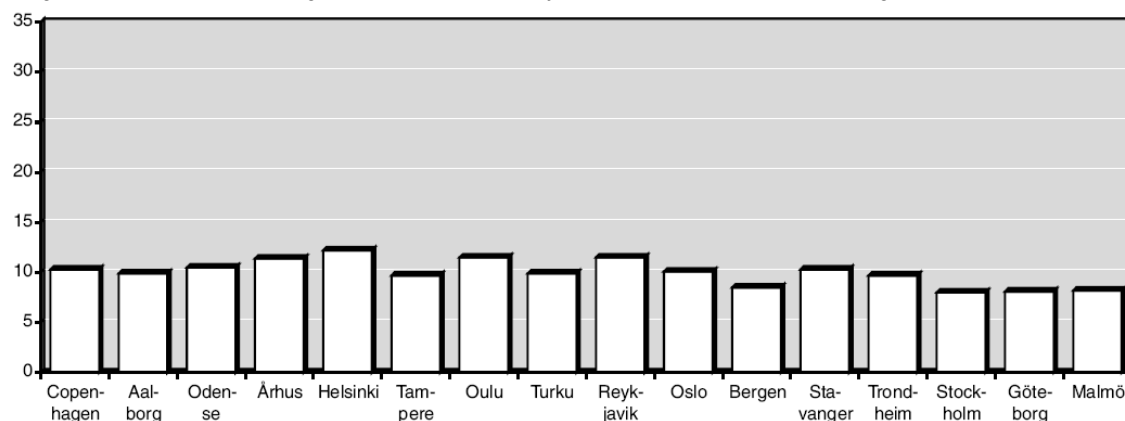
Figure 5.7 Percentage dead men 0-59 years of all dead men in the regions 2003



Source: NORDSTAT 2005

The mortality differences among Nordic women (figure 5.8) fluctuate less than those for Nordic men. The overall level of mortality is of course lower among women under 59 than for men, which explains the more stable level. However there are no clear patterns among women in this respect.

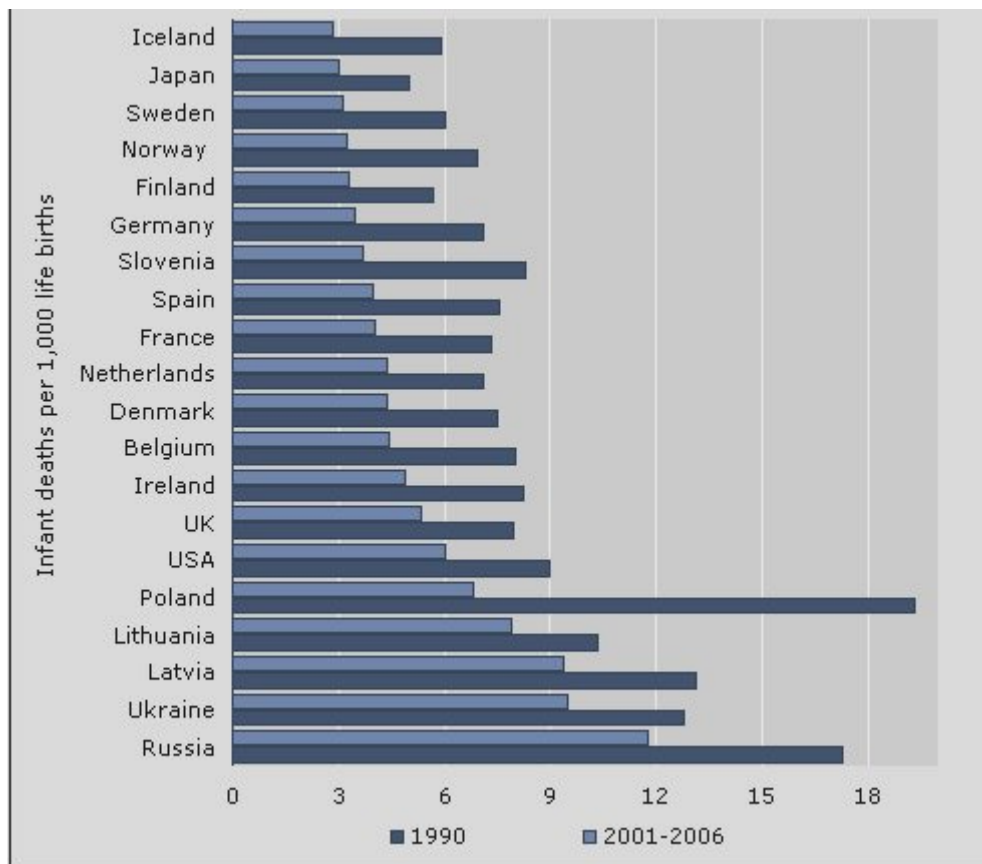
Figure 5.8 Percentage of dead women 0-59 years of all dead women in the regions 2003



Source: NORDSTAT 2005

The large increase in life-expectancy in the Nordic countries can also be related to the steadily declining levels of infant mortality. In figure 5.9 below it is evident that the Nordic countries have rather low infant mortality rates as compared to other countries. Four of the five large Nordic countries are in the top five rankings only Denmark shows a higher level of infant mortality in a Nordic perspective.

Figure 5.9 Infant mortality in selected countries of the world 1990 and 2001-2006 for Iceland, 2004 or 2005 in the other countries



Source: Statistics Iceland (2006b)

Summary

The Nordic countries are in many ways world leaders when it comes to high life-expectancy levels and low mortality levels. As discussed previously the main causes of uneven developments in the Nordic countries, such as the situation with Finnish men and that with Danish women are closely linked to socioeconomic factors which, in turn, affect people's lifestyles. Furthermore the differences in educational levels proves to be a pivotal factor underlying the development of life expectancy and mortality and as mentioned previously these differences can be as much as six years. On the whole, the differences between men and women, as well as regional differences, seem to converge but this development will not continue if social differences are polarized over time and the socioeconomic and educational factors are the main contributors to changes in life-expectancy and mortality. In the future the growing problems with obesity will pose new demographic challenges as this, in a long term perspective, will affect life-expectancy and mortality. A similar development was noted during the 1960's when cardiovascular diseases grew among men due to unhealthy lifestyles and possibly obesity will have the same effect on developments in the future.

6. Domestic migration and mobility

Introduction

The movement of people to urban areas and the subsequent population decline of rural areas has been one of the main trends during the 21st century (Edvardsson *et al* 2007). Net population growth in all five countries is concentrated in the major city regions of Oslo, Helsinki, Copenhagen, Stockholm and Reykjavik and the population concentration trend accelerated during the 1990s (Lundholm & Malmberg 2006). 1.2 million persons, or around 5 percent, of the Nordic population relocated over a domestic municipal boundary, in 2005. A share of this flow of inter-municipal migration takes place between peripheral areas and urban centres. Furthermore relocations are also taking place between the largest cities and their surroundings (Neubauer *et al* 2007).

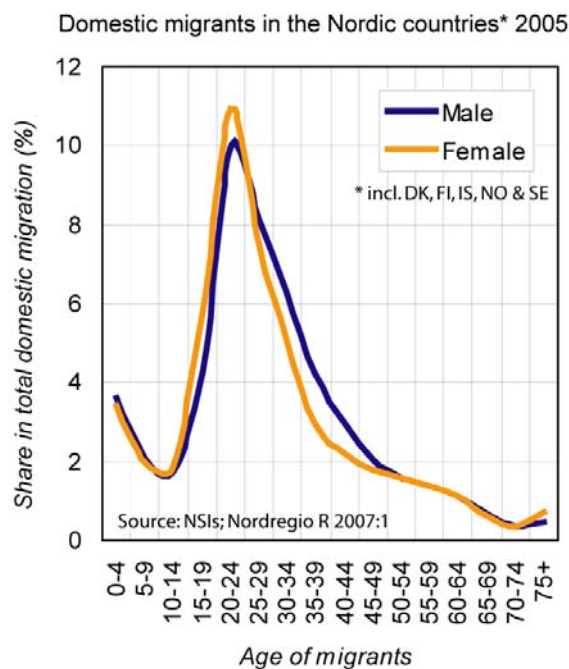
In the future many of the regions in Denmark, Finland, Iceland, Norway and Sweden will be affected by a negative population development. The continuing out-migration of young persons and an ageing population causes regional imbalances and these imbalances are unevenly spread across the Nordic countries (Edvardsson *et al* 2007). During the period 1993-2003 the peripheral population declined in all of the Nordic countries. In 2003 the peripheral population in Sweden and Iceland was between four and five percent less than the population ten years earlier. In Norway the reduction was just above one percent.

However, population development varied considerably among the different types of periphery within each country. The general pattern was a marked redistribution from the peripheral to the more central areas within the peripheries (ESPON 2005). In the Nordic countries population development is strongly linked to the urban hierarchy and its functional dimension. It is usually the largest urban labour markets which are favoured by both positive net migration and natural change (Neubauer *et al* 2007). The centres, on average, growing within the range of ca. 5-10 percent across the countries concerned, while the hinterlands and independent municipalities in some countries declined by 6-10 percent. In the Swedish periphery even the centres, on average, experienced stagnation or a slight decline, while the population of the rest of the Swedish periphery declined by 7-10 percent. The population redistribution within the periphery was however most pronounced in Iceland (Foss & Juvkam 2005).

Domestic migration

Migration flows by age and gender have been analysed by Neubauer *et al* (2007). Figure 6.1 shows that young adults dominate domestic inter-municipal mobility flows. The composition of domestic migrants is fairly similar in all Nordic countries and is rather sustainable over time. This pattern is also shown in a study done by Edvardsson *et al* (2007) where the population change between 1991 and 2004 has been analysed. The results show that the most expanding regions are the metropolitan and big city areas. Every second domestic migrant is aged between 20-35 years. That is due to the fact that the younger population favours capitals and larger cities including regional centres. This is not a particularly 'Nordic' phenomenon – it has also been identified in many broader European studies. The out-migration of young adults is especially marked if the area of origin is a peripheral or an old industrial area (e.g. ESPON 2005).

Figure 6.1 Demographic structure of domestic migrants in the Nordic countries 2005



Source: Neubauer et al (2007)

Lundholm (2007) compared migration frequency and age between the years 1970 and 2001 in Sweden. The results show that when comparing the composition of interregional migrants over time one obvious trend emerges, namely, that young adults constitute a dominant share of the total numbers of interregional migrants in 2001 as compared to 1970. Migration for those 18-25 years old increased from 27 percent for all interregional migrants to 32 percent. In 1970 it was more common for children to migrate, as the age group 0-17 years constitutes 14 percent of all interregional migrants in 2001 as compared to 27 percent in 1970. In 2001 students constituted 40 percent of all interregional migrants aged 18-65. According to the data this group only comprised 10 percent in 1970. Lundholm is however aware that the data may underestimate the number of student migrants since students may be registered as residing at their parents addresses during their university studies and hence not counted as migrants. (Lundholm 2007)

In Finland people move mainly within their municipality of residence. Some 530,000 Finns (10.2% of the population) move within their municipalities each year and 260,000 (5%) move to a different municipality. During the latter half of the 1990s the population growth rate for Helsinki metropolitan area was 1.5% *per annum* compared to an average of 0.5% for other European metropolitan areas. There has also been an organised movement of urbanisation to Vantaa and Espoo, which were once suburban peripheries in the region (OECD 2002b).

Data from Norway shows that in 2004 190 500 movements were registered between municipalities in Norway, and this is almost 4.2 percent of the population. There were also 392 000 movements within the municipalities. As in the other Nordic countries people in their twenties are those who moved most frequently. Oslo and the larger towns in Southern Norway had the highest net in-migration. In 2004 Oslo had a total gain of internal migration of 2 300. For the age groups 20-29 years and 16-19 years the in-migration was very high, with 6 400 and 700 respectively. The counties Sør-Trøndelag, Hordaland and Rogaland also had a net in-migration of people aged 20-29 years, but those were the only ones except Oslo. (www.ssb.no/flyttning). There is a net flow of relocations to the most central parts of the country every year. Increasing out-migration from the least central municipalities and an increased flow to the most central municipalities in respect of in-migration has occurred over time.

Data from Statistics Island shows that there were 65,576 changes of residence in Iceland in 2004 where the population counts 292,587 inhabitants (mid-year population). Internal migration was registered in 55,613 cases, 5,199 individuals immigrated whereas 4,764 emigrated. In relation to the population, internal migration has increased slightly in recent years. The internal migration rate amounted to 190.1 per 1,000 population as compared to 184.2 in 2003 and 167.9 in the early 1990s. In the 1990s there was a steady increase in internal long distance migration between the country's eight regions (www.statice.is)

In Iceland the most notable decline in long distance migration has been in migration flows towards the Capital region. Net internal migration towards this area was 8.9 in 1996-2000 compared to 3.1 during the period 2001-2003 and 3.4 in 2004. During the period 1996-2003 the capital area was the only region with a positive internal net-migration rate. The regions of Vestfjords and the North West have had distinct net out-flows of -27.6 and -14.6. Both regions have experienced high out-migration rates at least since 1986. During the period 1996-2000 the region of Vestfjords had an internal net migration of -39.5. (www.statice.is)

The study done by Edvardsson *et al* (2007) shows that in Denmark, only one region experienced a population decrease, Bornholm, this region is also the most peripheral part of Denmark. On the other hand, the metropolitan areas in Denmark did not show the same high figures as the corresponding ones in Sweden and Finland. This implies that monocentric development with concentration tendencies was more pronounced in these countries than in the smaller – in respect of area – but more densely populated Denmark (Edvardsson *et al* 2007).

Statistics from Sweden show that there were 1 307 584 changes of residences in Sweden in 2006 and there were 417 912 movements between municipalities registered for the same year. The internal migration pattern is stable over time. On average a man is expected to move eleven times during his lifetime while women on average move twelve times. Between the ages of 19-30 we, on average, move five times and these movements are often related to studies (www.scb.se).

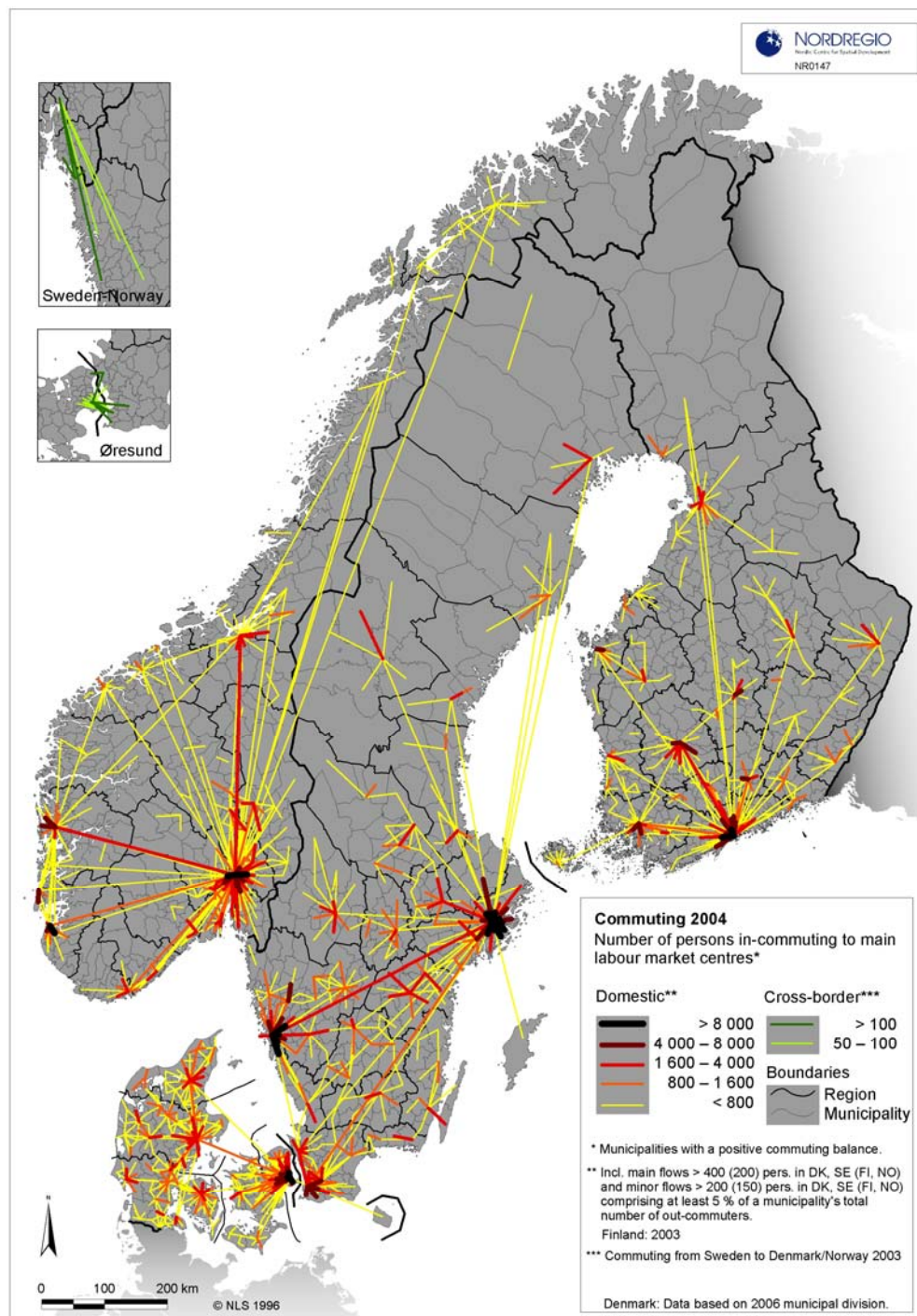
Lundholm (2007) suggests that since young people move more frequently than others and since the employment rates among the young have declined over the last few decades, it is reasonable to assume that a larger share of interregional movers today occur independently of labour market factors. In Sweden the number of students has been steadily increasing. The expansion has included a decentralisation of institutions for higher education and more young people can today attend universities in their home region. According to Lundholm (2007) previous studies suggest that migration can be seen as a strategic long term investment where the migrant chooses a region of destination that offers good opportunities on the labour market in the long term. Since employment strategies are usually better in areas close to universities student migration could be such a strategy.

The population structure by age in the Nordic countries in 2005 has been analysed by Neubauer *et al* (2007). The results show that peripheral municipalities are increasingly getting an older and older in population terms (See figure 3.2). The situation in respect of extremely old aged municipal populations is worst in the inner parts of Sweden and Finland. In Denmark and Norway the situation is modest compared to Sweden and Finland. The analysis undertaken by Neubauer *et al* (2007) shows that a shrinking working age population increases the dependency ratio. In these areas generally the employment rates are also low. In some municipalities in Finland and Sweden 30 percent of the population is older than 65 years. In 2004 about 15 percent of the population in Denmark was over 65. Twelve out of fifteen regions in Denmark had a positive excess of births in 2004 (Edvardsson *et al* 2007).

Depopulation has also been studied in ESPON 1.1.4. The results show that the geographical peripheries are associated with an under representation in the reproductive life stages. This is a result of out migration losses and increases the relative representation of older cohorts in the population. The ESPON 1.1.4 study shows that this loss is especially strong in Finland (ESPON 2005). The OECD report states that the problems of areas with population decline are profound, as these areas have not yet succeeded in replacing an occupational

structure of agriculture and traditional manufacturing industries with profitable 'new economy' enterprises and job creation. Ongoing out migration of young people to regional and national centres and low birth rates aggravate the problem of keeping population numbers stable (OECD 2005)

Figure 6.2 Main commuter flows in the Nordic countries 2004



Commuting

According to Lundholm (2007) the role of interregional migration for employment-related mobility is increasingly challenged by other forms of mobility such as commuting. Studies also show that the highly educated with high incomes commute longer distances compared to less skilled workers. In Neubauer *et al* (2007) the commuting patterns in the Nordic countries has been extensively analysed (figure 6.2). The study shows that commuting related to the labour market is increasing in all Nordic countries. In Finland the amount of people commuting is increasing most but the share of commuters in total is low in Finland.

The analysis undertaken by Neubauer *et al* (2007) also shows that in Denmark almost every second employed person commutes to work across a municipal boundary whereas in Finland, Norway and Sweden it is around every third person. More commuting and also commuting over longer distances have resulted in larger local labour markets and regional enlargement. This phenomenon is very obvious in e.g. Sweden (ESPON 2005). In Norway the number of commuters is growing slowly. 70 percent of the Icelandic population resides in commuting distance to Reykjavik city and it is also around the capital where the main commuter flows on the Iceland arise. Commuting is still dominated by men especially in Norway. In capital labour markets the shares are more balanced. On non-urban labour markets and in medium-sized towns men continue to dominate commuting flows. On the Copenhagen and Stockholm labour markets male commuting has declined slightly and the trend is that female commuters are increasing (Neubauer *et al* 2007).

Gender

Many international studies show that the costs and benefits of migration are gendered. Women gain less from migration compared to men in terms of career and income. Migration decisions are often based on the man's career in dual income couples and women are known to be tied migrants. A similar pattern is found in the Nordic countries despite the fact that these countries are often considered to be among the most gender equal and that labour market participation for women is very high compared to other countries (Lundholm & Malmberg 2006).

Lundholm (2007) states that an important development in Sweden during the period 1970 to 2001 was the dramatic increase in women's labour market participation. Labour force participation rates are currently almost the same for women and men in Sweden and the two earner household has become the norm. Migration might become more difficult since both household members have to consider their employment situations. Lundholm also points out that the two-income family has been shown to be less migratory in earlier studies. Moreover women have often been depicted as tied movers, moving for the benefit of their husbands' career. Lundholm (2007) also shows that gender differences in Sweden have diminished over time if one compares the propensity to move in 1970 as compared to 2001 though women were still somewhat more likely to migrate than men in 2001. A negative effect on migration for women is being married but for men it is the opposite. This gender difference has however diminished over time. The migration frequencies among parents have declined and parents as a group has not increased their interregional migration propensity in the 1990s as other groups did (Lundholm 2007).

The analysis undertaken by Neubauer *et al* (2007) shows that young adults concentrate in core cities, whereas families with children settle in commuting distance from a few main urban centres. In the Swedish case, differences remain between various regions. Lundholm (2007) notes that the existence of large numbers of people who are single for a long period can be expected to lead to more migration since research has shown that a greater proportion of migrants are single and that most of those who migrate do so before the age of 35. Migration among families with children is becoming less frequent. In metropolitan areas and university

regions, the share of 'singles' is higher than in industrial or rural areas especially in the child-bearing ages. The 'single' gap has, however, diminished in recent decades as a consequence of the societal transformation in all regions. The fact that rural families have always been larger than urban ones is partly a consequence of a higher share of 'singles' in urban areas, especially in the metropolitan areas (ESPON 2005)

In most Icelandic municipalities and larger cities on the western coast of Norway (e.g. Bergen and Stavanger) an extremely young working age population exists with many children. When reaching family-founding age mobility rapidly decreases and then slightly increases again after retirement. In addition, higher educated persons are more mobile than others. (Neubauer 2007). Moreover regional imbalances in the population structure are further reinforced by chain effects. At their place of origin, for example, fewer children are born due to the lack of women of fertile age. (Edvardsson *et al* 2007)

Between the years 1970 and 2001 the likelihood of a female student, aged 21-24 migrating more than doubled in Sweden. At the same time the likelihood of migration for an employed young woman decreased. The results also show that the likelihood of an employed man without higher education age 35-44 being a migrant remained almost the same between the two years. If that man had a university degree the likelihood of migration tripled in 1970 but doubled in 2001 compared to a man without a university degree. If that man were married and had children the likelihood of migration decreases, but more so in 2001 as compared to 1970 (Lundholm 2007).

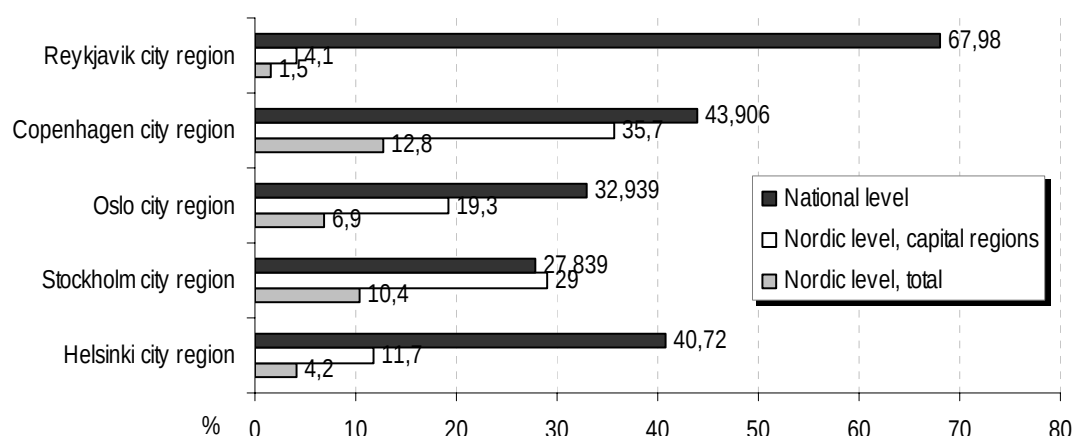
In Norway statistics show that mobility was slightly higher for men than for women in 2003. Geographical mobility, migration measured in relation to the population, was low however at 4.15 percent. This low mobility should however be seen in relation to the economic situation in the country. Since 1964 it is only from 1990-1994 that mobility has been lower than it currently is. The number of movements was higher in 2004 than in most of the past 35 years, but this is due to a steadily increasing population (www.ssb.no/flytting).

Ethnicity

Edvardsson *et al* (2007) have analysed the mobility pattern of foreign citizens in the Nordic countries. In 2004, the residents of the Nordic countries included 1 073 532 foreign citizens, 4.4 per cent of the total population. The population is growing faster in the city regions than the total population and during the period of 2000-2004 the majority of immigration into the Nordic countries was directed to the major Nordic city regions. Copenhagen, Oslo and Stockholm city regions are the Nordic capital regions that receive the biggest shares as shown in figure 6.3 (Edvardsson *et al* 2007)

According to Statistics Norway Immigrants are much more mobile than other people, and many move to the area around the Oslo Fjord (www.ssb.no) Edvardsson *et al* (2007) also state that immigrants to Sweden and Norway, besides the bigger city regions also settle along the borders of Sweden and Norway, where there has been a particular need for labour, i.e. in the oil and tourist industries.

Figure 6.3 Share of immigration to the Nordic city regions in 2003 (in percent at the national level, at the level of Nordic capital regions and Nordic level, total)



Source: Edvardsson *et al* (2007)

Edvardsson *et al* (2007) analyses show that the immigration settlement pattern is very similar in general to the settlement pattern of Nordic citizens. The immigrants strengthen the movement of people to urban areas and the depopulation of rural areas. The results show that in 2004 the counties of Copenhagen, Fyn Nordjylland and Aarhus were the destination for more than 61 percent of all the foreign citizens in Denmark (Edvardsson *et al* 2007).

The pattern is the same in Finland where the Uusimaa region gained the largest flow of the overall net migration to Finland. The metropolitan area of Helsinki in Uusimaa in particular gained a positive international migration balance: around 15 per cent of the net immigration to Finland was to the Helsinki capital city region, while the proportion for the city of Helsinki was 8 per cent. The conclusion drawn by Edvardsson *et al* (2007) is that this illustrates rather well the general European immigration pattern – immigrants cluster in the same metropolitan areas and major towns as the national population (Edvardsson *et al* 2007).

Education

The migration pattern of individuals with higher levels of education differs from that of others. Highly educated people may have more incentive to build a career, which can lead to successful migration. On the other hand, the labour market for those with a higher education forces people to adjust their choice of residence to places where they can find employment that matches their education, and this may be assumed to have a negative effect on the outcome of migration in non-pecuniary terms (Lundholm & Malmberg 2006). The probability of interregional labour mobility decreases significantly with the accessibility to job openings within the region of residence. Commuting is also relatively more likely to be the mobility mode for people living in metropolitan areas than migration (Eliasson *et al* 2003).

The effect of having a partner is also ambiguous. On the one hand, being single could mean being less ‘tied up’ and having less need to compromise, and hence single movers could be expected to be more content with the outcome. On the other hand, having a dual income leads to a less hasty decision and makes other options such as commuting more attractive. Hence cohabitants may have more flexibility in relation to various alternatives to migration, and can therefore presumably make better decisions leading to a more satisfying outcome. In all Nordic countries there are regional disparities in economic growth, where labour markets are better in urban areas (Lundholm & Malmberg 2006).

As noted previously the probability of migration increases the higher the level of education. If a man had a university degree the likelihood of migration tripled in 1970 but doubled in 2001 compared to a man without a university degree. Other expected patterns are

that single people are more mobile and more likely to choose migration as their mobility mode (Eliasson *et al* 2003).

Summary

This chapter has looked at the issue of internal migration in the Nordic countries. The findings show that migration remains dominated by movements from the peripheral regions towards the metropolitan zones. The studies show that it is young adults that dominate domestic inter-municipal mobility. Every second domestic migrant is aged between 20 and 35 years. That is due to the fact that the younger population favours capitals and larger cities including regional centres. During the ten last years (1993-2003) the peripheral population declined in all the Nordic countries. The composition of domestic migrants is fairly similar in all Nordic countries and is rather sustainable over time. The ongoing out migration of young people to regional and national centres and low birth rates aggravate the problem of keeping population numbers stable. Many international studies show that the costs and benefits of migration are gendered. Women gain less from migration as compared to men in terms of careers and incomes.

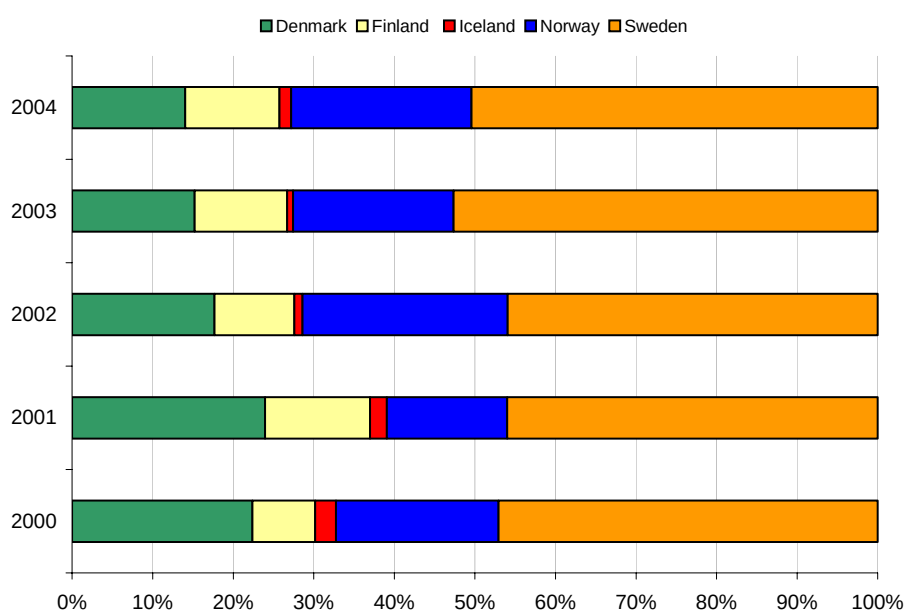
7. International migration

Introduction

The immigration pattern in the Nordic countries has however changed markedly. In the 1970s, immigration to the Nordic countries, particularly to Sweden, consisted primarily of labour immigration mostly from Europe. During this time most of the ‘foreigners’ living in the Nordic countries were themselves ‘Nordic-born’ persons. Since the turn of the century immigrants to the Nordic countries have tended to come from a wider range of countries with many of the new immigrants being born outside Europe. Immigration from distant countries has however been more substantial in volume, for example in the case of Asia, than from closer New Member States (Edvardsson *et al.* 2007).

Traditionally Sweden has been the chief destination country for immigration in the Nordic countries. Looking at the totals in the period 2000–2004 by country, Sweden remains top with the largest number of immigrants in each year (figure 7.1). Iceland however received the highest number of immigrants per 1 000 inhabitants in 2000–2004, followed by Denmark and Norway. When we take the size of the total Nordic population into account, there were 7.1 immigrants per 1 000 inhabitants in the Nordic countries in 2004.

Figure 7.1 Foreign net immigration by country in 2000–2004 (in per cent of Nordic immigration).



Source: Nordic Yearbook 2005

Analysing migration flows

There are two major aspects concerning the data on international migration that create a bias when analysing international migration flows: (a) when refugees receive their permit to stay, in e.g. Sweden, they become registered as immigrants in that municipality/region in which the refugee centre is located. Many of the refugee centres are located in rural and peripheral areas in Sweden (Ånge in Västernorrland or Alvesta in Kronoberg) and Finland (Kainu). The first thing the refugees do when they have their permit to stay in Sweden is to move to the larger cities where they can improve their chances of getting a job. The problem is that they are then

registered as domestic migrants. By looking at a map some Nordic regions appear to be very attractive to immigrants, especially if immigration is measured in terms of immigrants per 1000 inhabitants, while these regions in fact are very unattractive to immigrants (Edvardsson *et al.* 2007). A more balanced picture would be provided if refugees and e.g. labour immigrants could be separated from each other in the statistics (Johansson & Rauhut 2007a, 2007b).

(b) There is no internationally harmonised migration data. (i) In some countries a person is registered as a immigrant if he or she *intends to stay* for a period *P*, while in other countries the person is registered after *the actual stay* for a period *P*. (ii) The period *P*, whether counted as intended or actual stay, is different in different countries. (iii) Some countries, e.g. France, have no emigration records at all. So, what is the practical result of this? The migration flows between Sweden and Germany can illustrate this in an excellent way. According to German statistics emigrants from Germany to Sweden are twice as many as in the Swedish immigration statistics, and according to Swedish emigration statistics the emigrants from Sweden to Germany are only one third of the registered immigrants from Sweden in the German immigration statistics (SCB 2004b). There are thus probably more immigrants coming to the Nordic countries than official records show due to the problem of un-harmonised definitions.⁹

Migration statistics in the Nordic countries are based on definitions of the civil registration system in each country. The basic condition for being classified as an immigrant in the Nordic countries is that the immigrant intends to live in the country for a specific time, which varies from country to country. Registers differ between the countries (see table 7.1). These differences in the definition of migration will result in relatively higher numbers of migrations in Denmark and Norway.¹⁰

Table 7.1 Immigration rules of the Nordic countries

Country	Official statistics (intended stay)
Denmark	3 months
Finland	12 months
Iceland	12 months
Norway	6 months
Sweden	12 months

Source: Unpublished material from the Delano-project (Edvardsson *et al.* 2007).

Nordic trends

Many of the long-term experiences of the common Nordic labour market are based on the existence of common socio-cultural and historic characteristics. In 1954 the Nordic countries introduced a common labour market with free movement of labour between the countries. During the first 20 years the labour flows were, in general, directed towards Sweden, and, in general, came from Finland. The immigrants to Sweden picked up unskilled jobs in the industrial sector, i.e. so called '3D'-jobs (dirty, dangerous and degrading)¹¹. Today the strongest migration flow goes from Sweden to Norway (Heikkilä *et al.* 2004). An overwhelming part of the Nordic citizens working in Norway are occupied in the health and social work sector,

⁹ *Nota bene*, this underestimation of immigration should not be confused with clandestine migration and paperless immigrants.

¹⁰ A student from Norway who moves to Sweden to start the academic year at a Swedish university at the end of August and then moves back to Norway in mid-June the following year when the academic year is over will be registered as an emigrant in the Norwegian statistics (and as an immigrant when the student returns to Norway). Swedish statistics system will neither register this person as an immigrant nor as an emigrant. A Swedish student going to Norway to study for one academic year causes the same problems.

¹¹ Before emigrating had been engaged in unskilled manual labour and they had a relatively low education. The share of unemployed among the emigrants was higher than the share of unemployed in the total population (Fischer & Straubhaar 1996).

followed by the hotel and restaurant sector, the construction sector, the labour intensive manufacturing sector and in the sector containing retail, recreation, culture and sports (Edvardsson *et al.* 2007)¹².

The structural change of the Nordic economies has changed the relative demand for immigrant labour in the Nordic countries, *i.e.* it has dropped, due to a shrinking industrial sector. Since production is standardised, the industrial sector can easily use immigrant labour to supplement native labour, something which service production aimed at individuals does not have the same potential to do. At the same time, the service sector has expanded significantly, especially in the urban and metropolitan regions. Still, immigrants tend to have easier to obtain employment in the industrial sector and in the unqualified service sector jobs, *i.e.* ‘3D’-jobs (Rauhut *et al.* 2007. Cf. Edvardsson *et al.* 2007).

Table 7.2 Gross immigration by country of birth to the Nordic countries 2005 and the share of labour migrants

	Denmark		Finland		Iceland ^b		Norway		Sweden	
	Country	%	Country	%	Country	%	Country	%	Country	%
1	Europe non									
	Germany	7,2	EU/EES	4,8	Poland	19,8	Poland	8,1	Poland	5,4
2	USA	6,9	Sweden	4,5	China	5,2	Sweden	6,7	Denmark	5,4
3	The U K	6,6	Russia	2,4	Germany	3,8	Germany	4,3	Iraq	4,7
4	Sweden	6,6	Estonia	2,4	Portugal	2,8	Denmark	3,8	Finland	4,3
5	Norway	5,7	Germany	1,1	Lithuania	2,6	Iraq	3,5	Norway	3,7
Returning										
Natives	22 469 ^b	42,8	n.a.	n.a.	7 773	39,8	8 793	21,9	11 066	17,0
Share of labour										
immigrants ^a	4,6		5-10		n.a.		26,6		8,0	

a. Nordic citizens are excluded since no work permit is needed

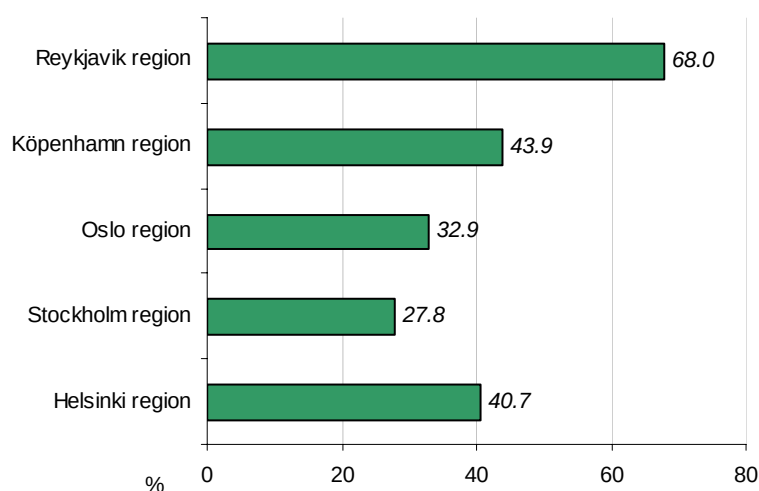
b. Data refers to country of citizenship

Source: Rauhut (2007) and Statistics Iceland

Labour immigrants from the new EU member countries constitute a minority of all labour immigrants in all Nordic countries; the majority of labour immigration to the Nordic countries come from other Nordic countries, ‘old’ EU/EES countries and from outside the EU/EES. Table 7.2 shows the five major sender countries of the immigration to the Nordic countries. It is worth noting that the major nationalities of all immigrants to the Nordic countries are Nordic nationals returning to their home country. Other Nordic countries are also common countries of origin for immigrants to a Nordic country, except on Iceland. Furthermore, only a small part of the total immigration to the Nordic countries is related to labour immigration; e.g. 4.6 per cent in Denmark, 8.0 per cent in Sweden, and between 5 to 10 per cent in Finland. Norway, on the contrary, has a relatively large share of labour immigrants – almost 27 per cent of all immigrants to Norway are labour immigrants.

¹² Many of the unskilled jobs in these sectors belong to the 3D-jobs, while e.g. medical doctors do not.

Figure 7.2 Share of immigrants to the Nordic capitals 2003 (per cent at the national level)



Data source: *Statistical Yearbook of the City of Helsinki 2004; NORDSTAT –database 2005*

In 2000-2004, the majority of immigration into the Nordic countries at the national level was directed towards the major Nordic city regions (figure 7.2). The international migration flows are concentrated in capital city regions in each Nordic country, but there is also an increased concentration among immigrants within some of the Nordic cities. Increased inflows of immigrants have led to the settlement of non-native groups in the capital city regions – urban regions – in the Nordic cities (Edvardsson *et al.* 2007). Along with this development Nordic countries follow the European settlement pattern (Vandermotten *et al.* 2004, 2005, ESPON 2005).

National trends

In figures 7.3 to 7.7 the net immigration of native and foreign citizens to the Nordic countries are shown. One common trait for all Nordic countries is that, in general, the net migration of native citizens has been negative, while positive for foreign citizens.

Figure 7.3 Net migration to Denmark by Danish and foreign citizens 1980-2004.

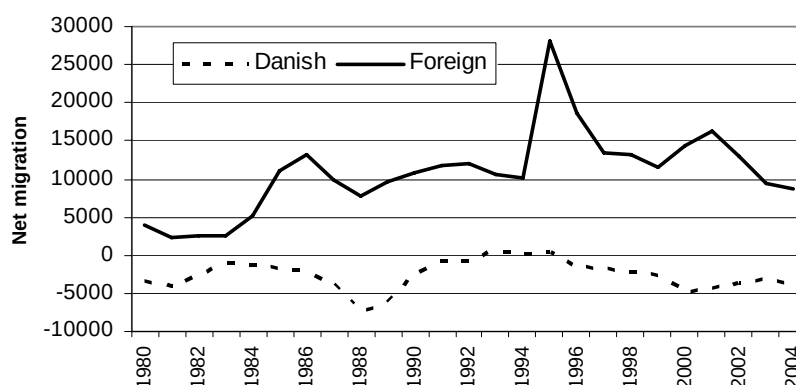


Figure 7.4 Net migration in Finland by Finnish and foreign citizens in 1988-2004.

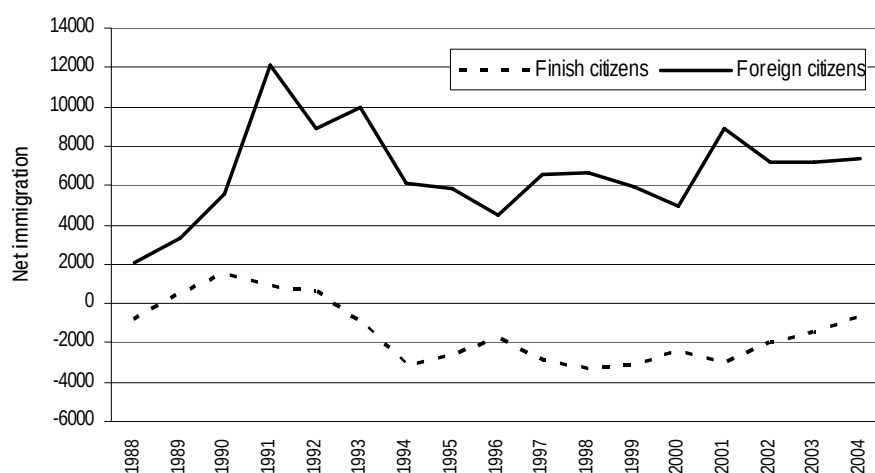


Figure 7.5 Net migration in Iceland by Icelandic and foreign citizens 1961-2004.

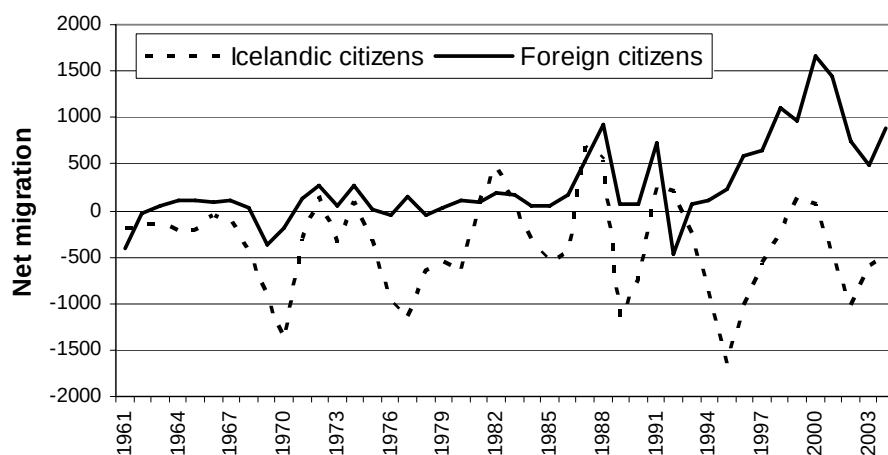


Figure 7.6 Net migration to Norway by Norwegian and foreign citizens in 1958-2004.

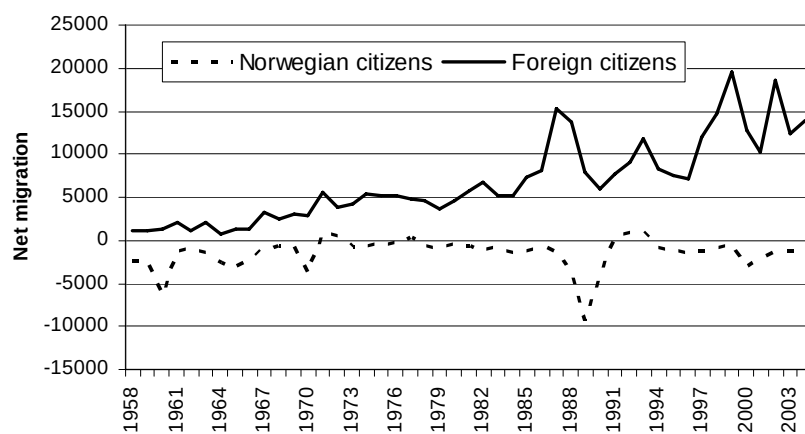
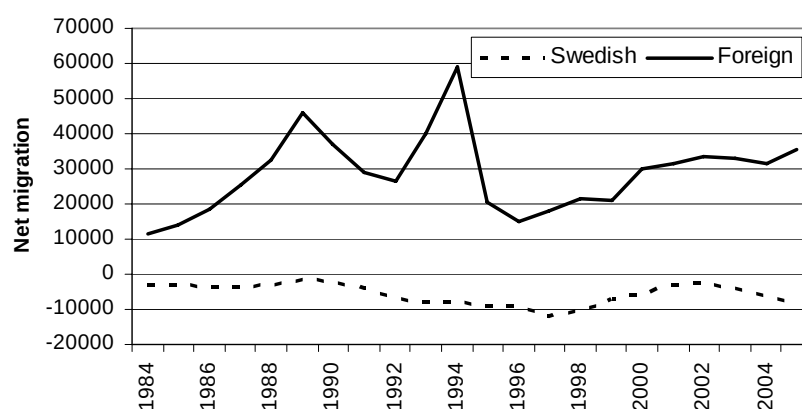


Figure 7.7 Net migration to Sweden by Swedish and foreign citizens 1984–2005.



Source: Edvardsson *et al.* (2007)

Immigration is a relatively recent phenomenon in Denmark. Until the First World War period Denmark was country of emigration. During the inter-war years neither immigration nor emigration was frequent in Denmark. Denmark had a net emigration deficit in the first decades of the post-WW2 period but became a net immigration country in the late 1960s. In the 1970s the nature of immigration changed in Denmark from being mainly labour force immigration to that of refugees. Before 1960, foreign residents in Denmark came almost exclusively from other Nordic countries but from 1960 to around 1974 a significant number of immigrants came to Denmark mostly from Turkey, Yugoslavia and Pakistan. Since 1980 Danish citizens have been net emigrants and foreign citizens have been net immigrants to Denmark.

Traditionally Finland has been an emigration nation with negligible net immigration. In the 1980s the direction of migration in Finland was reversed: from 1981 onwards Finland recorded higher immigration than emigration. The nature of migration altered greatly in the early 1990s when emigration slowed markedly and in addition the immigration of foreign citizens increased. Large-scale foreign net immigration is a new phenomenon in Finland. It was as recently as 1991 when Finland first experienced foreign immigration that was significant compared to former inflows. The three largest inflows to Finland came from Sweden, Russia and Estonia. It should be noted that numerous immigrants from these countries have former Finnish nationality (Swedes) or others of Finnish descent (Russia, Estonia).

Icelandic citizens have been net emigrants for most of the period since 1961 while foreign citizens have mainly been net immigrants for the same period. International migration in Iceland has undergone more annual fluctuations than is the case with internal migration. Although there was a positive net immigration balance in many regions in Iceland, net immigration was a significant component of population growth only in the East region.

Norwegian citizens have, in general, been net emigrants for the period of 1958-2004 while foreign citizens have been net immigrants. Without foreign immigration the total net migration for Norway would have been negative. This is illustrated in Figure 7.5. Immigration from neighbouring countries to Norway was the dominant factor historically; in particular many immigrant workers arrived from Finland and Sweden. Later more distant countries have been represented among the Nordic migrant workers, and recently, refugees have assumed a dominant role. In 2004, the majority of the refugee population by country background in Norway was from Iraq, Bosnia-Herzegovina, Iran and Somalia and they comprise almost half in percentage terms of the total refugee population (Edvardsson *et al.* 2007).

Inflows of immigrants to Sweden have fluctuated in terms of totals and in respect of sender countries since World War II when immigration to Sweden notably began to increase. Immediately after World War II Sweden received many refugees and in the late 1950s until the early 1970s workforce immigration predominated. During the 1980s and 1990s immigration to

Sweden was dominated by refugees. In the 21st century, immigration to Sweden has been dominated by tied movers and family reunions (SCB 2004, Edvardsson *et al.* 2007).

Some regional aspects

Table 7.3 clearly shows that net immigration to the Nordic countries is not evenly distributed among the regions. That capital regions (Stockholm, Oslo and Akershus, Uusimaa) are among the 10 regions with the highest net immigration is not surprising. Neither is it surprising to find Rogaland (the centre of the Norwegian oil industry) and Skåne (with its ongoing integration into the Øresund region of Malmö and Copenhagen) in the top-10 list. It is, however, surprising to find three regions outside the metropolitan areas in Sweden among the 10 regions with the highest net immigration in the Nordic countries. One explanation for their position on this list is related to the fact that major refugee centres are located in these regions (Östergötland, Västerbotten and Kronoberg). As soon as the refugees have received their permit to stay however, they will move to the metropolitan areas. Västra Götaland is a region which contains a metropolitan area, Göteborg, but this region also has major refugee centres in the non-metropolitan part which makes it difficult to interpret the immigration flows to this region. It is also worth noting that none of the regions belonging to the metropolitan area of Copenhagen¹³ are among the 10 Nordic regions with the highest net migration 2004.

Table 7.3 The 10 Nordic regions with the highest and lowest net immigration 2004

Region	Highest Net immigration	Region	Lowest Net immigration
Skåne	5 221	Norrboten	73
Stockholm	4 301	Åland	88
Västra Götaland*	3 923	Keski-Pohjanmaa	90
Oslo	1 555	Etelä-Pohjanmaa	116
Akershus	1 409	Satakunta	132
Uusimaa	1 367	Itä-Uusimaa	136
Rogaland	1 317	Pohjois-Savo	186
Östergötland**	1 033	Etelä-Karjala	203
Västerbotten***	990	Vestsjælland	207
Kronoberg****	882	Pohjois-Karjala	213

Source: Unpublished material from the Delano-project (Edvardsson *et al.* 2007).

* Major refugee centres in Borås and Göteborg

** Major refugee centre in Norrköping

*** Major refugee centres in Skellefteå and Umeå

**** Major refugee centres in Alvesta and Uppvidinge

There are two things worth noting here with regard to the 10 Nordic regions with the lowest net immigration in 2004. (1) No Norwegian region is on the list, and (2) all regions can be described as relatively rural and peripheral.

As indicated in figure 7.2, immigrants prefer to settle down in the major cities and the immigration pattern has changed. But is there a difference between where the labour migrants and the refugees settle down? The number of studies on immigrants' settlement patterns are very limited indeed outside the USA (Damm 2005). The few studies for the Nordic countries only cover refugees (Edin *et al.* 2004, Åslund 2001, Statistics Sweden 2006, Andersson 2003, 2005, Damm 2005, 2007, Damm & Rosholm 2005, Damm *et al.* 2006, Kokko 2002, Kauppinen

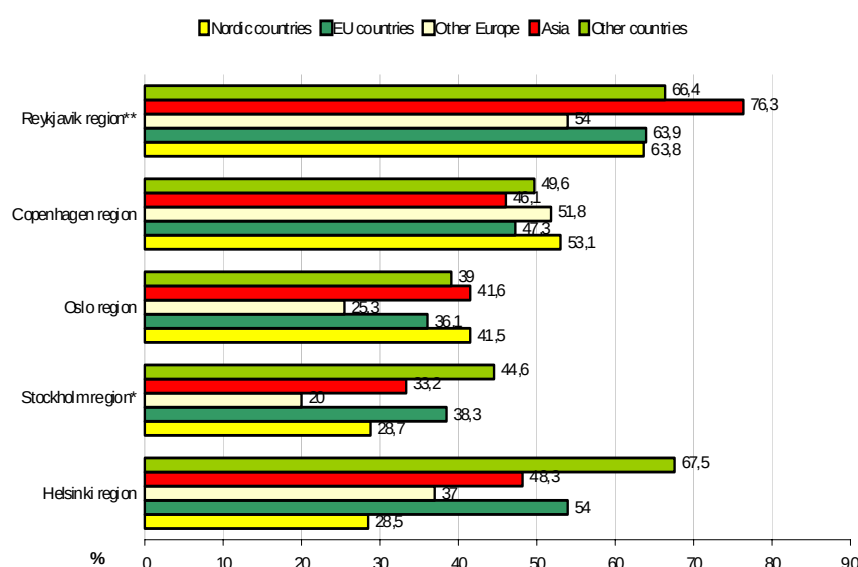
¹³ The region of Copenhagen, the region of Frederiksborg, and the municipalities of Copenhagen and Frederiksberg

2004, Heikkilä & Järvinen 2003, Djuve & Kavli 2000, Østby 2001, Lie 2002, Forgaard 2005, Høydal & Selboe 2006).¹⁴

Studies on the settlement patterns of labour immigrants are, more or less, non-existent. Johansson & Rauhut (2007a, 2007b) have made some explorative attempts to analyse the settlement patterns of labour immigrants and refugees in Sweden during the period 1950-2005. If immigration is to be favourable for the receiving country the immigrants must be able to fill the vacancies wherever the vacancies are located geographically. The results show clearly, contrary to common belief, that immigrants have been more evenly distributed around the country although the metropolitan areas undoubtedly remain the dominant areas with regard to the immigrants' settlement patterns. Furthermore, no significant differences in the settlement patterns between refugees and labour immigrants could be found. This result must, however, be interpreted with caution, partly because of how refugees are registered when they have received their permit to stay and the quality of the data.

Unpublished material from the *Delano*-project¹⁵ indicates that significant differences exist in immigrants' settlement patterns in the other Nordic countries. In figure 7.8 the settlement patterns in the Nordic capital region are shown. The five immigrant groups show very divergent settlement patterns in the Nordic capital regions.¹⁶ The causes of these different settlement patterns have not yet been analysed.¹⁷

Figure 7.8 The share of immigrants by citizenship in Nordic city regions in 2004



Source: Unpublished material from the *Delano*-project (Edvardsson *et al.* 2007).

* Refers to 1.1.2003

** Refers to 1.1.2004

¹⁴ In Iceland only some undergraduate examination papers have dealt with this issue.

¹⁵ The *Delano*-project ended up in a report by Edvardsson *et al.* (2007)

¹⁶ Nordic countries; EU countries refer to citizens of EU/EES countries; Other Europe refers to non-EU/EES countries, Asia refers to Asia including Turkey and the Caucasus; Other countries refer to all countries not included in the regions previously listed.

¹⁷ A number of hypotheses have however been generated on the settlement patterns of immigrants. Johansson & Rauhut (2007a) suggest that the structural transformation of the economy, the changes in the immigration categories, and the political strategy of spreading the immigrants countrywide have an impact on the regional distribution of immigrants. Edvardsson *et al.* (2007) also suggest that immigrants prefer to settle down where immigrants from their own nationality are already situated. See also Rauhut (2007b).

Has there been a convergent or divergent development in the regional allocation of immigrants? To our knowledge only one study has touched upon this question. In a study by Johansson & Rauhut (2007a) on immigrants' settlement patterns in Sweden 1950-2005, they find that regions with a large overrepresentation at the beginning of the period are not so dominant at the end of the period in respect of the stock of foreign people as well as the inflow of new immigrants. This is valid both for gross immigration and for the stock of immigrants but it is more pronounced with regard to gross immigration. In practical terms this means that immigrants have been more equally distributed around the country even if the metropolitan areas remain the overwhelmingly dominant areas with regard to the settlement pattern of the foreign population.

Summary

Historically, Sweden has been the prime Nordic country of destination for immigrants. Still today Sweden attracts almost half of all immigrants to the Nordic countries. In general, the typical immigrant to a Nordic country is a native citizen who is returning home, and, in second place, a Nordic citizen moving to another Nordic country. Immigrants from neighbouring countries to Norden (e.g. Germany, Poland, the U.K. and Russia) are placed in the third biggest group of immigrants.

While the net migration rate is negative for native citizens in the Nordic countries, and has been so over time, the net migration rate for foreigners is positive, and has been increasingly so over time. A majority of the immigrants settle down in the metropolitan areas and in the major cities, which means that they are not spread evenly over the Nordic regions.

If labour immigration is to be used as an instrument to solve the labour demand issue in the peripheral parts of the Nordic countries, it would be interesting to see where labour immigrants tended to settle down. This however remains a rather neglected research field; the settlement patterns of refugees have been studied but not those of labour immigrants'.

8. Demography and economic performance

Introduction

This chapter aims to discuss some of the economic implications of the demographic challenges we are witnessing today. The Nordic countries are not the only geographical area in the world facing these kinds of problems – they are a global problem. In a study by the U.S. National Research Council three specific problems were highlighted in respect of policy implications and policy recommendations:

‘First, there are uncertainties about how some of the demographic forces will play out /.../ Second, because population ageing generally is a gradual phenomenon, its socioeconomic consequences tend to appear gradually as well, and in some cases with a high degree of predictability /.../ third, most statements about ageing individuals tend to reflect averages and mask a great deal of diversity in the population’ (National Research Council 2001, p. 2).

The *first* point refers to the extent to which technological changes will interact with demographic changes and how demographic change will change our way of life which, in turn, will interact with e.g. ongoing technological change. The *second* point deals with the fact that even if we accept the reality of an ageing society we retain the ability to adjust policies, lifestyles, infrastructure, the labour market etc., to make the transition easier. Finally, the *third* point touches upon the fact that the analyses only deal with national analyses of the average population. Significant levels of individual diversity (e.g. gender, class, education, ethnicity), as well as regional and local diversity, however, also exist. This point also deals with the problem of the definition of ‘elderly’; who is an ‘elderly’ person? Someone who has passed 50? Over 65 years old? Or someone over 80 years old?

Depending on how these three problems are dealt with the policy implications and policy recommendations in respect of demographic change and population ageing will vary, not only in the U.S., but also in the Nordic countries.

Ageing

The process of ageing is not a new phenomenon. Since the 18th century life-expectancy at birth has steadily increased and mortality has been postponed to higher ages due to e.g. new technology for disease control (e.g. Easterlin 1996, Foss & Juvkam 2005). Parallel to this process the fertility rates have dropped, especially during the 20th century. This is not only a Nordic but rather worldwide phenomenon. Increased life-expectancy at birth has had an impact on ageing, but the major cause is the very low fertility – the base in the population pyramid has simply become smaller and smaller (Bengtsson & Scott 2005).

The process of ageing is not only a simple function of a higher life-expectancy at birth and fertility rates below the *replacement ration* (about 2.1 children/woman). To understand the process of ageing it is important to discuss on what geographic level – global, national, regional or local – the analysis is made and whether migration is included in the analysis or not. At the regional and local levels ageing (a higher life-expectancy at birth and very low fertility rates) can be augmented by the out-migration of young adults and an in-migration of persons in the upper middle-ages and pensioners. The result will be an even more distorted age-structure. Furthermore, a strong in-migration of young adults to one municipality in a region can conceal the ageing problems and distort the age-structure in the rest of the region (ESPON 2005).

The best way to fight ageing is to increase fertility. This is, however, a long-term measure, since it will take about 20-25 years until today's newly born children will be in the labour force and become productive. Immigration can only provide short-term, and uncertain, mitigation to ageing (Bengtsson & Scott 2005, ESPON 2005).

What implications ageing will have on economic performance are unclear (Foss & Juvkam 2005). The demographic changes to come will generate significant challenges for our societies – at all levels and in most aspects of our lives (from infrastructure and housing issues to labour supply and pension schemes). Notwithstanding this however much that passes for research into the effects of demographic change is often highly partial and generally short-sighted often culminating in 'alarmist' conclusions and providing a clarion call for significant policy changes based, ultimately, on rather thin scientific justification. There is then a need for a more historical as well as a more holistic perspective to be taken.

'The prospect of an ageing society fills many otherwise rational people with dread. They worry about a greying world, a stagnant place bereft of youthful vigour with unsupportable numbers of dribbling pensioners packing out care homes on every street corner, bleeding the small number of workers dry of every penny of wealth they slave away to generate. If you suffer from this fear, you've been reading too many newspapers. It is just ageist hysteria. /.../ People are frightened of an ageing society because it is a step into the unknown, and because we have a youth-obsessed culture and ageist prejudices. But almost all our fears are totally unfounded' (Browne 2002, p. 52).

Without doubt then more research is needed to analyse the possible implications of ageing on economic performance.

Depopulation

The concept of 'depopulation' is far from clear. Most often the word is used almost synonymously with population decline, but sometimes it is reserved for population decline of a certain enduring nature, or even more narrowly confined to processes that carry ominous signs of socio-economic impacts.¹⁸ In one or more of these senses of the concept, 'depopulation' has been discussed from time to time during most of the former century – in national and European terms as well as with reference to sub-national uneven territorial development.

Depopulation may be regarded as a special course of development in the process of population change, often indicated by certain probable demographic implications or impacts *with a problem potential* (for instance the so-called ageing of the population and the labour force, increasing dependency ratios, labour shortage, decreasing demographic vitality and natural growth potential etc.) and associated with long-term demographic process (notably the 'modern' fertility decline and sometimes – and even combined with – enduring territorial patterns of uneven selective migration). To be able to indicate the presence of processes with depopulation potential, a relevant territorial scale and a reasonable temporal perspective are needed (ESPON 2005).

However, based on the aspects mentioned here and the more immediate background of the current interest in depopulation as a spatial phenomenon, it must be borne in mind that depopulation may be associated with certain:

- Levels or degrees of demographic change (relatively significant rates of population decline)

¹⁸ These kinds of concern may, as already indicated, relate to socio-economic implications of distortions of the age-pyramid, or of demographical 'thinning-out' of already sparsely populated (and often remotely located) areas, or even – as was the case in some peripheral parts of the Nordic area from the 1960s on – complete depopulation in the sense that entire local communities are emptied of population and literally 'die out'.

- Durations of demographic change (population decline as a relatively stable trend and prospect)
- Dynamics (or relative components) of demographic change (e.g. long periods of uncompensated excess of deaths over births)
- Population-structure aspects of demographic change (causing demographic imbalances like e.g. ageing, potential labour shortage)
- Implications/potential implications of demographic change (entailing needs for significant socio-economic adjustments; problems of service supply, problems of recruitment; negative effects on demographic, social and economic vitality of communities/regions)
- Territorial contexts of demographic change and of implications of demographic change (e.g. population density, settlement pattern, location/remoteness, regional integration/functional status)

A reasonable (perhaps an ideal) point of departure seems to be to regard depopulation as population decrease *i)* of a certain enduring – and potentially territorially comprehensive – nature, *ii)* which is related to long-term fertility decline, and where *iii)* the structural demographic implications of which are inadequately counteracted, and sometimes even reinforced, by lasting patterns of net migration. In its turn the inherent demographic dynamics imply *iv)* particular age-pyramid effects, which entail *v)* a problem potential *depending on the specific qualities of the regional context*.

It is not evident what the implications of these demographic trends will be. When we leave the aggregate levels of nations and large regions and move down to more detailed territorial divisions, the challenge of detecting prospects and problems comes increasing into focus.

A limited survey of the available research literature reveals that very few projects and reports seem to focus specifically on population decline and ageing as a sub-national territorial phenomenon, in the sense that they explicitly set out to illuminate territorial variation in the phenomenon (the geography of depopulation and ageing) and/or focus in particular on the need to establish a better basis for detecting and understanding possible *non-demographic* impacts at the territorial level.

Migration trends seem to imply accelerating depopulation and ageing in sparsely populated rural and peripheral regions and in regions lagging in economic and labour market performance. Competitiveness policy will need to recognise the regional changes of the labour supply and the actual characteristics of the labour-force available in different types of regions. As the population will become increasingly older in certain areas the labour market will need to adjust. Even consumer needs and preferences probably change in the wake of demographic transformation while certain areas will be relatively more influenced by the upper segment of the age-pyramid. Ageing will not however impact uniformly on regions. Given the diversity of the impact on regions, the necessity to 'adapt to their demographic circumstances' will require different measures in different regions. This requires statistical analysis and research to be carried out at a more detailed territorial scale taking into account the fact that demographic trends are only a single factor among a very large and complex set of factors influencing socio-economic development, and – after all – probably the slowest and most predictable factor, traditionally considered to be the *outcome* rather than the *cause* of socio-economic change (ESPON 2005).

Labour shortage

Missing labour and the lack of adjustment

In short, the evolution towards a post-industrial society is, first and foremost, characterized by a transition from goods-producing to service-handling activities, where services such as education, health and other professional services become central in society (Bell, 1973). Theories of structural transformation in advanced capitalist societies stress the combined

impact of major technological changes where information-communication technologies play a leading role, the formation of a global economy, and a process of cultural change whose main manifestations are the radical change in respect of women's role in society and the rise of ecological consciousness (Castells, 1999).

During periods of structural transformation the demand for labour with certain competences and skills will exceed supply. Problems with mismatch and with the allocation of labour will also occur. A labour shortage occurs when the demand for labour exceeds labour supply at a specific wage level. The shortage is said to be *relative* if the imbalance can be fixed by a change in prices (wage or reservation wage). Otherwise the shortage is said to be *absolute*. Absolute labour shortages thus reflect the difficulty of finding a worker, in the working age population, with the adequate skills without transferring them from a similar post (OECD 2003).

Labour shortages can be 'partial' and 'general'. A *partial* labour shortage occurs when there is a shortage of labour in a specific profession or sector of the economy, e.g., farm workers, nurses, bus drivers or construction workers. A *partial* labour shortage can also be geographical, i.e. there is a labour shortage in a defined geographical area. A *general* labour shortage is a result of demographic changes in the population, i.e., there is a shortage of labour in all professions and sectors of the economy (Rauhut, 2002).

According to standard economic theory, the demand for labour depends on the fluctuations of short-term business cycles. In a short-term perspective, the opportunity cost of replacing labour with capital, i.e. investing in new technology, will be too high. If the labour shortage continues, or even worsens, over time, the opportunity cost of not replacing labour with capital will be too high. In a long-term perspective, labour shortage is not about being short of labour, but about lacking the capacity to adjust to the structural changes in the economy (Begg *et al.*, 1987; Wonnacott & Wonnacott, 1986; Elliott 1991; Fallon & Verry, 1988; Schön, 1994, 2000).

It is possible to estimate the effects of changes in the relative prices of a factor commodity, according to economic theory, especially when it comes to the demand for that specific factor commodity and substitution effects. Given the assumption that a company is profit-maximising, the shortage of a factor commodity will result in an increase in its price. As a consequence, this specific factor commodity will be replaced by another, cheaper, factor commodity. If it is labour that is in relative shortage, capital will be substituted for labour. Elliott states that the 'substitution effect distinguishes the firm's reaction to the change in the relative price of capital and labour, holding constant the scale of production' (Elliott, 1991: 236).

Begg *et al.* state that 'the substitution effect leads the firm to produce a given output using a technique which economizes on the factor that has become relatively more expensive. Thus, a rise in the wage rate of labour leads to a substitution effect towards more capital-intensive production methods at each output' (Begg *et al.*, 1987, p. 214). According to Wonnacott & Wonnacott (1986: 723):

[I]n a competitive, fully employed economy, the wage rate increases as productivity increases. This conveys a clear message to those producers who can no longer afford the higher wage. The message is: society can no longer afford to have its scarce labour employed in your activity. There are now too many other, more productive pursuits. This may seem harsh, but it is the sign of economic progress.

In general, there are five ways to deal with a relative change in the price of labour (Rauhut 2003):

- 1) If the relative factor price for labour increases on a short-term basis, the increase in cost will be paid by the consumer of the commodity or service (or the tax payers).
- 2) If the relative factor price of labour increases on a long-term basis, capital will, if possible, be substituted for labour.

- 3) If the relative factor price of labour in labour-intensive production increases on a long-term basis, organisational or institutional changes will take place in order to use the labour more efficiently.
- 4) If the relative factor price of labour increases on a long-term basis, labour immigration can be used, provided that imported labour can replace domestic labour. This is easily done for some sectors of the economy, but for others, it is more troublesome to replace domestic labour with immigrant labour.
- 5) If the relative factor price of labour increases on a long-term basis, labour-intensive production will be moved to countries where labour is cheap and in abundance.

An increase in wages is to be expected when labour is scarce, which leads to an increasing wage ratio in the production. When the marginal cost of a continued increase in production is higher than the marginal cost of substituting capital for labour, institutional, organisational and technological changes will be required in order to replace the scarce and expensive factor commodity labour in production. Despite using less labour, production will be kept up due to increased productivity. This is so not only because firms are profit maximising, but also because they are cost minimising! (Fallon & Verry, 1988).¹⁹

Historically, situations of long-term labour shortage have led to labour being replaced through technological, institutional and organisational changes. This has meant that productivity improvements have resulted in increased growth. The creation of an economic surplus through economic growth is a condition of welfare (Dillard, 1967; Rider, 1995; Cameron, 1997 and Landes, 1998). Technological, institutional and organisational changes, however, require, a dynamic economic structure (Rauhut 2002).

Mismatch problems

A central condition for any efficient labour market is that the matching process between vacancies and job searchers functions well. Information and search costs are central in this process (Elliott 1990). In the economic literature the matching process is described as a function stating the causality between, on the one hand, the number of job positions, A , and, on the other hand, the number of vacancies, V , and unemployed, U . This can be formalised as

$$A = A(V, U) \quad (1)$$

The labour market is frequently troubled by matching problems and these problems are often related to structural changes in the economy at branch or sectors levels. The matching efficiency at the Nordic labour market has decreased, *i.e.* the mismatch has increased, in recent decades (Johansson & Persson 2001). Examples of this include the fact that geographic mobility has decreased, that the labour force rejects low paid low status jobs and that people are rejected from the labour market. The segmentation of the labour market also affects the matching process.

There are several aspects to the *geographic mobility* of the labour force. When moving from one geographical entity to another is often related to e.g. changing employers, changing profession, changes in the labour market status (from e.g. unemployed to employed or from studies to work etc.). Whether it is a one-person household or two-person household, namely, whether there is/are one or two adults as 'breadwinners' in the household also affects geographical mobility (e.g. Björklund *et al.* 1996, Furåker 2003, Johansson & Persson 2001).

The *insider-outsider dilemma* is mainly related to the phase of establishing oneself on the labour market. Usually, insiders are already employed and outsiders unemployed (Björklund *et al.* 1996). Persons who have been unsuccessful in establishing themselves on the labour market easily end up in a vicious circle; higher education and qualification conditions raise the thresholds for entering the labour market and the social security systems. Young adults, persons with an immigrant background and single mothers are particularly exposed to the insider-outsider dilemma (Salonen 2000). Employers are also hesitant to hire a person who has

¹⁹ Fallon & Verry (1988) also provide an overview of the theoretical models used to describe the substitution of labour for, primarily, capital.

been unemployed for more than 6 months. The best way to get a job is then to already have a job (Ackum-Agell 2002).

A threat to matching efficiency comes from the fact that a part of the labour force is *locked into* certain professions and workplaces. The potential to change profession or employer without moving are very small if a person is 'locked in'. For those who are locked in both in a profession and at a specific workplace this means that they work in a profession and for an employer that they do not wish to. In a Swedish survey undertaken in 1997 it was shown that 36% of the labour force with a permanent position and 62% with temporary positions are 'locked in'. At the same time, those who are locked in in the double sense outlined above constitute some 20% of the labour force with permanent positions and 40% of the labour force with temporary positions (Aronsson *et al.* 2000, Aronsson 2002).

While some parts of the labour force are locked into professions and workplaces they dislike, other parts of the labour force are rejected, i.e. *excluded*. Persons with an immigrant background often face this problem, and this is related to the structural changes in the economy resulting in a lowered demand for low or unskilled labour. Swedish research has shown that employers, if labour reductions are needed, are more likely to fire persons with an immigrant background than natives and that the unions do not protect persons with an immigrant background to the same extent as they protect natives (Vilhelmsson 2002). Employers also reject persons with an immigrant background if they believe that 'the market' will punish them for having too many employees with an immigrant background (e.g. Broomé *et al* 1998, 2001, Vålfärdspolitiska rådets rapport 1998, 2002).

The *segmented labour market* also creates problems in the matching process. The first segment contains employees with a key competence for the employer. They have permanent positions and good working and employment conditions. The workforce is also assumed to be flexible in the sense that they can change between different tasks. The second segment contains labour on temporary contracts, with poorer employment conditions than the first segment. This labour segment does not have the same competence requirements as the first segment and flexibility basically means that they are available for the employer when needed. The third segment on the labour market contains quite a large group of persons with little attachment to the regular labour force. This group is, to some extent, dependent on welfare benefits and the informal (black) market (Lundh 2002, Aronsson & Sjögren 1994). Increased segmentation does not improve the matching efficiency of the labour market.

When the mismatch between vacancies and job searchers increases, i.e. the matching efficiency decreases, it is often seen as a *labour shortage*. Matching problems can and do occur on occasion then when, in reality, there is no shortage of labour at all. When the job requirements do not match the competence profile of the unemployed, labour is located in the 'wrong' geographic area or labour is, for some reason, rejected the inefficiency in the matching process creates problems on the labour market.

Immigration

Theories on the economic benefits of immigration

There is no general consensus in respect of the economic benefits of migration. Different theories, based on different assumptions, reach different conclusions on the impact of international migration on economic growth, unemployment, labour force participation, wages, taxes, and transfers.

According to *neoclassical macroeconomics* immigration will promote economic growth (Simon 1999, Friedberg & Hunt 1995. See also Borjas 1995). Immigrants will constitute substitutive labour. Given that the number of jobs is constant, wages will be lowered and the native workforce will have difficulty competing with cheap immigrant labour (Fassmann & Münz 1995). If the number of jobs is constant, adding more workers to the labour market pool will lead to a competition for jobs. The equilibrium on the market will be changed, resulting in lower wages (Fassmann & Münz 1995. See also Zimmermann 1995 and OECD 2002). Low-income earners are the ones who will be hit most severely (Johnson 1980). The capital owners

in the country of destination will gain from immigration (Layard *et al.* 1994) as well as the well educated (Johnson 1980). If the immigrant is young, well educated, has no dependents and finds a job immediately on arrival, the country of destination will gain from immigration: the tax contributions of this immigrant will exceed the transfers from the public purse (Layard *et al.* 1994). This kind of immigration ought to be encouraged. If the transfers to immigrants exceed their tax contributions, filters are needed in the immigration policy process to ensure that only the most profitable immigrants are allowed to immigrate (Borjas 1995).

According to neoclassical macroeconomics a completely different scenario in respect of the economic benefits of immigration is also possible: immigration can slow structural change in the economy. Economically stagnating sectors can survive by employing cheaper immigrants, preserving and maintaining the existing economic structure (Maillat 1974, Lundh & Ohlsson 1994, 1999). Access to immigrant labour may also lead to labour intensive investment, keeping productivity down (Wadensjö 1981, Elliott 1991).

According to *dual labour market theory* we are accustomed to thinking of industrialization and economic growth as a process that in some basic way involves increasingly sophisticated technologies and a progressively more highly educated and well-trained labour force. At the same time unskilled and cheap labour is needed to do hard work under bad working conditions and for low salaries, the kind of work the native labour pool does not want to do. According to this theory, immigrant labour constitutes a complementary workforce. If labour at the lower segment of the labour market is missing, economic growth will slow. Substituting labour with capital is one solution, but since it is not possible to substitute labour with capital in labour intensive sectors hiring immigrants is another solution. Immigrant labour can then maintain economic growth on a short-term basis; on a long-term basis changes in society are however needed. Since immigrants work in the low-paid sectors their tax contributions will be lower than the tax contributions of natives. A physically hard and monotonous job will affect an individual's health, resulting in a need for public transfers. Since immigrants usually end up in hard and monotonous jobs, their need for public transfers will be bigger than for natives (Piore 1979. See also Schoorl 1995).

According to the *new economics of migration* continuing immigration will lead to lower economic growth, since the amount of low productive work increases and that the immigrants send home remittances to the family (Stark & Yitzhaki 1982). Immigrants will take jobs in sectors with many other immigrants, which usually means sectors in which natives do not want to work (Stark 1991). If the salary in the country of destination is much higher than that in the country of origin, *low-quality migrants* are the ones who are most willing to migrate (Stark & Katz 1989). Since these immigrants are usually poorly educated and low skilled workers they will 'experience a higher unemployment rate and have fewer hours of work per year' (Stark 1991, p. 393). Employers have asymmetric information of the productivity of the immigrant workers, and, together with the fact that immigrants in general do low qualified jobs, this is the reason why the immigrants receive lower salaries until the employers have improved their knowledge of their workers. As a result of having a low salary, or working in the informal sector, the tax contribution of the immigrants will be lower than the natives'. If the immigrants work in the informal sector they are not entitled to any public transfers. If they work in the formal sector they have low salaries, and they will receive less in public transfers than natives (Stark 1991).

Empirical evidence

The gains of immigration are difficult to calculate, and results very much depend on the method used (see Kelly & Schmidt 1994) and on the spatial context. In general, immigration confers small net gains, in terms of *per capita* output, to the host country. However, the distribution of the benefits is not even and depends, to a large extent, on the qualifications structure of the immigrants and the native workforce. Thus far the net impact at national levels on government expenditures and revenues seems to have been negligible for most countries (see Rauhut & Blomberg 2003).

Only a limited number of studies have been made on the income transfers from immigrants to natives for Western countries or on the impact on economic growth of immigration. During the period 1950-1980 the income transfers from immigrants to natives in *Sweden* reached approximately 1% of GDP annually (Ekberg 1999). They peaked around 1970, when the transfers barely reached 2% of the GDP (Ekberg 2002)²⁰. The income transfers were even 1980-1985, i.e. the immigrants paid as much in tax as they received in transfers (Gustafsson 1990. See also Gustafsson *et al.* 1990). During the 1990's income transfers changed direction: immigrants are now net receivers and the natives are net payers. The transfer of incomes to immigrants was about 0.9% of Swedish GDP in 1991, and in 1994 the transfers to the immigrants reached 2% of GDP. Income transfers from natives to immigrants have remained at that level throughout the 1990's (Ekberg 1999. See also Gustafsson & Österberg 2001). By using data for 2001 Rauhut & Blomberg (2003) estimated the effects of a hypothetical situation in Sweden – what would the budgetary effects be if the foreign-born population had the same labour force participation rate and income structure as the natives? The estimation showed that the tax base would be enlarged and the social transfers would be lowered by a amount equating to 1.4% of Swedish GDP for 2001. It is obvious that the gain from integration would be even higher if second generation immigrants were included in the analysis.

A simulation study on the long-term gains of economic growth from immigration to Sweden concluded that the plausible economic gains were insignificant (Ekberg 1977). An estimation of the economic surplus of immigration to Sweden shows that it has been negligible (Ekberg 1998).

Two studies on income transfers have been made for *Denmark*; they show that income transfers from natives to immigrants were close to 1% of GDP in the 1990's (Christensen 1998, Økonomiministeriet 1997). In a study on *Norway*, for 1993, it was shown that refugees received income transfers close to 0.9% of GDP (Larsen & Bruce 1996). Another Norwegian study concluded that the annual income transfers from natives to immigrants were approximately 1% of GDP in the mid 1990's (Larsen 1996).

In *Canada* a positive net income transfer from immigrants to natives has been found (Akbari 1989), which is also the case for *Australia* (Kakwani 1986) and *Switzerland* (Straubhaar & Weber 1994). One study on *Germany* shows net income transfers from immigrants to natives (Miegel 1984), but another shows the opposite result (Ulrich 1994). The changed direction of income transfers can be explained by changing employment patterns for the immigrants since the 1960's, as well as the changing age structure among the immigrants (Ibid.).

Some studies for the *USA* show a positive correlation between immigration and economic growth. The most well-known study was made by Julian Simon, and he argues that immigration has a significant positive impact on economic growth (Simon 1999). Other studies on how immigration affects the American economy shows that the economic impact of immigration depends on the human capital of the immigrants, and particularly on their geographic and social mobility. Estimations show that a 1% increase in immigration to the USA leads to a 0.1% increase in economic growth (Friedberg & Hunt 1995).

Estimations of the size and direction of these income transfers between immigrants and natives in the USA show divergent results. Some studies find net income transfers from immigrants to natives, and in 1998 the income transfer to natives was about 0.1% of GDP or USD 30 per native person (Borjas 2001). A newer study concluded that the income transfer from immigrants to natives in 1996 was USD 166-226 per native household (Hanson *et al.* 2002). Other studies find negative income transfers from immigrants to natives in the USA (Blau 1984, and Weintraub 1984). A study for 1990 finds that the income transfers from natives to immigrants reached USD 16 billion, which is close to 0.3% of American GDP (Borjas 1994).

²⁰ In Ekberg (1999) the income transfers from the immigrants to the natives are estimated to about 1% of GDP.

Labour migration can counteract structural changes in the economy, as stagnating trades and sectors are kept going. The labour immigration of the 1960s counteracted the structural transformation of the Swedish economy, as stagnating trades and sectors were kept afloat through access to cheap labour. When the crisis came in the 1970s, the bubble burst and companies within these trades and sectors went under. The immigrants remained, and since then, they have maintained only a weak tie to the Swedish labour market (Lundh & Ohlsson 1994, 1999). As such then immigration should, primarily, be aimed at reducing the bottle-necks in production as indeed was the case in the 1950s in Sweden (Rauhut 2002).

Uncertain causality

What does theory say?

Two major theoretical approaches have, in general, been used to explain the causality between age and economic performance: *the life-cycle hypothesis* and *the human capital theory*. A third theoretical approach, *the hypothesis of structural change*, also deserves to be mentioned here.

In the *life-cycle hypothesis* the demographic aspects are placed at the centre of the analysis. Individuals are assumed to be utility-maximising and they aspire to a constant level of consumption throughout their lives. At the same time, the income needed to ensure their ability to consume in this manner can only be made during a limited period of their lives – after their childhood but before their retirement. Savings must then be substantial in the active years. These savings must be able to repay debts amassed from childhood and to compensate for the loss of income as a retiree. This means that these savings will be consumed and that the net savings over the life-cycle will be zero (Modigliani & Brumberg 1954, Modigliani 1986, Samuelson 1958).

The life-cycle hypothesis is a macro-model, focusing on national savings rather than on individual savings. The demographic influence on economic performance is considered to be the following: young adults settle down, marry and have children. The consumption of the children must be provided for. When the children have left home, incomes are saved for the coming retirement. A labour force in the middle ages is considered extremely favourable for savings, investments and growth. Since the group 65+ years has very negative savings a high share of middle-aged people in the population will put pressure on the national savings purse when they retire. In addition, a ‘baby boom’ will put pressure on aggregate savings.

In *human capital theory*, the demographic aspects are allotted a somewhat different position. This remains the dominant theory on the analysis of wages and productivity at the micro-level. Wages are assumed to reveal the changes in the worker’s productivity, while both the productivity level and the wage are the result of investments in education. The educational cost is based on the earnings forgone and the direct costs for education. The profit from education is considered to be higher future income. While in working life human capital is accumulated, i.e. human capital does not only consist of formal education but also of on-the-job-training. Investments in human capital for promoting productivity will result in a positive slope in earnings over time (Mincer 1958, Schultz 1961, Becker 1964).

The effects on economic performance would be more positive if a larger share of the labour force is relatively old, and a lower average age in the labour force would lead to relatively lower economic growth. A given age-group is assumed to possess a constant capital of work experiences, no matter *e.g.* the length of education, hours worked and the number of job changes. These are not realistic assumptions.

Bengtsson (2003) takes parts of the life-cycle hypothesis and the human capital theory and adds them to the *structural change hypothesis*. Since individual productivity changes over the life-cycle, different age-groups possess different kinds of human capital. Parallel to this process changes occur in the underlying economic structure, something which determines the demand for different kinds of labour and the conditions for using the different kinds of human capital in the most efficient way in production terms. Therefore, it can be assumed that during a

period of structural change in the economy relatively young workers with a relatively high formal education will be more productive than relatively older workers with a relatively high accumulated human capital. During periods of structural rationalisation the opposite relation can be assumed to exist.

Which indicators to use?

These theoretical approaches focus on the net savings ratio (life-cycle hypothesis) and human capital (human capital theory) – both formal and informal – to explain age-effects and economic performance. The third theoretical approach (the structural change hypothesis) takes its point of departure from the structural change hypothesis and adds parts of the two other theories to this. Investment and productivity are key indicators here. These indicators are (i) very dependent on a number of theoretical assumptions for their interpretation, and (ii) they are themselves very complex in nature. Furthermore, it can be questioned whether they actually explain what they are supposed to.

In a study by Rauhut & Malmberg (2003) some indicators are discussed when analysing the relationship between demography and economic performance. On the one hand, they use GDP growth as an indicator of economic performance, and, on the other hand, they discuss four different indicators for demography – two *demographic* and two *economic-demographic* indicators.

The most common indicator used to illustrate who is feeding who is the *dependency ratio*, which is a purely demographic indicator. The dependency ratio, K , can be formally expressed as

$$K = \frac{P}{N} \quad (2)$$

where P is the total population and N is the number of persons aged 20-64. The higher the ratio, the higher is the burden for those persons aged 20-64. It must be stressed however that no economic aspects, *e.g.* labour force participation, are taken into account in this indicator. This is, in fact, one of the major shortcomings of this indicator.

Another common indicator is the *post-active dependency ratio*, which is also a demographic indicator which does not include economic aspects.²¹ The post-active dependency ratio, T , can be expressed as

$$T = \frac{N_{65+}}{N_{20-64}} \quad (3)$$

where N_{65+} is the number of persons aged 65 or older and N_{20-64} is the number of persons aged 20-64. Again, the higher the ratio, the higher is the burden for those persons aged 20-64.

The two demographic ratios presented thus far do not include any economic aspects at all when measuring the burden. This is a problem. (1) A relatively significant share of the population retires early, long before they reach the age of 65. (2) A relatively significant share of the population aged 20-64 actually studies, is on sick-leave, is unemployed etc. If we are going to analyse the effects of demography on economic performance these problems must be controlled for.

A simple model for controlling some of these problems is to use the *dependency burden* as an indicator. The dependency burden, F , can be formalised as shown in equation 4 below:

$$F = \frac{P}{N - (U + E)} \quad (4)$$

²¹ A *pre-active dependency ratio* can also be constructed, in which the population 0-19 years old is divided by the population 20-64 years old.

P is the total population, N is the number of persons aged 20-64, U is the number of unemployed and E is the number of persons aged 20-64 who are not in the labour force. Once again, the higher the ratio, the higher is the burden for the employed part of the population.

The dependency burden has one major problem: it only takes into account the number of persons who are *employed*. Persons who are absent, *e.g.* due to sickness and parental leave, constitute a 'burden', but they are not controlled for in the model. Rauhut & Malmberg (2003) suggested that the number of persons *in work* should be used instead of the number of persons employed. As a result, the variable for the working part of the population must be expanded. This modified model is called the *modified dependency burden*, F^* , and it can be expressed as

$$F^* = \frac{P}{N^* - (U + A + E)} \quad (5)$$

where P is the total population and N^* is the number of persons aged 16-74. U is the number of unemployed and E is the number of persons aged 20-64 who are not in the labour force. A is the number of employed persons who are absent due to *e.g.* sickness or parental leave. The F^* , the higher is the burden for that part of the population in work.

What then are the theoretical implications of this? Even if we keep P , U and N^* constant, F^* will worsen if A and E increase. Analogous to this, F^* can also decrease, given that P , U and N^* are kept constant, if A and E decrease. Rauhut & Malmberg (2003) concluded that the most important factor in determining the 'burden' is the number of persons in work, not the share of population in different age-groups.

What is the result?

There are a number of studies based on the life-cycle hypothesis and the human capital theory, confirming or rejecting the tested hypotheses on the age-effects on economic performance.²²

The two pure demographic indicators – the dependency ratio and the post-active dependency ratio – show a negative correlation to GDP growth during the period 1960-2001 (see table 8.1). These two indicators do not, however, say anything about *who* is being a burden to whom – they only show the ratio between different age-groups. Nothing else. Both the dependency ratio and the post-active dependency ratio worsen because the share of elderly has increased between 1960 and 2001. As a consequence of this the labour intensive and low productive elderly care has expanded. Furthermore, an increasing share of the economy has become related to public financed pensions during the very same period. It is likely that the dependency ratio and the post-active dependency ratio will then impact on this economic demographic process. It is not ageing *per se* which creates lower economic growth, but the expansion of a marginally productive and labour-intensive service sector. The expansion of this service is, in turn, caused by ageing (Rauhut & Malmberg 2003). Therefore, the negative correlation between, on the one hand, the dependency ratio and the post-active dependency ratio, and, on the other hand, GDP growth, cannot be used as evidence for the occurrence of economic stagnation in an ageing society.

Table 8.1 The correlation between different demographic indicators and GDP in Sweden

	Correlation with GDP	Period
Dependency ratio	$r = -0,37$	1960-2001
Post-active dependency ratio	$r = -0,44$	1960-2001
Dependency burden	$r = 0,27$	1960-2001
Modified dependency burden	$r = -0,08$	1963-2001

Source: Rauhut & Malmberg (2003)

²² For an appraisal and review of empirical studies, see Bengtsson (2003).

The dependency burden shows a weak positive correlation with GDP growth during the period 1960-2001. Since persons on parental leave and sickness leave are considered as 'working', they create a bias in the population in working age. When this is controlled for in the modified dependency burden the result is that there is no correlation between the actual shares of persons in work and the GDP growth for the period, 1963-2001. One explanation for this may be that the share of persons in work is less important than what they actually are working with, i.e. their productivity level.

Rauhut & Malmberg (2003) do not find this result surprising since it is only logical that the economic growth in an economy with a highly productive industrial sector (1960s) will be higher than the economic growth in an economy with a large marginally-productive and labour intensive service sector (1990s). Furthermore, it is just as logical that the relative 'burden' in an economy with an unemployment rate between 1 and 2 per cent (1960s) will be lower than in an economy with high unemployment, increasing long-term sickness leave and an increasing number of early retirements. The economic structure plays an important role in this context.

It must be remembered that these analyses are simplified. Welfare is not produced in a homogenous way in the Nordic countries. One example of this is healthcare which is under pressure due to an ageing population. In e.g. Norway healthcare is produced at the national level and is financed from national taxes. In Sweden, on the contrary, healthcare is produced by the regions and financed by regional taxes. The result will be that regions with an ageing population in Sweden will have to impose higher taxes to finance the healthcare system relative to Swedish regions with a more favourable age structure. In Norway the regional age structure will not affect the financing of the health care system since it is paid for through national taxation. Childcare, elderly care and schooling are produced at a regional level in Sweden, and predominantly financed through local taxes. The local age structure will have a significant effect on the financing of these services in Sweden, while countries which have organised their welfare state differently will not face these problems.

The study by Bengtsson (2003) clearly illustrates the importance of including more than just the supply and demand of human capital in the analysis when estimating the age-effects on economic performance. The inclusion of the interactions between human capital and the changes in the economic structure are also of fundamental importance. Depending on how dynamic the economic structure is this will determine how important different age-groups will be over the economic structural cycle. This is, however, not really a new finding. Previous research has already concluded that depending on the institutional and organisational changes that take place at the time as the population changes, a population decline could lead to positive as well as to a negative economic development (Rosenberg & Birdzell 1994, Easterlin 1996, Kelley & Schmidt 1994 and Coale & Hoover 1958).

The regional perspective on demography and economic performance

Studies at the national level in the Nordic countries have been relatively numerous.²³ Only a few studies have however analysed the regional relationships between demographic changes and economic performance in the Nordic regions.²⁴

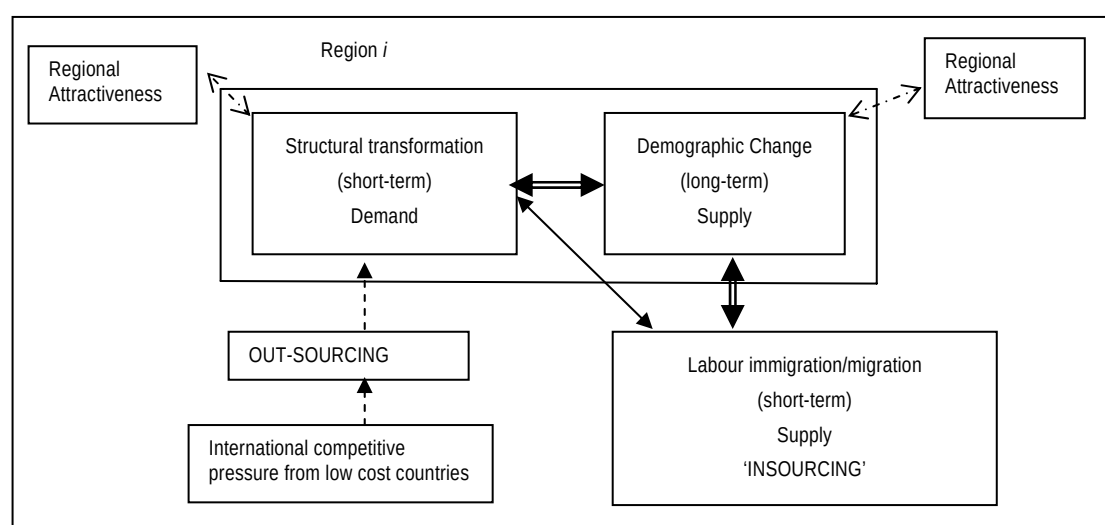
Edvardsson *et al.* (2007) argue that regional trends are to a large extent determined by the demographic changes in the incumbent population. Changes in fertility rates will gradually change the natural reproduction rate, which will in turn impact on the labour supply. It may potentially also change the quality of the labour supply due to endogenous mechanisms of

²³ Since the focus in this report is on the regional aspects of demographic changes and economic performance in the Nordic countries, national studies analyzing an aggregated level is not discussed.

²⁴ The most recent study by Edvardsson *et al.* (2007) is given much attention since it makes a serious attempt to discuss and analyse the inter-relationships between demography and economic performance.

adapting competences towards the service sector providing services for the increasing share of elderly people in the population. Demographic changes stand at the core of a 'sustainable' economic development based on incumbent resources. The actual extent of such sustainability will depend on two factors. Policies directed towards families and children and its relative importance for different kinds of regions and the nature of regional attractiveness for families with children. The first of these reflects a policy mix determined at the national level designed according to national goals on demographic issues. The second will to a greater degree be in the hands of regional and local policy agents, as regional attractiveness for families with children could be expected to depend on the extent of public service provision for these kinds of families. These dynamics enter figure 8.1 under the label 'Demographic Change (long-term) Supply'. They reflect long-term issues of labour supply. As indicated above they are also, to a certain extent, region specific.

Figure 8.1 Regional intersections between demographic changes and economic performance



Source: Edvardsson et al. (2007)

Each region undergoes structural transformation at the industrial level, which renders changes in the labour demand for given skills in the short and medium term. Changes in the composition of, and product portfolio within, sectors will change the demand in the regional labour market for low, medium and highly skilled labour and for specific competences associated with sector specificities. The impetus for these changes may originate from both regional trends as described above but also from the international competitive pressure associated with internationalization and the enlargement processes in e.g. the EU. The competitive pressure from 'outside' may originate from changes in policies or from cross-sector externalities such as the reduction in transport costs due to technological changes in the transportation sector. This may lead to the exhaustion of previously regionalised strongholds in the production process in specific sectors. Policy change may relate to national or international measures. Such national measures could relate to the location of national knowledge resource centres, which may be pivotal for the location of specific sectors. The international policies discussed here relate to the inexorable move towards the integration of product markets and from the enlargement of supranational geographies of cooperation and integration. EU enlargement is one such example of the emphasis on extending market access to increase international trade thereby increasing the pressure on regional structural change. The importance of this issue is stressed by the large gap in GDP/capita measures for the accession countries relative to the incumbent countries.

The pressure to attain structural change may also originate from regional trends towards the exhaustion of regional resources. The presence of bottlenecks on the labour market and the

resulting potential increases in regional wages will influence individual firms' location choice relative to regions with ample labour resources at their disposal. The extent to which such pressures in relation to a dearth of regional resources in respect of regional competitiveness will materialize depends on the labour market mechanisms available to individual regional labour markets which have, at a Nordic scale, previously been analyzed in a number of studies (Stambøl *et al.* 1997, 1999, Persson 2001, 2004, Edvardsson *et al.* 2002).

Individual firm choices will through these mechanisms be interconnected with the mass of individual choices taking place in a region. Individual choices by the incumbent population will in the medium and long run change the natural labour supply. Migration to other regions will add to the problem of sufficient and qualitatively inappropriate labour. Demographic changes in the incumbent population of the region will change the natural labour supply through ageing and the amending of fertility rates. Demographic renewal from other regions is one solution through intra-national migration. A counter argument here would pertain to the in-migration and immigration of low-skilled labour that prevents the necessary regional structural changes needed to preserve international competitiveness from occurring. In-migration and immigration may therefore be seen as both *the solution* and *the problem* at the same time depending on the match of competences in the flow of migrants and immigrants relative to the needed regional processes of industrial renewal.

Above all these mechanisms of interaction between regional trends determined by the choices of incumbent firms, individuals and international trends, in respect of competition from low cost countries and in-migration and immigration to a region, provide only a rather intangible form of regional attractiveness. This regional attractiveness will influence both the choices of individual firms and those of individuals and is thus endogenously determined. Regional attractiveness is to a large extent endogenous. It may however also capture trends in regional policies and preferences among individuals for certain characteristics of the region of residence. The exact outcomes in respect of regional attractiveness are accordingly diverse depending on the location of regions and the different policy measures at hand to promote regional attractiveness. The current approach is therefore to use the concept of *revealed regional attractiveness*. Regions are attractive if individuals and firms reveal their attractiveness by staying in or moving to a given region. This allows for a rather broad interpretation of regional attractiveness and avoids doubt as to on the proper measure to use when dealing with regional attractiveness.

One further aspect should however be stressed before proceeding with some of the theories that support the current setup. Figure 8.1 implies a potential timing problem. While regions may see structural transformation changing labour demand in the short-run, the demographic changes take place over the long-term. If firms make location and investment decisions based on current structural changes, supplemented by expectations of future changes in the demographic change, the temporary labour supply may not match the labour demand adapted to future regional demographic changes (Edvardsson *et al.* 2007).

Thus far only the regional relationships between demographic changes and *production* have been discussed. There is no doubt that the outcome of these processes affects *public consumption* and *social transfers* as well as the *tax base*. The tax base is directly linked to the size of the population in the working ages. If the tax base is too small to maintain a reasonable level of social services (consumption), tax transfers can be made from the state to the regions or between regions to compensate for an unfavourable age-structure in some regions. Social transfers, e.g. pension, sickness insurance and unemployment insurance, are financed by individual contributions and national taxes, and are thus not so vulnerable to a region's age-structure.

It is difficult to do a Nordic comparison on the regional effects of demographic changes on public consumption since the welfare state is not organised in the same way in the Nordic countries. Healthcare, which is a public consumption good highly vulnerable to changes in the age-structure, is financed and produced at a national level in Norway. An unfavourable age-structure in some regions will be levelled out by favourable age-structures in other regions. In

Sweden, healthcare is financed and produced at a regional level. In this case, an unfavourable age-structure will have a negative impact on the production and financing of this public consumption good. Another example is e.g. given by the fact that in Sweden elderly care and childcare are, predominantly, financed by local taxes and produced at a local level, which is not the case in all Nordic countries. Again, a negative age-structure will limit the ability to maintain these social services.

Current trends in respect of demographic development have consequences for welfare production in the Nordic countries. Not only have the increasing number of elderly burdened the welfare system, but they have also burdened those who constitute single households. Although the demographic changes ahead are well known and can be carefully planned for, not all parameters are certain. The demographic dependency ratio is not as important as the economic dependency ratio. While population projections can be made with a high degree of certainty, projections on e.g. unemployment are notoriously susceptible to error. We also know that technological innovations, as well as institutional and organisational changes, will occur and improve the conditions for welfare production, but we do not know which and when they will occur (Kautto 2002). Two aspects of the conclusions by Kautto (2002) must be stressed: (1) the regional aspect is missing, and (2) a development we currently consider to be troublesome can be mitigated or even solved by the occurrence of institutional, organisational and technological changes.

Summary

What then are the economic implications of demographic changes? What causality can we infer? Firstly it must be stated that no clear-cut evidence exists that any specific demographic development will lead to a certain economic outcome. As stated previously, population decline could lead to positive as well negative economic development, and *vice versa*. The key factor here is the ability to adjust to the new situation. Historically, the Nordic countries have been good at doing this.

Demographic ageing is not a phenomenon that has suddenly been aroused. During the 20th century, fertility has fallen sharply in most of the countries of the Western World while life expectancy has increased as people live longer. A simple indication of this is the higher median age of the population. This trend was pointed out by a number of demographers as far back as the 1940s (Notestein et al. 1944, Kirk 1946, Hofstee 1950). In the Nordic countries the population has been gradually ageing since the mid-18th century (SCB 1999, Statistics Norway 2007, Statistics Denmark 2007).²⁵ Nobody can argue that the last 250 years have been a stagnant economic period in the Nordic countries although e.g. the median age increased in Sweden/Finland from 23 years in 1750 to close to 40 today, or that life-expectancy in Norway has increased by about 30 years since 1821.

Historical occurrences of population decline with a possible depopulation potential have probably most typically been a small area phenomenon in Europe, although some of the implications as well as some of the causes may be related to larger regions and even entire nations. Depopulation is also linked to the size and scale of the geographical area (ESPON 2005). Historically, depopulation has been rare in the Nordic countries. During the Black Death 1349-1350 a depopulation of sparsely populated areas did occur, but the extent of this depopulation remains a subject of scientific debate (Lindkvist & Ågren 1985, Norborg & Sjöstedt 1987). A population decline, with possible depopulation, did occur in Sweden at the very beginning of the 18th century as a result of the wars by the Swedish king Karl XII (SCB 2001). To what extent the demographic processes we are experiencing today will actually lead to depopulation is unclear (e.g. Foss & Juvkam 2005).

²⁵ In relation to Denmark, data for this is found in Statistikkbanken, tables HISTB4 and FT. Finland is included in the Swedish statistics until 1809.

Labour shortage is not a homogenous concept – but, at least, three: partial, general and geographic labour shortages can be identified. A central factor in dealing with labour shortages is whether it is a labour shortage caused by business cycle fluctuations (short term perspective) or if it is a labour shortage caused by structural problems (long term perspective). As discussed previously in this chapter, situations of long-term labour shortage have led to labour being replaced through technological, institutional and organisational changes historically, leading to productivity improvements. They have, in turn, resulted in increased growth, and the creation of an economic surplus through economic growth is a condition of welfare. Short-term labour shortage is a constantly recurring problem. Who has not heard of the problem of getting e.g. construction workers during an economic boom?

In a recent OECD study it was concluded that immigration can mitigate the bottle-necks in the labour market, but immigration can neither change the population structure, nor solve the deficits in the public budget (Coppel et al. 2001). Immigration can only offer a short-term solution, but the problems ahead are rather more structural in nature and thus require long-term solutions. Furthermore, Borjas (2001) argues that the relative success of immigration in the USA is unique. If the USA is an exception, it can be questioned whether the American experience can be transferred to the Nordic countries.

There are many possible indicators which can be used in an analysis of economic performance and demographic change. The indicators, however, tell us little themselves unless they are placed in a socio-economic context. It is also of the utmost importance that the indicators used clearly distinguish between the causes and effects of ageing. This may sound trivial, but is often neglected in analyses on the economic implications of demographic change.

There is then a shift from many children and few elderly to few children and many elderly over time. This is not observed when analysing the dependency ratio only, but analyses of the pre-active and post-active dependency ratios are needed to detect it.

9. Policy implications

Introduction

All of the Nordic countries currently face major demographic changes though demographic change itself is nothing new. Urbanization and population decline in rural and sparsely populated areas are common trends. This trend, in turn, affects the regional age structure while current domestic migration trends aggravate the growing issue of an ageing population. Future labour shortage and further polarization between urban and rural areas are possible future outcomes.

The ageing population and potential labour shortage have significant policy implications for the Nordic countries. Such challenges call for adaptation and the ability to develop policy measures which correspond to these challenges.

Problems and policies

Fertility

In the Nordic countries as in Europe in general fertility rates have steadily declined since the 1960s and fertility levels in several European countries are now under the replacement level (Kohler *et al.* 2006). Moreover, foreign women migrating to the Nordic countries quickly adjust their fertility rate. From an earlier high rate they drop to the average national levels (Andersson 2004, SSB 2002). Studies show that countries with a developed welfare system are more likely to have higher fertility levels (Vogel 2003) and when comparing the Nordic countries with the average fertility level for the European countries as a whole the Nordic countries do retain a slightly higher fertility rate (Kohler *et al.* 2006).

When analyzing the main factors behind declining fertility levels economic reasons remain the most important underlying factor. Economic uncertainties experienced by young adults affect their fertility rates as they respond to these uncertainties with postponed fertility. Furthermore the labour market and the threat of unemployment encourage people to choose to educate themselves to a greater degree than before thus also further postponing childbearing. Here a problem arises: as women, due to low fertility and mortality rates, must increase their participation in the workforce even more to compensate for an ageing population, the increased labour market participation rate is then one of the most important factors behind fertility decline (Kohler *et al.* 2006).

Steadily declining fertility rates in recent decades impose new challenges for society as we need to adapt or to alter the current development trend. The changing age structure due to lower fertility rates and lower mortality rates will undoubtedly affect welfare systems on a large scale. Therefore different policy actions are needed to induce fertility. One key policy issue here is to help young adults overcome the economic uncertainties they are facing. To overcome the uncertainties regarding labour market issues might be difficult but to increase their overall economic status, subsidies and child support might convince more young adults to overcome the economic uncertainties in respect of future parenthood. The potential to combine family life and education or work are also important here.²⁶ In this case childcare becomes important as it creates opportunities for (especially) women to combine work and family life and this implies that the level of gender equality is of importance as different conditions for men and women effect fertility to a large extent. Although several policy measures can be discussed, the negative trend in fertility is a long term development and is not likely to be affected in the short run by any specific policy measures. Even if relevant action is implemented today, it will take about 20 years before increased fertility will have an impact on e.g. the size of the labour force.

²⁶ See the discussion on *transitional labour markets* in Persson (2004).

Mortality and life-expectancy

Life-expectancy levels have been steadily rising throughout the 20th century and this development has been made possible by overall better welfare due to economic development which in turn has led to better healthcare. With better healthcare and medical treatment society is less vulnerable to epidemics. Working conditions have improved and people's lifestyles are generally healthier (SCB 2007). Although the overall development experienced during the 20th century has improved there are a few small trends along the way that are worthy of mention. During the 1960s and 1970s men's life-expectancy levels stagnated due to an increase in cardiovascular diseases. The main reason for this related to the higher consumption of alcohol, tobacco and non-nutritious foods among men relative women. This development was later arrested by more efficient healthcare provision and also, most importantly, men in particular changed their lifestyles and began to live more healthily (SCB 2007).

Several studies have also pointed to the socioeconomic factors behind life-expectancy. In general, persons with a higher level of education have a higher life expectancy level. Those times when the trend has shifted and the development has changed direction generally occur when socioeconomic and healthcare standards change. This primary factor affects the lifestyle of people and their consumption of unhealthy products. In the future obesity may become a new negative trend replacing cardiovascular diseases as a major health problem. The problem with obesity is yet another lifestyle-related disease that is clearly linked to having an unhealthy lifestyle.

The policies needed to support the lowering of mortality rates are clearly linked to health-related actions. Therefore to further increase life-expectancy levels as well as to lower mortality levels policy actions should be aimed at peoples' consumption of tobacco and alcohol as well as increased exercise which will alter peoples lifestyles and make them more healthy.

Although life-expectancy has increased due to lower mortality caused by healthier lifestyles and better medical treatment, this development poses major policy and societal challenges as the average population gets older. The development is clear in that, in the future, we will have more and more elderly people and this development is also accelerated by the fact that fertility levels are declining or stabilizing at low levels. The ageing population is one of the major demographic challenges facing society today as this imposes several policy implications. The most hotly debated issue concerns the future of economic growth and the distribution of public funding. This development is most evident in the sparsely populated areas in the Nordic countries because of the out-migration of young people from these areas. The imposed and possible policy actions required to face up to the problems posed by the increasing number of elderly people in society are that people may have to work longer and retire later in life. This would immediately mitigate the pressure on the labour force by increasing the amount of tax payers. This type of policy action can be identified as being part of the search for a more dynamic response to the issue. As people get older perhaps they must work longer is the logic behind this policy action. This dynamic approach is rather interesting in connection with overall demographic change as it imposes the notion that society must be more flexible and be ready to adapt to new challenges.

Internal migration and mobility

In all the Nordic countries population growth is taking place in the urban areas and particularly in the capital and/or metropolitan regions. This trend towards urbanization has accelerated in recent years and is likely to continue (Lundholm & Malmberg 2006). Movements are mainly between urban and rural areas but also within the rural areas the more urbanized places within the region are experiencing in-migration. This development is particularly evident among young people (Neubauer *et al* 2007). The out-migration of young people affects fertility and thus the overall age structure in the rural regions. With young people moving the number of fertile women decreases as well as the number of people in the workforce (Edvardsson *et al.* 2007). This in turn creates a negative cycle where economic development is hindered by, for example, labour shortage. Therefore large imbalances between regions arise and the aim of achieving a balanced and cohesive development is hindered.

Among the young people who constitute the majority of the internal migrant's, women are keener on moving than men. The reasons behind the desire for young people to move, preferably metropolitan regions, are closely associated with local labour market conditions and the potential to access higher education, but also relate to the desire for culture and entertainment, i.e. to have a metropolitan lifestyle.²⁷

If women are more likely to move within a country, they do not constitute the majority in respect of commuting. The most mobile and commuter-type persons are young to middle aged men with high levels of education. The gender pattern for commuting is rather cohesive across all of the Nordic countries as men constitute the overall majority of commuters while the gender gap is larger in rural areas and smaller in urban areas (Neubauer et al 2007). This fact is interesting in itself to analyze when comparing the development and results with other international studies which suggest that women are less favoured and do not achieve the same benefits as do men in respect of migration and commuting in general. This gender cost/benefit difference is due to income and career reasons where men are more likely to gain from migration than women (Lundholm & Malmberg 2006).

The main challenges related to internal mobility relate to the depopulation of rural and peripheral areas. Looking at the main causes behind migration, young people in particular, are moving to areas with better labour markets and better job opportunities as well as access to universities and higher education. The main focus of policy actions should be located on the local and regional level in an attempt to develop place-specific solutions for the region in question. More concrete policy actions should aim to encourage young people to consider their home region in respect of education and to make a connection here to the labour market. Ensuring that the potentials exists for people to educate themselves and to subsequently graduate to gainful employment in their own home regions is therefore crucial.

International migration

During the last few decades the international migration pattern in the Nordic countries has changed. Looking back at the immigration flows to the Nordic countries in the 1970's the pattern was that people migrating to the Nordic countries were mainly labour immigrants from other Nordic, but also other European, countries. Today however the situation is different. The people migrating to the Nordic countries today have a more diversified geographical background. More and more people migrate from outside Europe to the Nordic countries. Moreover, the reason behind the migration has changed from being mostly labour-related to ostensibly refugee-related. Among the Nordic countries, Sweden accepts the most immigrants with almost half of the total number of immigrants to the Nordic countries. Finland and Iceland however have less immigration, at least in absolute terms (Edvardsson *et al.* 2007). Although a general picture can be given for the Nordic countries a lack of harmonized data regarding migration flows nevertheless exists while the definitions used by the each country often differs.

Immigrants tend to move to the urban and metropolitan areas while designated 'refugee-receiving municipalities' only harbour immigrants in the short term. This has accelerated the urbanization process in the Nordic countries as the general native trend coincides in that the rural and sparsely populated areas continue to face depopulation. Immigrants tend to move to the urban growth areas because of the labour market possibilities expected there and also tend to live near people who have emigrated from the same country (Edvardsson *et al.* 2007).

In this context then the problem of an ageing population and, especially in these regions experiencing depopulation, immigration can be seen as a solution. However to tackle the problem of labour shortage and depopulation by inducing immigration to certain areas proves to be a rather complex issue. As we know from earlier studies foreign women with higher

²⁷ This is regarded by many young people as a future investment as they improve their chances for future employment and these opportunities are linked to university areas. This fact, of young people moving to educate themselves, has been a focus for policy actions and this is rather evident in for example Sweden where universities have been located in areas with a tradition of out migration (Lundholm 2007).

fertility rates in their native country quickly adjust to the low Nordic levels (Andersson 2004, SSB 2002). Following the issue of fertility rates immigrants like the native Nordic population move to urban areas, which in turn aggravates the issue of depopulation (Edvardsson *et al.* 2007).

The twin challenge of integrating immigrants into society and tackling depopulation and potential labour shortages in relation to the current labour market situation and economic systems is then rather large. Today when the Nordic countries are in the process of developing an emerging service economy with more advanced jobs requiring higher levels of education, several problems arise as most of the immigrants attracted are located firmly within the low skilled sector of the labour market. This creates greater competition for jobs where labour shortage is not an evident problem. This in turn potentially affects growth. What the Nordic countries need then is more immigrants with high levels of education suited to the jobs in the sectors requiring highly skilled employees and preferably not in the urban areas (Rauhut 2007).

Following the outline of challenges in respect of potential labour shortage and depopulation, the policy issues most important to address are those primarily related to integrating immigrants more fully into society and ensuring that they can match expected labour market needs. The issue of depopulation in rural and sparsely populated areas is hard to address and the possible measures to address this problem mainly relate to the labour market and the potential to gain employment. To induce profound change on the Nordic welfare system is rather drastic but perhaps this is what, ultimately, is needed in order to better address the broad and ongoing societal developments currently being witnessed across the Nordic area and beyond. In this case, as in many others, the problem of static or entrenched policy actions or measures – often seen in relation to desired state-level ideological ‘goals’ or as ‘producer bias’ in the public sector – is evident while the formulation of policy that coincides with new societal developments imposes a significant challenge as the ideological basis of the ‘Nordic welfare model’ has initially to be confronted.

Demographic changes and their economic implications

Firstly it must be emphasised that the causality – both in terms of direction and magnitude – between demographic changes and their economic effects is, at best, unclear. The first argument for grounding this stance relates to a number of theoretical issues. Most analyses are based upon parts of the *neoclassical* economic theory and, to some extent, *new classical* economic theory.²⁸ These two theoretical approaches find very negative implications from demographic changes (i.e. ageing, depopulation and labour shortage). There are, however, other economic theories, with different points of departure – and definitely not so market-oriented – indicating other results. The question is what result these theories produce. Furthermore, although it is a good starting point to analyse the *direct* economic effects of demographic change, several *indirect* effects – dealing with e.g. political, social and psychological aspects – undoubtedly also exist. These aspects can probably be better analysed by other disciplines. The question here is then what results these disciplines produce.

The second argument for grounding the conclusion that the economic effects of demographic change is that we tend to treat the issue as a novelty, something which has never previously occurred in history. This is very erroneous. Things like ageing, depopulation and labour shortage have happened before and we probably have lots to learn from how these problems were dealt with previously. It is probably not very difficult to find ‘best’ as well as ‘worst’ practices on how to deal with the problem when looking back in history.

There is also a third argument for grounding the above statement on indistinct causality between demographic changes and the economic effects which is related to methodological aspects. (1) The choice of indicators is dependent on what theoretical point of departure is used. As noted above only a few theories have been used to analyse this problem so far. (2)

²⁸ *Neoclassical economic theory* is a very market-oriented theory – all state activity will create bias on the market. The leading economists advocating the *new classical economic theory* are also leading neo-liberals.

Most of the previous studies do not distinguish between the long and short term effects of ageing, depopulation and labour shortage when they analysing the economic effects of these processes. What can be seen as a devastating effect in the short term can also produce positive effects in long term, and *vice versa* (table 9.1). This *lacuna* in respect of our understandings of the long and short term effects economic of e.g. ageing, depopulation and labour shortage however narrows the ability of policymakers to make good decisions. (3) The final aspect worthy of mention here is the choice between a *macro* and *micro* economic approach to the problem. Thus far the *lifecycle* hypothesis has utilised a macro-approach while *human capital theory* has used a micro approach. It is undoubtedly the case, moreover, that the economic effects of e.g. ageing, depopulation and labour shortage will affect the state finances and all individuals of that country. There are, nevertheless, a number of public services produced by public actors other than the state – regional and local producers produce welfare and educational services. Depending on what the population structure looks like in each and every region the implications of demographic changes will differ. Thus far most analyses have only dealt with national-level analyses of the average population while existing regional and local diversity is ignored. This is surprising since e.g. the European Union continues to advocate stronger regions. The absence of a *meso* level in the analyses is then rather puzzling.

When putting all of these arguments together it is clear that we still have only a very fragmented knowledge of the causality between demographic change and its economic effects – both in terms of direction and magnitude.

Dilemmas and goal-conflicts

Several of the policy implications mentioned previously in this chapter are rather predictable. (1) Low fertility should be mitigated by increased gender equality, increased possibilities to combine family and work/education, while measures should be taken to stimulate an increase in fertility. The Nordic countries have worked actively with policies in these areas for decades, but there is no major sign of changing fertility in sight. (2) The Nordic countries have also taken measures to spread higher educational institutions across the country in the hope of encouraging more open access. Nevertheless, young adults still prefer to move to the major university cities, and if they study in a regional university or university college they move to the larger towns to get a job. Unless new jobs in dynamic and expanding sectors are created in rural and peripheral areas, this development will continue.²⁹ Government actions to encourage private companies set up or expand their businesses in rural and peripheral areas cannot be undertaken in the same way today as was possible 30 years ago. (3) Raising the retirement age is a short term measure. The problem in respect of ageing is simply pushed a few years ahead, but it is not solved.

²⁹ An evaluation of the regional effects on higher education in Sweden shows that the regional differences in recruitment of students have been reduced. At the same time, most regions face an out-migration of educated young adults on a larger scale than previously; the new jobs are created in the metropolitan areas and in larger cities. The conclusion is that the increased availability of higher education in all Swedish regions has not managed to raise the competence level of the regional labour force. Since the demand for highly educated labour is bigger in the metropolitan areas and in larger cities the migration flows from the periphery and rural areas to the central and urban areas have not changed (Westlund 2004). Edvardsson (2001) analyses the same problem and concludes that the regional universities have had a significant impact on the regional brain-gain on Iceland. The statistical material however does not allow for a detailed analysis.

Table 9.1 Short- and long-term policies

Short-term policies	Medium-term policies	Long-term policies
Raised retirement age Increased gender equality Immigration Improved educational possibilities nationwide	Labour market widening	Stimulation of fertility Improved health status

There are also goal-conflicts in respect of the policy implications mentioned earlier in this chapter. (i) On the one hand, increased female labour participation is needed – especially in typical non-female sectors – but, on the other hand, increased female labour participation will lower fertility since the alternative cost for having children will increase. (ii) On the one hand, an improved health status will enable people to work longer – and thereby not be a burden to the social security and healthcare systems – but, on the other hand, the higher the share of elderly people there is, the higher the dependency burden will be. (iii) On the one hand, persons with an immigrant background in the Nordic countries face greater difficulties in getting a job even if they are qualified for – with an increased need for social transfers – but, on the other hand, new immigrants are needed to fill the vacancies. The notion of ‘improving’ the labour market situation for persons with an immigrant background in the Nordic countries is however a highly-charged question politically. (iv) On the one hand labour immigration can promote economic growth in the short-term since bottlenecks on the labour market are mitigated, but, on the other hand, labour immigration can obstruct long-term economic growth since it obstructs structural change in the economy.

Many of these goal-conflicts – or dilemmas – are not new. In fact, they have existed for approximately the last five decades. In regulated economies, as the Nordic economies were until the 1980s, these policy implications could be dealt with nationally. Today the situation is different; the Nordic economies can only be described as open market economies. They are no longer controlled by national politicians, but by international market actors, and, to some extent, regulations imposed by the EU/EES-treaties.

Summary

Many of the policy implications discussed in this chapter are already well-known. From time to time they have been successfully dealt with. Over the last couple of decades the basic conditions for policy measures in respect of demographic change have changed due to the emergence of supra-national institutions (e.g. the European Union) and an increased exposure to market forces.³⁰

Often ignored is the distinction between the *long and short-term implications* of various policy implications. Given some assumptions, e.g. that labour immigration can be positive in the short-term, but negative in the long-term, but without taking this distinction into consideration when imposing policy measures, the outcome may be neither expected nor desired.

The discussion in this chapter also shows that *intrinsic goal-conflicts or dilemmas* exist in relation to the policy implications. Is it possible to have a high female labour force participation rate and at the same time have a high fertility rate? Is it socially sustainable to import foreign labour while domestic labour with an immigrant background is rejected on the labour market? When discussing migration, should the long or short-term effects of migration be prioritised? These few examples only illustrate the intrinsic goal-conflicts or dilemmas in the policy implications and how difficult it is to deal with them.

In some respects our *knowledge remains rather limited*, e.g. regarding the causality between demographic change and economic performance, whereas it is difficult to discuss the policy

³⁰ This refers to an internationalisation and globalisation of the economy as well as to increased cross-border regionalisation.

implications regarding the implications on economic performance of an ageing population. A lot more research is needed to fill these knowledge gaps.

10. A Nordic typology

The purpose of using typologies is to be able to create a coherent pattern out of the multiple dimensions of available data. A typology helps to characterize patterns by defining categories which then enables an overview to be produced, and a fuller understanding of the processes behind the patterns to be forwarded. Consequently, it may support the interpretation of anticipated potential consequences of future development, and assist decision makers in the evaluation of the possible economic and political approaches needed.

In the previous chapters several typologies have already been applied to the demographic trends, showing how individual components characterize the Nordic countries. In this chapter, however, we will try to take the analysis one stage further, in order to show how classification of the component into type classes helps in the description of characteristic regional structures and in the identification of suitable indicators for determining processes – and thus also in producing relevant policies.

Developing typologies

The starting point of the analysis is the basic components defined in connection with the Demographic Transition components of population dynamics - birth rates, death rates, and in addition to this the other effects of migration. The classification of the components in different types of dynamics enables a focus on their contribution to the current status of the demographic structure in the municipalities, and thereby connects to immediate and direct policy measures.

The next step in the analysis is the focus on the question of gender, as this has turned out not only to be a very important regional characteristic, but at the same time an indicator of community demographic well-being. On one hand due to the fact that the reproduction of the population requires a balance in gender proportion and that an unequal distribution of gender basically causes a disequilibrium thus placing significant limitations on the ability to meet the sustainable reproduction rate. And on the other hand, gender has become an important issue in relation to acquiring the higher education needed as a competitive factor in the knowledge economy. Consequently, combining these two focal points in a joint classification helps us to identify regions which seem to cope better with the challenges, and regions which will have to take new policy measures in order to be able to manage in the future.

The final section of this chapter tries to combine the multitude of both independent and dependent demographic components, in order to see how the different components interact, and finally to see how these interactions lead to different classifications and structures of the Nordic municipalities.

In all the proposed typologies and analyses data from 2006 has been used, with the individual components being available in Appendix A.

Potential integrated impact

To summarize, the basic demographic data – birth rate (figure A.1), death rate (figure A.2), net migration rate (figure A.3) and net growth rate (figure A.4) – have been organized in a two dimensional matrix (figure 10.1), showing the integrated effects of the different parameters discussed above. This could be characterized as a balance sheet matrix.

The rows in the matrix indicate the three potential net effects of the birth-rates and death-rates, as they are situated in the Demographic Transition model's different phases. With birth rates significantly higher than death rates, the situation is similar to the phase II, and partly also to phase III of the model, while a balance between mortality and fertility is achieved – according to the model – during phase III and maintained in phase IV. And finally, mortality

surpassing fertility is a characteristic of phase IV. In the grouping of data a tolerance of $\pm 5\%$ has been considered as defining a balanced situation.

Figure 10.1 Balance sheet classification based on the basic demographic parameters.

Demographic Transition Balance Sheet			
	Out-migration	Balance	In-migration
Birth > Death (Phase II)	1. Balanced Supply Regions Surplus of births and out-migration	4. Moderate Increasing Regions Surplus of births and balanced migration	7. Fast Increasing Regions Surplus of births and in-migration
Birth = Death (Phase III)	2. Moderate Declining Regions Balanced population with out-migration	5. Balanced Regions Balance in both births and migration	8. Moderate Increasing Regions Balanced population with in-migration
Birth < Death (Phase IV)	3. Fast Declining Regions Declining population with out-migration	6. Moderate Declining Regions Declining population with balanced migration	9. Balanced regions Declining population compensated by in-migration

The columns in the matrix indicate the possible migration outcomes, i.e. a balanced situation, a net out-migration, or a net in-migration. Also here a tolerance of $\pm 5\%$ has been considered as one defining a balanced situation. Within this framework the regional characteristics have been determined in three different balanced situations (1, 5, 9), three situations with increasing population (4, 7, 8), and three situations with declining population (3, 6, 9). Situation 9 is only theoretical in relation to the Nordic countries, as this situation has not been identified in the analysis. The result of the analysis is shown on figure 10.2 below.

Blue colours are indicating municipalities with a high level of in-migration and red colours with a domination of out-migration. Within these main colours nuances have been applied in order to show differences in dynamics due to natural population growth.

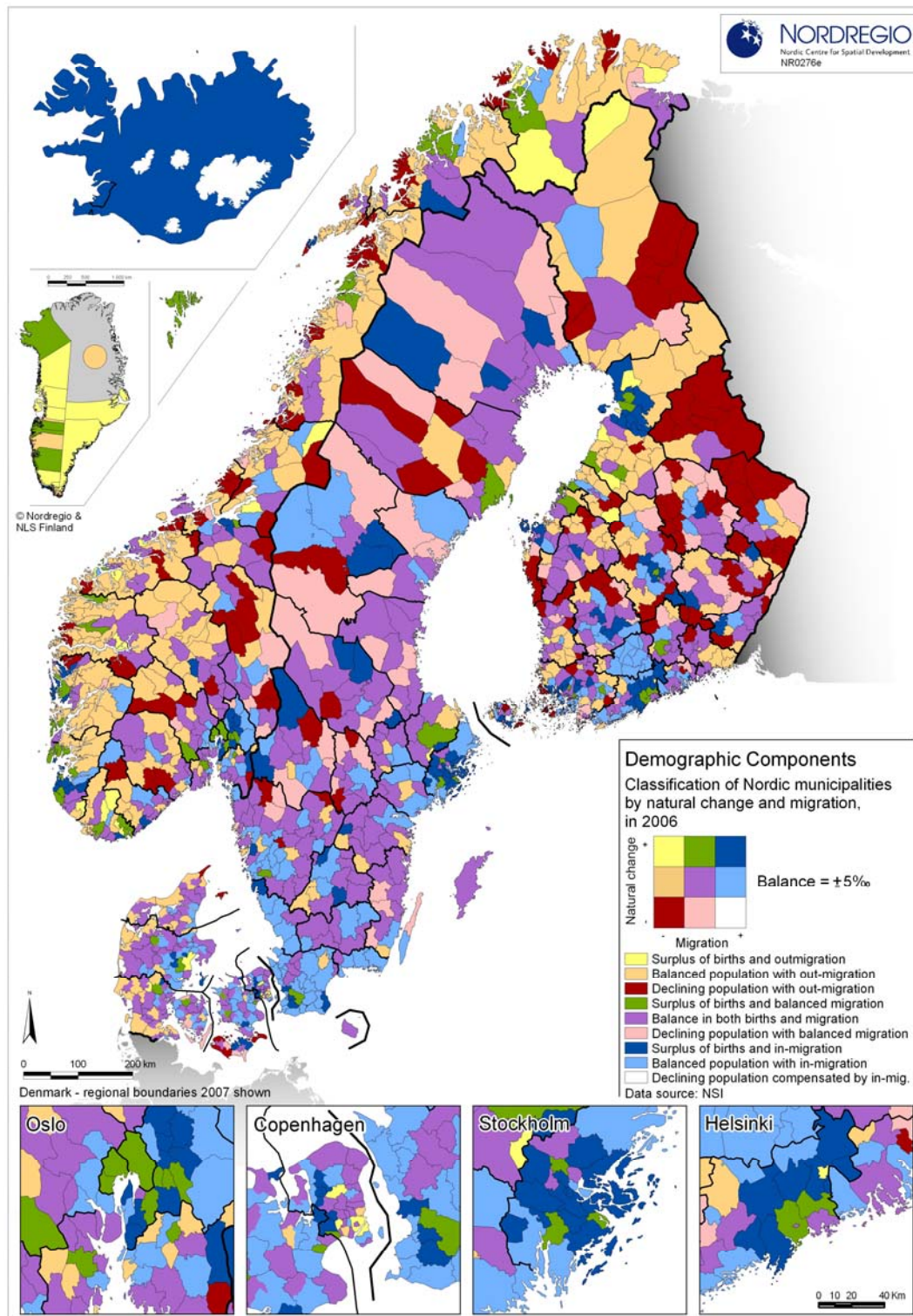
The map clearly shows the main structure of two central growth axes, one situated around Kattegat and Skagerak, from the Oslo region in Norway and down to the southern parts of Sweden and Denmark. And the other region stretches across the Baltic Sea from Stockholm to Helsinki. In addition to this there are major growth centres in all three countries, just as Iceland and a few municipalities in Greenland are characterized similarly. The domination of group 7 and 8 indicates a positive net migration in combination with a balance or positive natural growth pattern.

Similarly, a north/south divide in Sweden and Finland, and an east/west divide in Denmark become very clear just as some main infrastructural components are identifiable. The infrastructure – primarily roads and railways – seems to be attractive to high performance features, and therefore results in high mobility as well as high reproduction rates.

A clear feature is also the divide between Sweden and Denmark, on one hand, and then Finland and Norway on the other. While Denmark and Sweden are dominated by the red and yellow colours, indicating a dominance of net in-migration pattern with different levels of natural reproduction levels, both Norway and Finland are characterized more by the blue and

green colours, indicating a net out-migration pattern, also with different levels of natural reproduction levels.

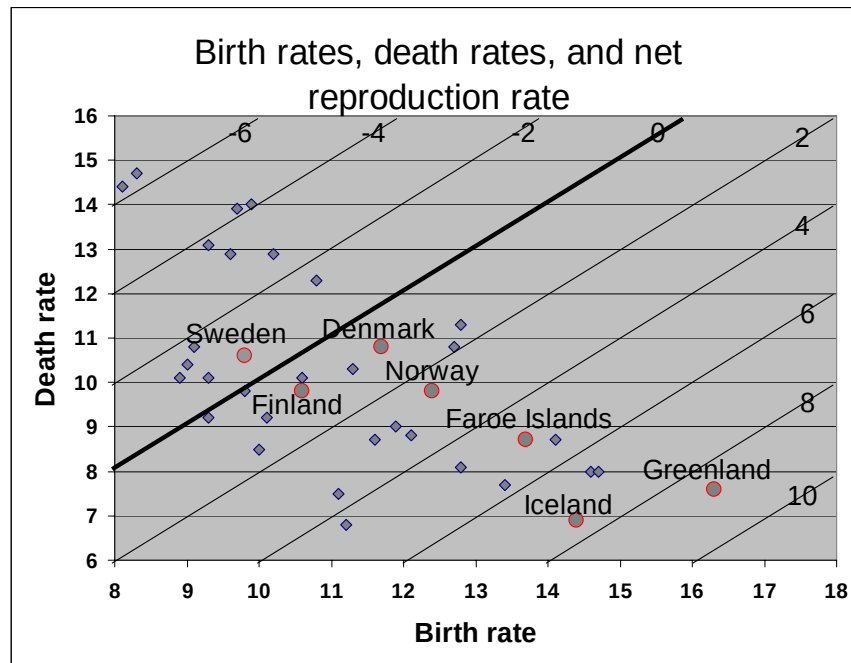
Figure 10.2 Classification of the basic demographic parameters



Part of the explanation here has to do with the different positions in relation to what could be characterized as 'potentials', i.e. the interpretation of the status of the basic demographic

parameters into dynamic categories. The natural reproduction rate in this connection (birth rate – death rate) gives an idea about the ability of a region to reproduce itself, and in the European setting the Nordic countries are positioned very differently, as illustrated on the figure 10.3.

Figure 10.3 The Nordic countries in a European setting in relation to birth rates, death rates, and reproduction rates.



The figure illustrates the situation of all European countries in relation to birth rates and death rates, and on top of these two dimensions the net reproduction rate has been superimposed, with negative reproduction rates in the upper-left corner, and positive reproduction rates in the lower right hand corner. The data used is from 2006, and at that point of time Sweden (-0.4‰) was the only Nordic country with a negative reproduction rate, with Denmark (0.9‰) and Finland (0.8‰), however, very close to a situation of balance. Norway (2.6‰), however, shows a situation with a positive reproduction rate, just as the North Atlantic region where the Faroe Islands (5.0‰), Iceland (7.5‰) and Greenland (8.7‰) show reproduction rates in the absolutely highest positive part of the European setting.

In the European context, the North Atlantic region is in group with Montenegro, Ireland and Macedonia, but also with the USA. Norway is situated on a level with France, while Denmark is close to UK. Finland has almost the same pattern as Belgium, and Sweden is in a group with countries as different as Greece, Slovakia and Japan. These differences between the North Atlantic region and most of the other Nordic countries clearly show in the balance sheet, in all three cases with high reproduction rates, and in Greenland and the Faroe Islands high out-migration, and Iceland with a balanced migration pattern.

In relation to policies at the national level it may be relevant to look into how differently the Nordic countries fit into an European setting. At the regional level, however, the divide between the municipalities exceeds the countrywise differentiation, emphasizing the potential for common approaches, still, however, with the situation that there seems to be more communalities between Denmark/Sweden on one hand, and Norway/Finland on the other.

Gendered regionality

As discussed previously, marked regional gender differences have evolved over the last 10-15 years, characterized by an out-migration of women especially from rural areas, as shown on figure A.14, but also a situation where women have become dominant in relation to high and higher education, shown on figure A.15. This is not a situation only characterizing the Nordic countries. It is a pattern which has emerged in most of the developed countries, and relates to some general tendencies in relation to the gendered division of labour. It is, moreover, a situation which requires a new typology emphasizing the two components, out-migration and education, each requiring more in-depth attention.

Out-migration patterns

Comparative research from a number of northern regions (Alaska, Greenland, the Faroe Islands, Newfoundland and Iceland) seems to indicate very similar patterns regarding affinity to rural community life. Compared to males, more female consider, and also eventually tend, to migrate permanently away from their home community and region, first of all to look for job opportunities which better fit their qualifications, and provide opportunities outside those traditional economic activities in these communities (Hamilton, 2003; Hamilton and Butler, 2001; Hamilton, Haedrich and Duncan, 2004, Hamilton and Otterstad, 1998; Hamilton and Seyfrit, 1994; Rasmussen, 2005).

This, however, is not only a 'northern' issue. Even though the processes of globalisation have different affects on various rural areas a general pattern has emerged in the context of the restructuring and decline of the agriculture sector, the growth of the service sector and increased emphasis on technology. These undergoing economic and social changes fundamentally affect women. Indicators from EU research reveal that the employment rates of both men and women are lower in rural areas, just as unemployment combined with a lack of diversification in employment is more common for women than for rural men (Klass, 2007). As a consequence, rural areas experience marked demographic, social and cultural changes, and as the process of change in the dependency structures becomes still more evident throughout Europe, especially affecting predominantly rural areas, where women dominate as the providers of primary care for children and other dependent people. As a consequence, women tend to experience negative short-term and long-term consequences in terms of careers, earnings and pensions, and this has severe consequences for migration patterns.

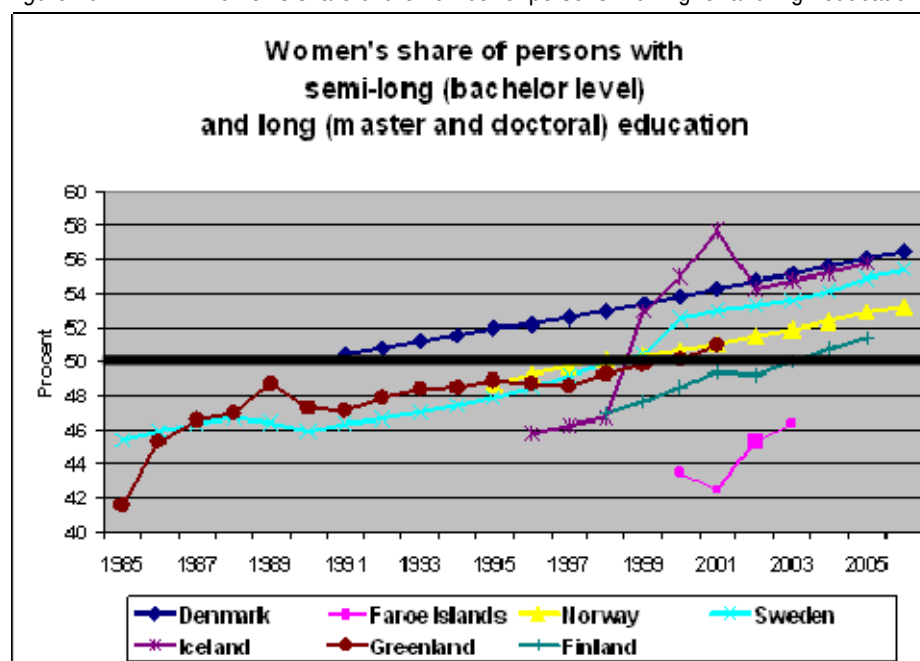
These changes contribute to a continuing out-migration of young and well-trained persons from regions which are predominantly rural. As a majority among those who leave are women, there are negative effects on the social life of that rural area and on the rural economy for instance though opportunities for marriage, the maintenance of family life and family structures, while it also has an influence over cultural activities (Hamilton and Seyfrit, 1993; Rasmussen, 2005). Furthermore, it contributes to the deterioration of the institutions of social infrastructure and to the decline of services of public interest, eventually leading to a loss of population, observable lower fertility rates thus endangering the medium to long-term development of these regions (Klass, 2007). The relatively high number of women employed in the service sector has been argued to represent 'an escape valve' away from the traditional rural structure based on agriculture which has become highly mechanized and masculine, towards a new, more diversified socio-economic structure in which women participate in and receive both a salary and social protection (Garcia and Gonzalez, 2004). Furthermore, it is stressed that women often initiate the diversification of the rural economic realm by creating businesses, thereby generating both income and jobs.

These patterns can be seen as connected to a number of gender-related differences in aspirations and approaches to change. Firstly in relation to the question of work and work-related activities the perception of customary male activities related to renewable resource exploitation seems to be 'sticky', in the sense that the male discourse – or perhaps the prevailing discourse in respect of males - has difficulty in moving on from what once were key

activities, but now constitutes only a miniscule percentage of the available jobs. Contrary to this, the females in their upbringing are socialized into collective activities, more attentive to other's needs, and consequently much more open to change (Rasmussen, 2007; Hansen, 1992; Petersen, 2002; Nathansen, 2004). As a result of this, they become less limited by specific job characteristics, determined by what may be considered as being 'traditional' and 'acceptable' activities. To use an analogy, males seem to be socialized into path-dependency, creating difficulties in accepting other paths and changes, while females tend to be socialized into situations where adjustment and change are required leaving them prepared to move between job categories and job options. Only jobs related to (new) technology have become status-providing alternatives for males. Consequently, the adaptation to change through the educational system fits much better with the socialization of girls, even in spite of the fact that girls are constantly underrated and underrepresented when it comes to filling high ranking positions, both in academia and in administrative affairs. Finally, the economic needs of the family and also their greater need for social recognition motivates women to look for work within the rural area, which creates social networks more frequently than in larger urban centres, and when this is not possible, the only option will be starting to look for opportunities outside their communities of origin.

All in all, the fact that women, due to longer life expectancy (men: 77 years, women: 82 years), actually are 50.5% of the total population in the Nordic countries is hidden by the dominance of women in the densely populated areas, obviously offering better opportunities and perspectives. So it is obvious that national averages do not provide a reasonable background to understanding the ongoing processes, and subsequently the relevant policies needed to cope with these changes.

Figure 10.4 Women's share of the number of persons with higher and high education



Females and education

The question of 'better opportunities' mentioned above has very much to do with the marked changes in patterns of education which have taken place during the last 10-15 years. The figure 10.4 shows the female share of the number of persons with bachelor level and master's and PhD-level higher education. Already in the 1990's women had become a majority group in

relation to higher education, but by the late 1990's basically all Nordic countries had moved into this situation. The only reason for the Faroe Islands not being in the same situation is, that many of the women when they finalize their education tend to emigrate, predominantly to Denmark, in order to pursue a career where they are able to take advantage of their acquired skills. This has also been the pattern in Greenland, due to a limited acceptance of women with higher qualifications, although in recent years an increasing number of positions requiring higher education have been taken by women.

Where figure A.13 shows the general pattern regarding persons with tertiary education in the Nordic countries in general, the figure A.15 illustrates some of the consequences of the increasing number of women with higher education.³¹ The most obvious characteristic is that there are very few municipalities with a majority of males with higher education (marked in green on figure A.15). And in many cases this has to do with the existence of specific male activities, for instance in relation to the military, heavy industry, resource extraction, or the existence of a technical university dominating the community. In communities with a generally high level of persons with high and higher education – first of all the urban areas with one or more higher education institution - female dominance is limited to a few percentage points. The high level of dominance, i.e. a women's share of 56% and more, appears in municipalities representing small town and urban settings. This is the case in spite of the fact that it is in these same communities where the highest deficit of women appears.

The following figures 10.5 and 10.6 show a typology synthesis of the three components, Gender distribution, Population Growth and Gender distribution of education. In order to identify the major types a three dimensional colour coding system has been applied based on a divide with red/blue colours identifying a high proportion of women and yellow colours identify a high proportion of men. Within these basic colours intensities and shades identify growth and education characteristics.

Figure 10.5 Colour coding of the gender based regional characteristics

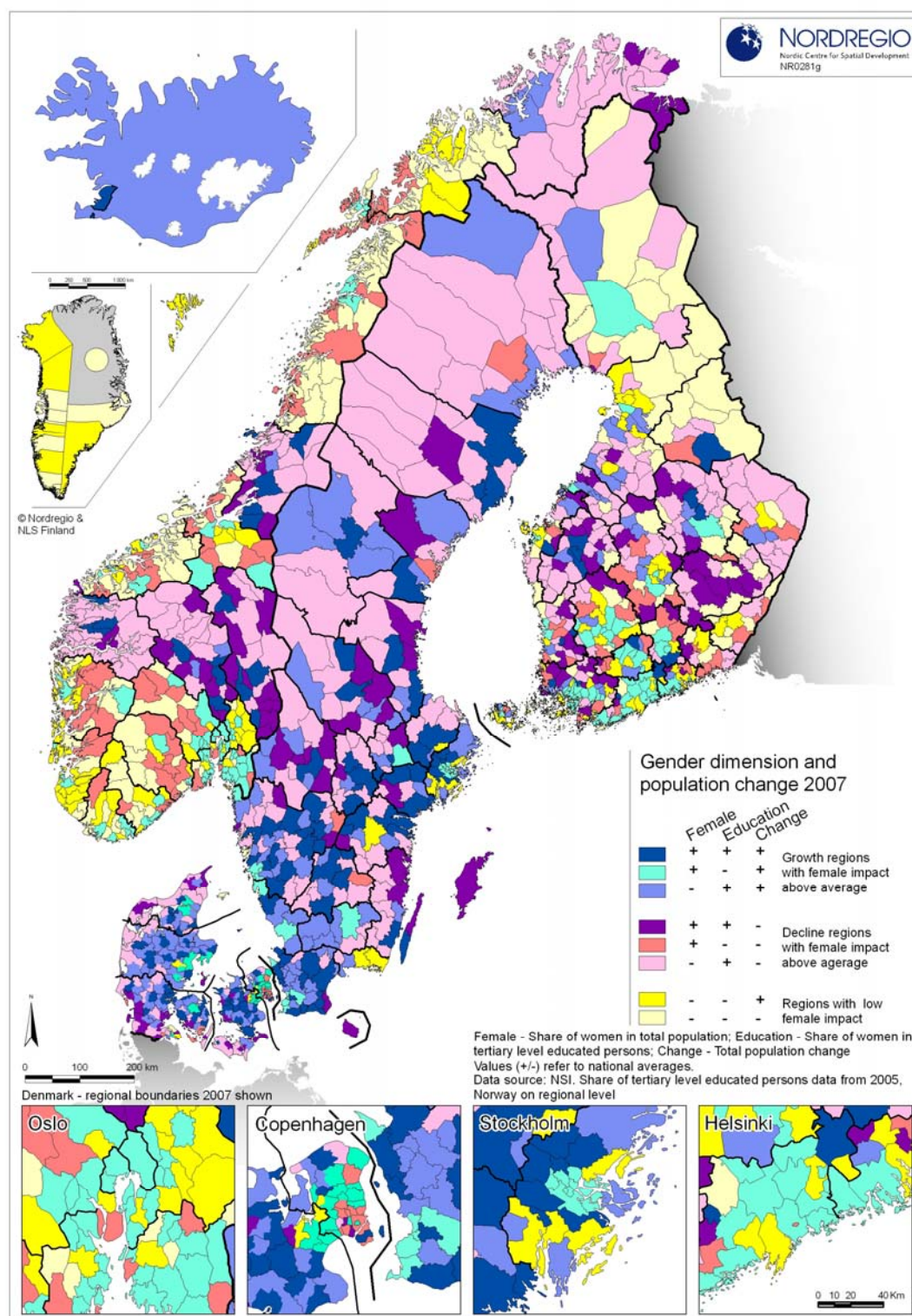
	Women share of population 50% and above	
	Women share of education below 56%	Women share of education above 56%
Population growth		
Population decline		
	Women share of population below 50%	
	Women education share below 56%	Women education share above 56%
Population growth		
Population decline		

The most marked characteristic is the centre-periphery divide in the representation of women as described above. Regions with a significant deficit of women, population decline and even a significant deficit of women with higher education (light yellow colour) – Greenland, large parts of coastal and south-central Norway, and North-Eastern Finland – are

³¹ Be aware of the special situation with Norway, Greenland, Iceland and Faroe Islands where gender based data has only been available at the county or national level. It has the immediate consequence that the level of detail is much more limited, compared to the other Nordic countries, just as the existence of urban municipalities with one or more higher education units influence the average values in the rural areas, and *vice versa*.

in a precarious situation, lacking dynamics, and lacking the skills and education needed to improve their situation.

Figure 10.6 Gender based regional characteristics



The situation is somewhat different where a low share of women, both in absolute numbers and in the share of education, is combined with a population increase (dark yellow). Besides being found in peripheral areas with a natural population increase, this type of region is also

found around growth centres, often due to a high level and continuing influx of an unskilled labour force. In spite of their joint characteristics, policies in overcoming the problems in these two types of regions will be very different, first of all due to accessibility.

One of the most striking features of most of peripheral and semi-peripheral regions is the deficit of women, the declining population, and the very high proportion of women with higher education (pink). To make the proper use of the potentials, and in particular adjust policies and expectations in this direction, will be an obvious – but often also overlooked – objective. As fringes to urban and suburban development there are a number of municipalities showing a deficit of women, but also characterized by population increase and a surplus of women with higher education (light blue). These areas show some of the same characteristics as the previous group, with an out-flux of women with higher education, while at the same time also providing a base of skills and knowledge by means of having a female educated surplus.

The male dominance in urban connection with jobs requiring higher education has the consequence that only a slow rate of adjustment seems to be the response to the availability of qualifications in the core areas, while the suburbs, the urban fringe and the municipalities along the major infrastructure routes show an educated resource. There are, however, marked differences between the Nordic countries in this respect, showing similarities between Sweden, Denmark and southern Finland, while northern Finland and Norway seem to have many features in common. Consequently, the exchange of experiences between the Nordic countries may be a boon, but nonetheless remains highly dependent on the type of region.

As indicated above, many specific issues exist in relation to the gender perspective of regional development, and in this connection questions of education and the local response to the challenges of globalization undoubtedly need further scrutiny. The analysis undertaken above, however, shows that both the gender and generational perspectives on the changes outlined have become an issue of very highest importance.

Multivariate clusters

A cluster analysis may be appropriate in identifying regional typologies when many different components are interacting. And this has been the case in this book, as a total of 11 different components have been used as basis for both qualitative and quantitative analysis in the previous chapters. The list includes the following components:

- Percentage of persons in age group 0-14
- Percentage of persons in age group 15-24
- Percentage of persons in age group 25-64
- Percentage of persons in age group 65+
- Birth rate
- Death rate
- Net migration rate
- Net growth rate
- Percentage of persons with tertiary / higher and high education
- Percentage of females
- Female percentage share of persons with tertiary / higher and high education

In the previous analysis the effects of individual, two or even three of these components have been discussed, but the question remains to what extent the joint effect of most, or all, of these components can identify the structures generated by these effects. As the magnitude and scale of the different components differ, data has been standardized so that the mean is set to 0 and one standard deviation set to 1 within each of the categories. Thereby data becomes comparable, and each of the components contributes in a similar manner to the analysis.

Significant correlations

Out of the 11 component included in the analysis (11x11 correlation matrix) a total of 13 combinations generate significant correlations, i.e. above +0,3 and below -0,3. The components and their respective correlation coefficients are listed in the table 10.1 below:

Table 10.1 Significant correlations between the components

Significant correlations			
Net Growth	0,93	Net Migration	
Death Rate	0,59	Pct 65+	
Net Growth	0,56	Birth Rate	
Birth Rate	0,50	Pct 0-14	
Net Migration	-0,30	Death Rate	
Pct 25-64	-0,39	Pct 14-24	
Net Growth	-0,44	Pct 65+	
Death Rate	-0,52	Birth Rate	
Birth Rate	-0,53	Pct 65+	
Death Rate	-0,53	Pct 0-14	
Pct +65	-0,55	Pct 25-64	
Net Growth	-0,58	Death Rate	
Pct. Tert. Edu	-0,67	Women Higher Education	
Pct 65+	-0,82	Pct 0-14	

Basically there are few surprises in the correlations. By far the largest level of correlation is between net growth and the net migration rate ($\rho=0.93$), a situation which has already been indicated in the previous analysis. The numbers simply confirm that migration is the most important single element in relation to the population dynamics of the municipalities. Similarly, the two basic components of birth rate ($\rho=0.56$) and death rate ($\rho=-0.58$) show that these components are important for the dynamics involved, though not to the same level as migration.

Regarding correlations between the different components, a number of obvious relations become clear. For instance the fact that there is a close connection ($\rho=0.59$) between death rates and a high proportion of the population in the old age group is one obvious factor here. This is also the case between the birth rate and the net growth rate ($\rho=0.56$), just as there is a clear negative correlation ($\rho=-0.82$) between the proportion of children and old age persons, just indeed as one would expect. While there is also a negative correlation ($\rho=-0.58$) between the net growth rate and the death rate.

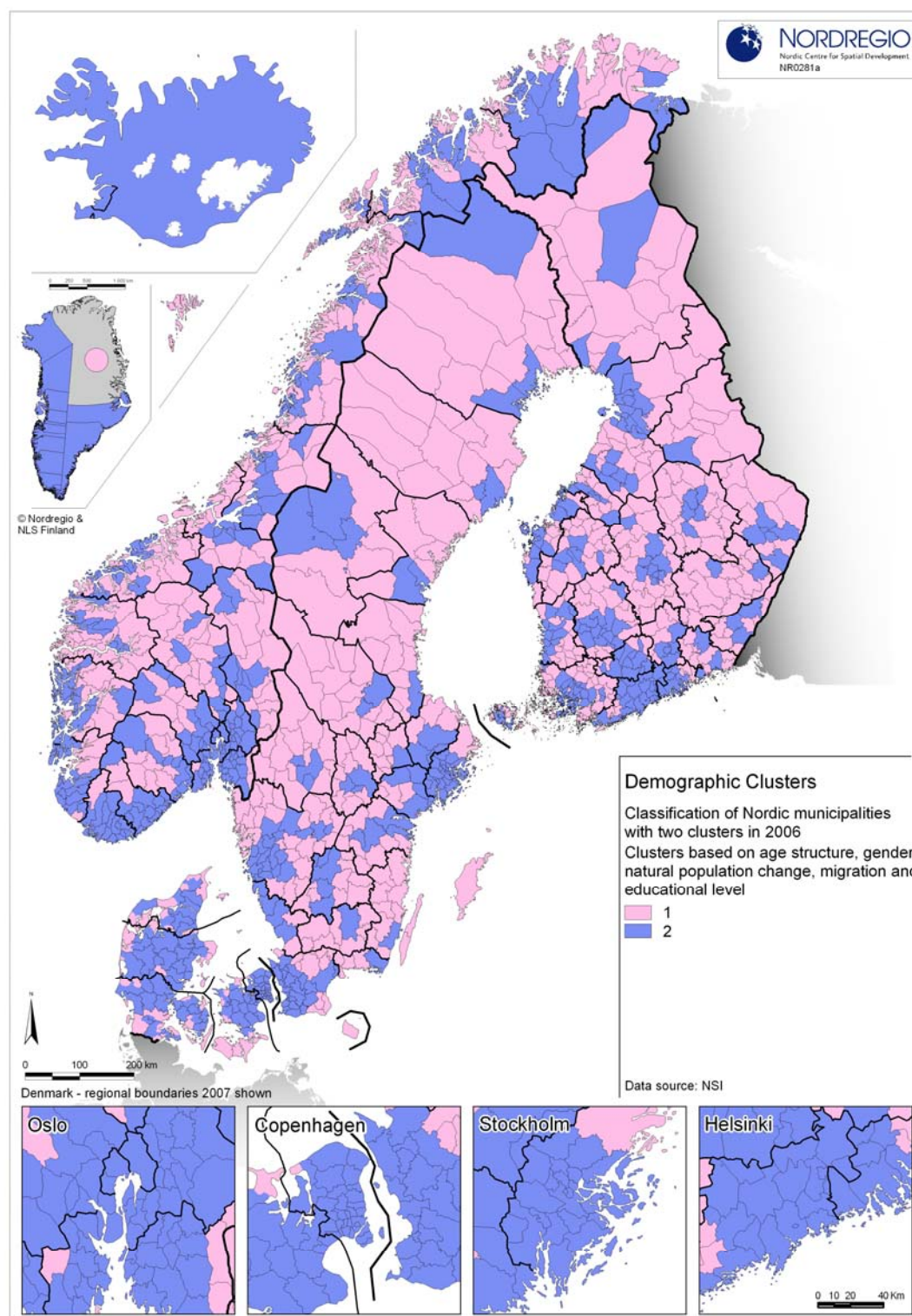
It may seem to be surprising to see a significant negative correlation ($\rho=-0.67$) between the total number of persons with tertiary education and the number of women with higher education, as one might expect the two components to be more or less parallel, i.e. that municipalities with a high proportion of persons with higher education would include both males and female. But as shown in the section on gendered regionality, even though women with a higher education have become the majority in all Nordic countries, they are particularly dominant in rural areas, smaller cities and villages where the total proportion of persons with higher education is low, while their dominance is more limited in the larger population centres where the total proportion of tertiary-educated people is substantially higher. Consequently, there is a clear negative relationship between the proportion of women with higher education, and the total proportion of persons with higher education.

Clusters

The best way of presenting similarities between municipals based on several components is to identify which municipalities are most alike, and then arrange them in clusters. The level of correlation also indicates the level of affinity between the different components, and is also important in connection with the process of clustering the many municipalities into a few classes. The more alike, the higher the probability is that they fall into the same group. In

practice, the method applied in the following analysis is a grouping based on distance to cluster centroids.

Figure 10.7 Grouping of data into two clusters



Two clusters

The simplest level of clustering is the grouping of data into two clusters, with the result shown on figure 10.7 above. With a limited number of clusters the major structures are identified, and

to characterize the two clusters one may identify class 1 as pure rural areas, while class 2 are areas identified as urban areas and 'urbanized' areas with a marked urban influence.

The rural areas are characterized by a very high dependency level, first of all in relation to the age group 65+. High death rates and low birth rates in combination with a dominant out-migration pattern leads to a negative growth rate. Moreover, the urban influence is very limited, as infrastructure and distances only to a limited extent allows commuting to contribute to the economies.

Contrary to this, the urban and urbanized areas in the activity sphere of the urban centres have positive growth rates due to a combination of high birth rates and positive in-migration patterns. Even municipalities where agriculture remains a major activity are included in this group as they are close enough to larger and medium-sized urban centres to be influenced by the dynamic socio-economic conditions characterizing urban activities.

A very rough description of the 2 class grouping may be that it, on the one hand identifies regions which directly or indirectly experience demographic development, and on the other, regions which experience demographic stagnation and decline. Consequently, policies applied have to address these two major characteristics. More detail, however, is needed in order to gain a more precise picture of the influence of the different components.

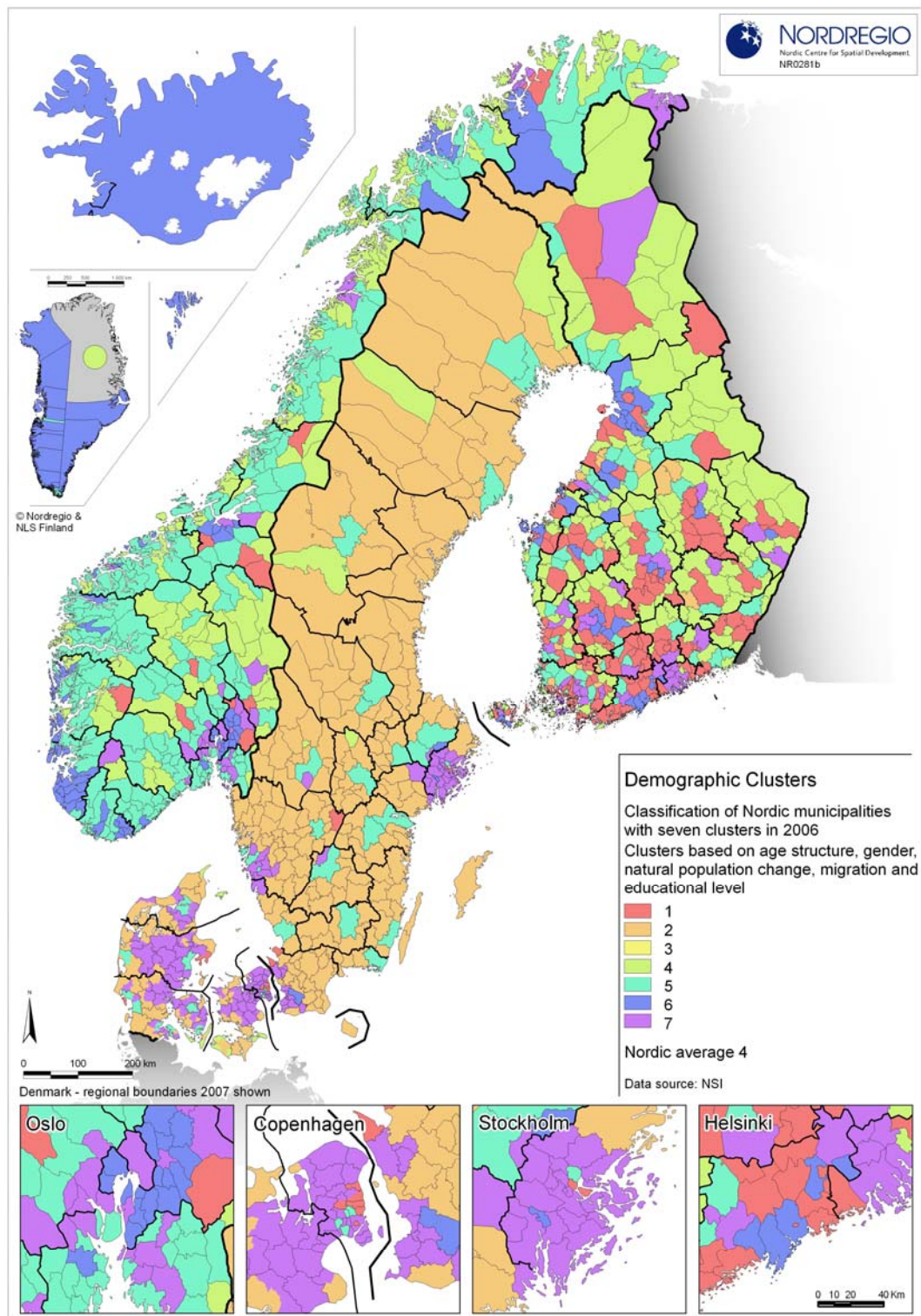
Seven clusters

As noted previously, the next level of clustering would be a grouping of data into 7 clusters, as shown on figure 10.8. The increase in number of clusters provides a much more nuanced image of the cluster characteristics, and enables the inclusion of several components in the analysis.

In relation to the rural areas a marked difference between the Nordic countries appears, with Denmark and Sweden in one group (class 2), while Finland and parts of Norway turn out to be in a different rural class (class 4). The differences have already been seen in connection with the gendered structure, as well as with the basic demographic parameters, but here the differences become even clearer. This has partly to do with the fact that both Denmark and Sweden are very close to a situation with zero growth rates – Sweden even with a negative growth rate. The education component, however, seems to be influential on the marked differences between the countries.

Urban centres are still easily identifiable, but are now sub-divided into different sectors (classes 5, 6 and 7). Once again however differences exist between the countries, as the groups identify different segments of the urban structures and the urban sprawl. And while the patterns seem to be rather similar in Sweden and Denmark, marked differences exist to the situations pertaining in Norway and Finland. One of the most important factors here is the level of population concentration i.e. to what extent the municipalities are characterized by both a municipal centre and rural areas, or the two categories are sub-divided into rural and more urbanized municipalities. The latter pertains in Norway. Another component is the level of education which is influential on the identification of another group of both semi-urban and rural municipalities in Finland.

Figure 10.8 Cluster analysis with 7 clusters



Principal component and factor analysis

Another way of putting a new view on a dataset is to apply a Principal Component Analysis or a Factor Analysis. Both types of analysis are based on a mathematical procedure that transforms a number of possibly correlated variables into a set of new variables, where the first principal component or the first factor accounts for as much as possible of the variability of

the data, while the second component accounts for as much as possible of the remaining variability of the data, etc., until all variations in the original data are explained.

The resulting components or factors do not then simply reflect just one of the original parameters, but a combination of several of them, and generally a set of original parameters that show a high degree of correlation. The result is, moreover, not a simple grouping, such as the result of the cluster analysis. Instead it produces a result in map form showing high and low values in relation to the principal components or 'principal' factors, thereby producing results reflecting the interaction between several of the original data.

The defining characteristic distinguishing between the two approaches is that in *principal components analysis* it is assumed that all variability in an item should be used in the analysis, while in *principal factors analysis* only the variability in an item that is found to be held in common with the other items are used. In most cases, these two methods usually yield very similar results, but the *principal components analysis* is often preferred as a method for data reduction, while *principal factors analysis* is often preferred when the goal of the analysis is to detect structure. In this case the PCA has been chosen, and figures 10.9 and 10.10 show the first two principal components with the following characteristics.

The table 10.2 below shows to what extent the new axes are able to describe the variations in the original data, and as indicated the first new component is able to describe a total of 35% of the total variation, while the second axis is able to describe an additional 16% of the variation. By focussing on these first two axes it is possible to show more than 50% of all variation in the 11 original parameters.

Table 10.2 Data variations and new components

Data explained by new components			
Cumulative	Pct	Component	
35	35	First axis	
51	16	Second axis	
65	14	Third axis	
76	11	Fourth axis	
84	8	Fifth axis	
89	5	Sixth axis	
94	5	Seventh axis	
98	4	Eight axis	
101	3	Ninth axis	
101	0	Tenth axis	

For this reason only two maps are able to show more than half of all variation identified in the original datasets, and these maps are shown on the following pages. When interpreting the maps it is important to focus on whether or not specific municipalities are within the same groups or not, as well as the distance between the groups in the relative values given on the legend, as the latter show whether the municipalities are very similar or very different. The values, however, cannot be converted into absolute numbers in relation to the components that constitutes the axes.

Figure 10.9 Principal Component 1

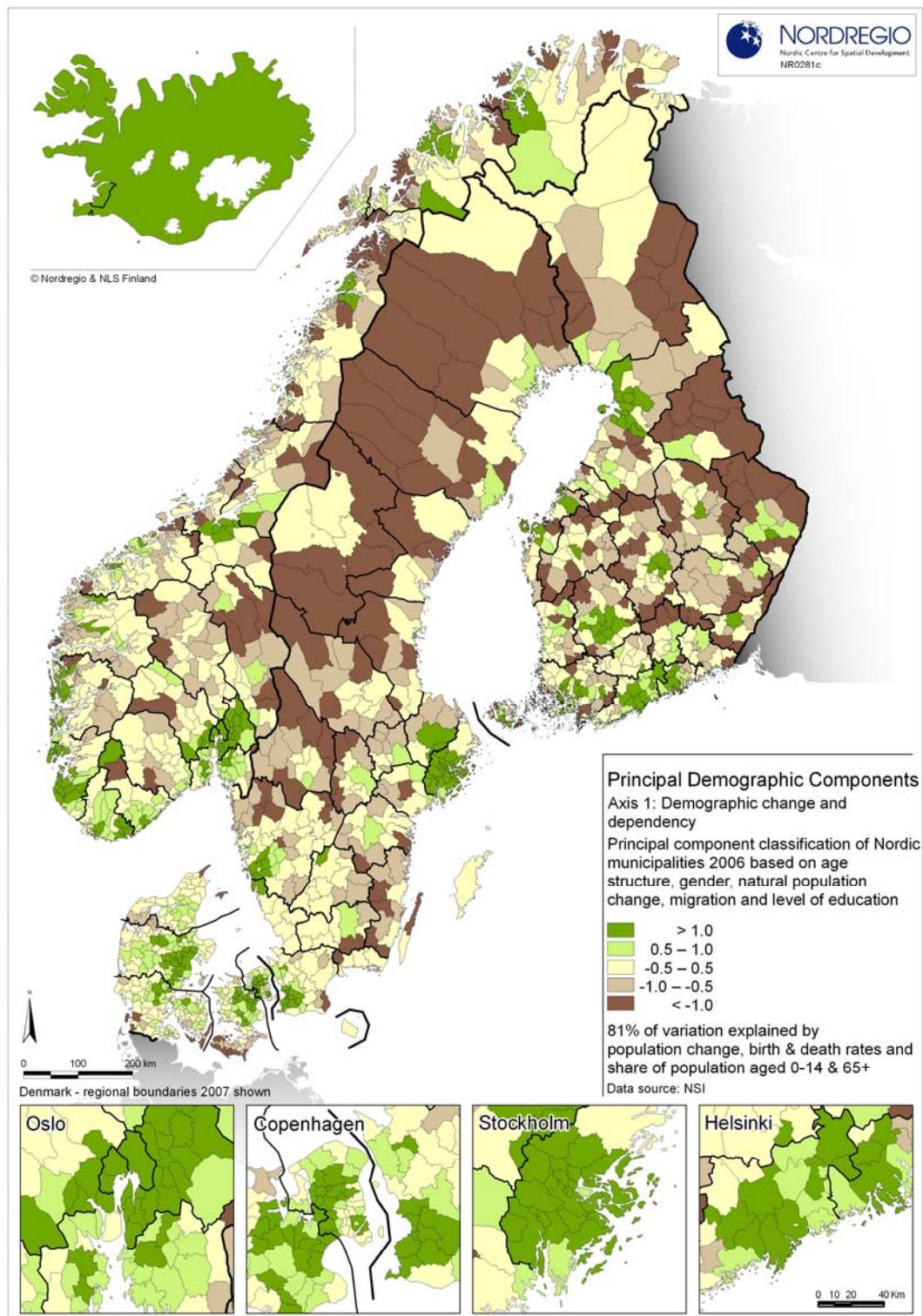
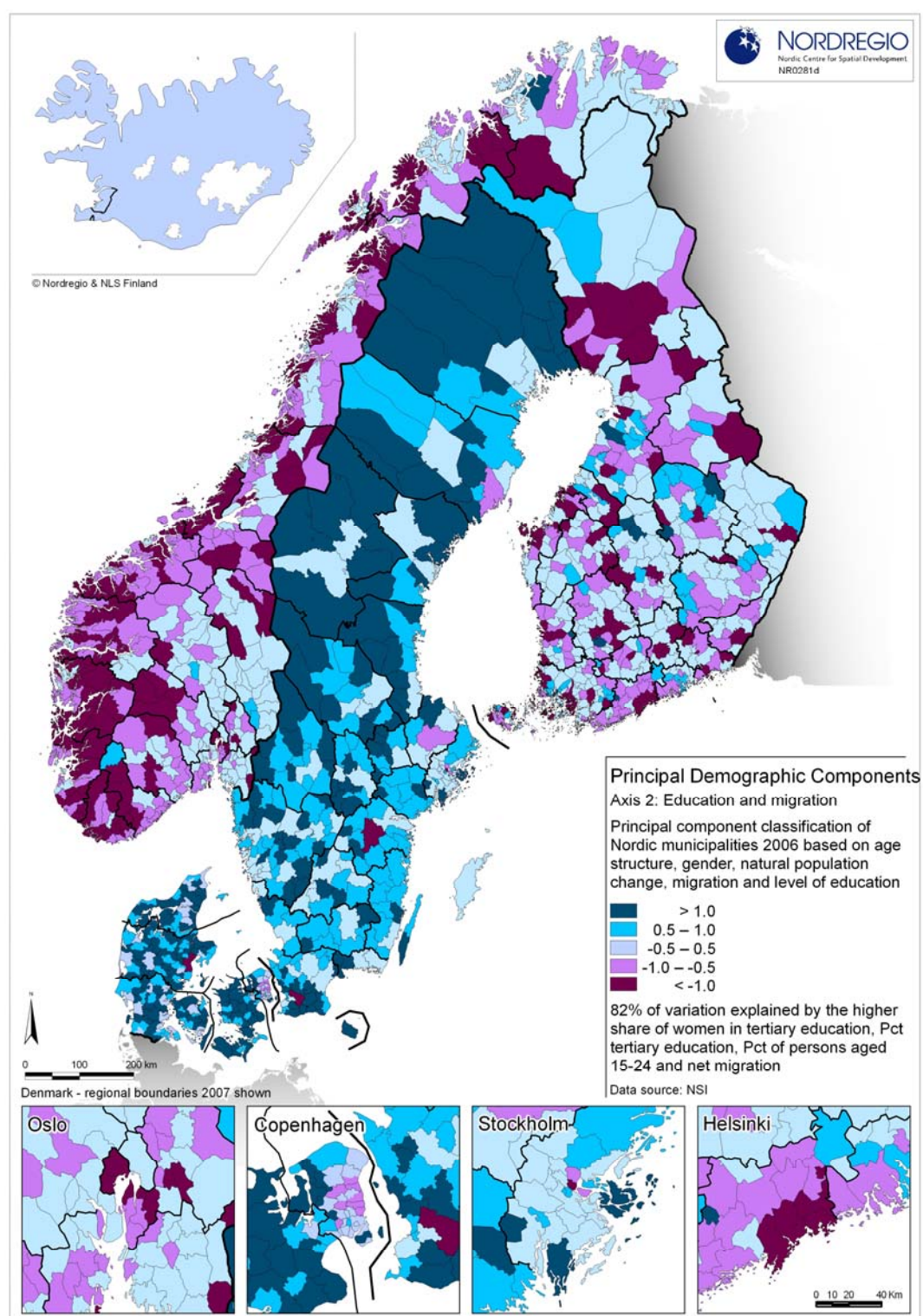


Figure 10.10 Principal Component 2



When analysing the maps it is useful to already have an idea of what parameters are influential on each of the axes, and the first axis is clearly defined by some of the basic components describing the demographic transition, and positioning the municipalities in this respect.

Table 10.3 Variation of the first axis

Definition of first axis		
Cumulative	Pct.	Variable
17,55	17,55	Net growth
33,81	16,26	Death rate
50,07	16,26	Birth rate
67,85	17,78	Pct 65+
81,03	13,18	Pct 0-14

As shown in the table 10.3 above, 81% of all variation of the first axis is explained by five variables which can be sub-divided in two groups. The first three variables basically define the demographic transition, namely birth rate, death rate, and net growth. In addition to this the two age groups closest to birth and death, namely children in age group 0-14 and old age persons in age group 65+ contribute to describing the first component. When reading the map the intensity of colour and the values indicate the positive *vs.* the negative influence of the components.

Besides identifying the differences between urban and rural areas, the map confirms a centre-periphery pattern in Denmark, but not the simple north-south divide which has been evident on several of the individual variables presented earlier in this chapter. It indicates how the policies in relation to the far north have had implications on the population structure, and especially on the parameters in relation to the demographic transition.

The second axis shown on map 10.18 is explained at a level of 82% by the four variables in the following table 10.4.

Table 10.4 Variation of the second axis

Definition of second axis		
Cumulative	Pct.	Variable
29,62	29,62	Women in higher education
57,40	27,78	Pct tertiary education
69,90	12,50	Pct 15-24
82,37	12,47	Net migration

Three of the variables and a total of 70% of the variation are related to education. Approximately 30% is described by the share of women with higher and high education, and 28% by the total percent of persons in high and higher education. The last 13% is explained by the group of persons age 15-24, usually involved in education activities. The last variable – net migration – at least to a certain degree could be ascribed to the education component, as the group of persons in education generally is mobile, and therefore contributes to the net migration pattern.

When interpreting the map, the divide between Denmark/Sweden on one hand and Finland/Norway/Iceland on the other shows up very clearly. A part of the difference here has to do with the various approaches adopted in respect of the classification of higher education, though the contribution from the other components, especially the migration patterns, also remain highly influential on the result.

11. Scenarios

The previous chapters have sought to highlight the issues in respect of the current demographic structures of the Nordic regions. These chapters have also outlined the main mechanisms and development trends behind the current situation. In this chapter however we attempt to look forward in our analysis. We attempt to estimate what kind of future we are going to embrace, what some of the main challenges will be, and what the projected development will be in the Nordic countries in terms of population. We will follow the same logic as in the previous chapter, moving from simple population projections to dependency status, and finally to a more complex evaluation of vulnerabilities. What could be done in future, however, i.e. a discussion of what kind of policy measures would be relevant, will be left the following chapter.

Population projection

The applied population projection method is based on the main population components (births & deaths and immigration & emigration together with internal migration) and composition (by sex, age groups and life expectancy). All the assumptions are weighted equally, so this estimation is purely demographic. It does not seek to estimate social, economic or other factors impacting on population development. The regional patterns are based on estimations from the national statistical offices. Some minor harmonization issues emerged and were addressed in order to make the data between countries comparable. For instance data for Sweden is available only at the NUTS2 level.

Figure 11.1 Annual average change (%) of population in 1990-2005 and projected change of population in 2006-2020

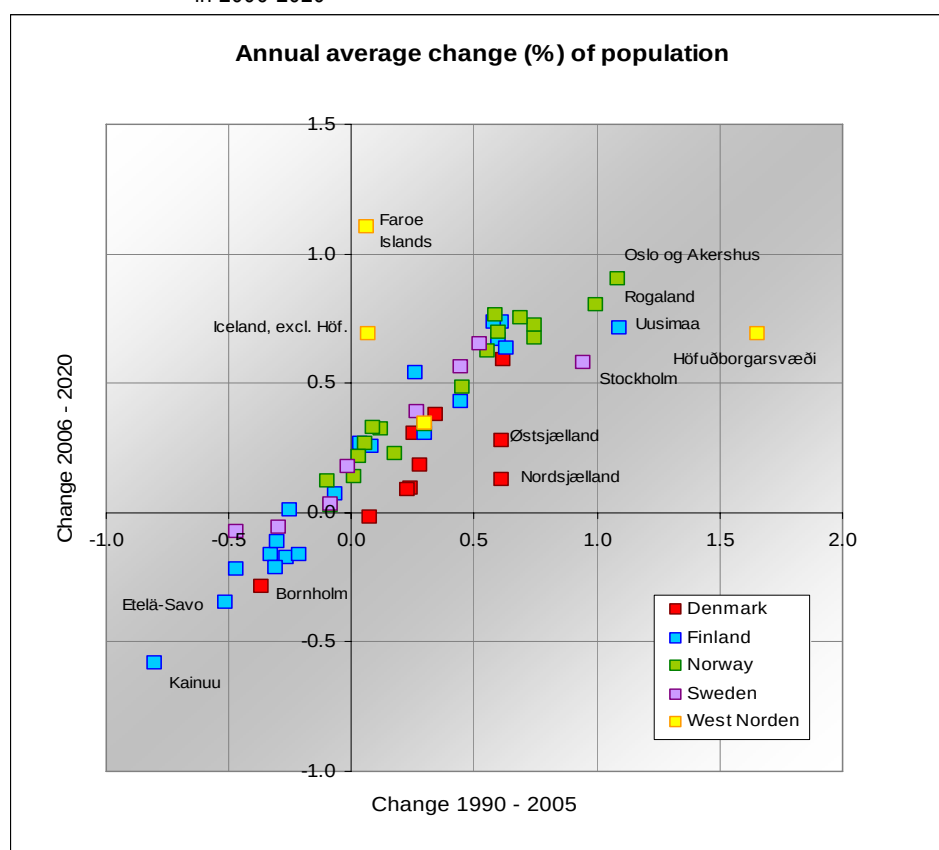
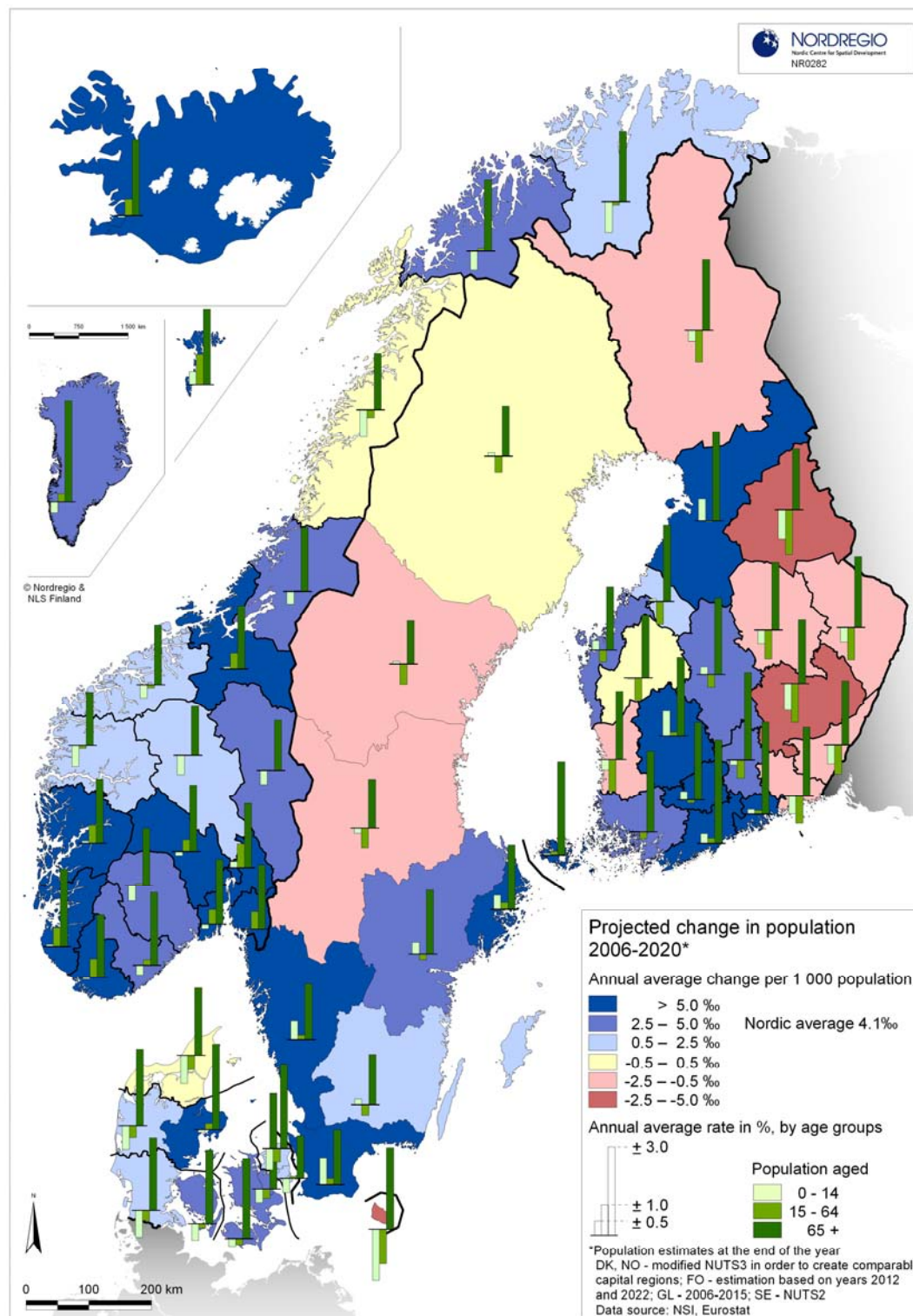


Figure 11.1 shows the annual average change (%) of population in 1990-2005 in relation to the projected change of population in 2006-2020. Even if many of the regions are situated in close proximity to a line indicating the likelihood of future changes being similar to what has already been experienced previously, a number of regions nevertheless show clear deviations from this path.

Figure 11.2 Projected change in population 2006-2020



It is estimated that the Nordic total population will increase from 24.8 million to 30.3 million by 2020. Annually this means a growth of approximately a 0.4%. The fastest growing regions (figure 11.2) are, in general, located in the most densely populated areas in the capital and big city regions, in other words the Norwegian capital labour market (Oslo and Akershus 0.9%) and city regions of Rogaland (Stavanger) and Hordaland (Bergen) together with Pirkanmaa (Tampere). Surprisingly the fastest increase can be found in the small island societies of the Faroe Islands (1.1%) and Åland. In the case of the Faroe Islands, however, extrapolation of data from 1990 to 2005 may be misleading in relation to the general development, as it is based on a period of time where a historic low existed in the early 1990's due to a massive crisis in fisheries causing a wave of out-migration followed by a restructuring of the economy, and thus the return of many of the emigrants.

The number of Nordic regions with a negative population development has decreased and the population decrease in general will smooth. Iceland and Norway are going to see a population increase in all regions. In Denmark the total population will increase particularly in Østjylland (Århus) and decrease in Bornholm (-0.3%). The population in Nordjylland is estimated also to decrease. In Finland the population increase will concentrate mostly along the Helsinki – Tampere axis. Pohjanmaa (Vaasa) region is estimated to switch from being a population decrease to an increase region – even rising in status to become one of the fastest growing Finnish regions. In Sweden the importance of Øresund region is becoming even larger. Our projections suggest that population here will increase also in the northernmost regions.

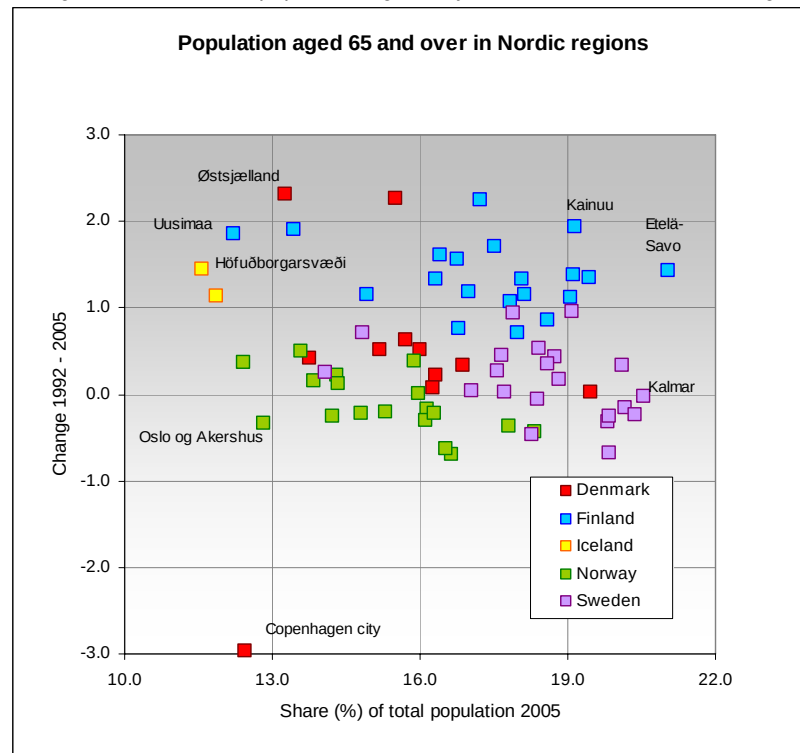
Changes in the 'dependency ratio'

When looking at the population estimates according to age structures we find that the share of elderly people (65 years and over) is increasing in every Nordic region (see figure A.8 and figure 11.3 below). The growth is most obvious in Uusimaa (FI) and in Greenland (both 3.5%). Itä-Uusimaa and Åland are however 'greying' fast. It is nevertheless important to bear in mind that today's share of elderly people is very low in Greenland, both due to a shorter life expectancy than in the other Nordic countries, but also to the fact that a number of pensioners choose to settle in Denmark. The growth in the number of elderly people is more moderate in Copenhagen city area (København by 1.3% and surroundings 1.6%) and in northern Central Sweden. An important feature of the aged population is that it seems to develop independently of the share of population in 2005.

The pattern evidenced here in connection with the old age group is not repeated when it comes to the younger population, as indicated in figure 11.4 below. The overall tendency for the Nordic countries indicates that a high share in 2005 follows a high level of change in the period 1992-2005. The number of young population, aged 0-14 years, is expected to grow especially in secondary city regions in Finland and Sweden. This growth seems to be most rapid in Southern Sweden and Pirkanmaa (0.9%) and in Pohjois-Pohjanmaa (0.7%). The increased number of young-aged population in Southern Sweden (Blekinge and Skåne 0.9%, Halland and Västra Götaland 0.6%) could, in part, be a result of high migration rates, especially from the other side of the Öresund region, in contrast the number of persons aged 0-14 is decreasing in every Danish region. There are several factors for this. On the one hand living expenses are lower on the Swedish side of the Öresund, especially costs in respect of housing. This enables young couples to settle here while working in the Copenhagen region. Another factor has been the 'infamous' 24-year regulation of marriages in Denmark. Due to the illegality of immigrant marriages below the age of 24, young couples who do not want to postpone marriages choose to settle in Skåne. Both processes lead to an increase in childbirths as well as attracting young families with infant children.

Figure 11.3

Change and share of the population aged 65 years and over in the Nordic regions



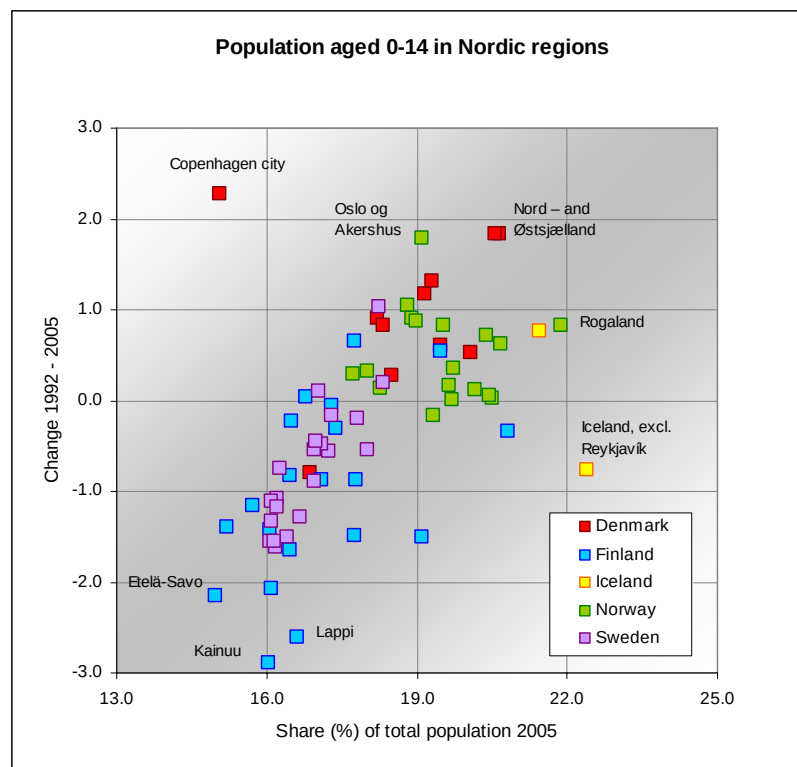
The total number of the young-aged population is decreasing, especially in the peripheral regions. All together their number is expected to decrease most severely – annually by over one percent – in three Nordic regions: Bornholm (-1.8%), Finnmark and Kainuu (-1.0%). The working age population is increasing in every capital and secondary-type city region and in West Norden more generally. Growth is most marked in Norwegian city regions. The number of the population aged 15-64, however, is going to decrease in the peripheral regions of Denmark, Finland and Sweden, with Kainuu (-1.5) being the least well performing Nordic region.

Overall the Nordic countries act surprisingly different. The number of elderly people has increased by a large degree in Finland and Iceland. In Denmark and Sweden the increases have been more restrained, while in Norway the number of elderly people has actually decreased in the period 1990-2005. The growth in the number of elderly people in Finland and a huge part of Sweden is particularly striking, as these regions already have the highest share of elderly people in the Nordic countries. The share of elderly people in Denmark and Norway is in general lower, and in West Norden the ageing population is a more recent phenomenon.

However, Finland is, in general, the worst performing country in this context, but the share of elderly people is among the lowest in capital area (Uusimaa 12.2%) and in Pohjois-Pohjanmaa (13.4%). In Denmark the regional differences are remarkable. In Sjælland the share of elderly people is very low (Copenhagen city 12.4%) whereas Bornholm (19.5%) is dominated by these age groups. At the same time the growth rate is highest in Østsjælland (2.3%) and lowest in Copenhagen city (-3.0%) – compared to all the Nordic regions.

While ageing is a trend across $\frac{3}{4}$ of the Nordic regions, all the capital regions with the fastest population growth are those with the lowest share of elderly people. This is also the case in Rogaland (Stavanger) and Pohjois-Pohjanmaa (Oulu). Correspondingly, the capital regions and Sjælland are the regions with the highest share of children and young people.

Figure 11.4 Change and share of the population aged 0-14 years in the Nordic regions



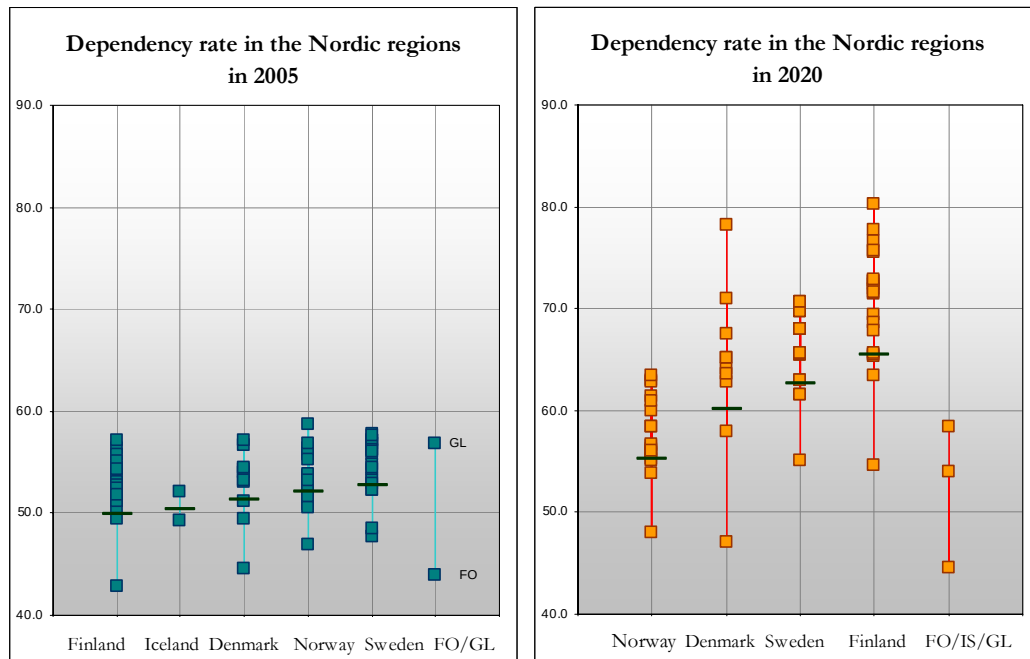
In contrast to the elderly population, a clear correlation exists between the share and change of children and young people. In Finland and Sweden, where the share of children is in general smaller, the number of the young-aged population is becoming even smaller – while in Denmark and Norway with a higher share of young-aged population the number is growing. In Denmark and Norway only the regions of Bornholm (-0.8%) and Nordland (-0.2%) are losing young-aged population, while figure A.10 highlights that regions in Northern and Eastern Finland (Kainuu -2.9%) faced a sharp decline in the number of children and young persons in 1990 - 2005. Such a decline can also be found, to a lesser extent, in Northern Sweden, Gotland and Kalmar. Meanwhile, the number 0 to 14 -year olds remained more or less stable in many Norwegian and Swedish regions, while in Sjælland and Oslo area (Oslo and Akershus 1.8%) the regions actually saw a significant increase in the number of children. In Copenhagen the number young people has annually grown by 2.3%.

The number of those in the working age population (15-64) has increased in Iceland (Reykjavík 2.0%), Southern and Western Finland (Uusimaa 1.8%) and in Southern Norway and – Sweden. Growth has been fastest in the capital regions. Meanwhile the working age population has decreased in Norrbotten (-0.5 %) & Central Sweden (especially in Västernorrland), Finnmark, Bornholm and Kainuu.

Because the Nordic regions are and have been developing differently, different types of development can be found when comparing demographic change and age structures. In the fastest growing regions the population is growing in all age categories. This is particularly so in capital regions and in the Øresund region (Excluding Copenhagen). In a substantial part of Southern Norway and the Icelandic countryside the number of young people and people of working age is growing while the number of elderly people is decreasing. This is the case in small Icelandic regions, even when the total population change is negative.

In those regions with the steepest population decrease (Kainuu and Etelä-Savo in Finland and Norrbotten in Sweden) the number of population aged 65 and over is actually increasing while all the younger age groups are out-migrating. In Nordland (NO), Central Sweden and Kalmar the population is decreasing in all age groups.

Figure 11.5 Current and expected dependency rate in the Nordic regions.



In terms of future ‘dependency’ (figure 11.5) some Nordic regions, especially in the peripheral Danish and Finnish regions, are likely to face very difficult challenges. Given the size of soon to be retiring ‘baby boomers’ in Finland moreover these regional changes are expected to be rather striking. The demographic dependency rate in Finland was 49.8 in 2005 and it is expected to be 65.5 in 2020. In seven of the 20 Finnish regions, mostly in Eastern Finland, the change is expected to be over 20 % units during the next 15 years. In Denmark and Sweden the development is rather similar – the dependency rate is becoming larger, and the peripheral regions in particular are likely to face a rising number of demographic and economic challenges, though the change here is not as dramatic as it is in Finland. In Norway the situation is however somewhat different. The change is, in general, much smoother and the capital and secondary-type city regions of Bergen and Trondheim are actually expected to have a lower dependency rate in 2020 than in 2005.

Vulnerabilities

The major structures in respect of individual demographic components have been presented in the previous chapters. The cluster analysis and principal component analysis demonstrated which regions resemble each other most, and which differ in respect of the key components. Not complying with the general trend, for instance being unable to ensure a sufficient level of fertility, or compensate for a net deficit in the natural reproduction through sufficient immigration, etc., eventually leads to a declining population, which may be characterized as an unsustainable situation. The major challenge, of course, will be for these communities to meet the challenges faced. Are the communities resilient, and able to respond to the exposures they face, or do they lack the necessary dynamic actors and structures? Answers to these questions are beyond the scope of this analysis, but by identifying the number of demographic components at risk, an indication of the level of problems the municipalities face will give a good indication of whether such an endeavour would be manageable or not.

The following components and thresholds (table 11.1) have been chosen in identifying whether or not they can be considered at risk, while the figures 11.6 and 11.7 on the following pages show the application of this approach on the data for 2006.

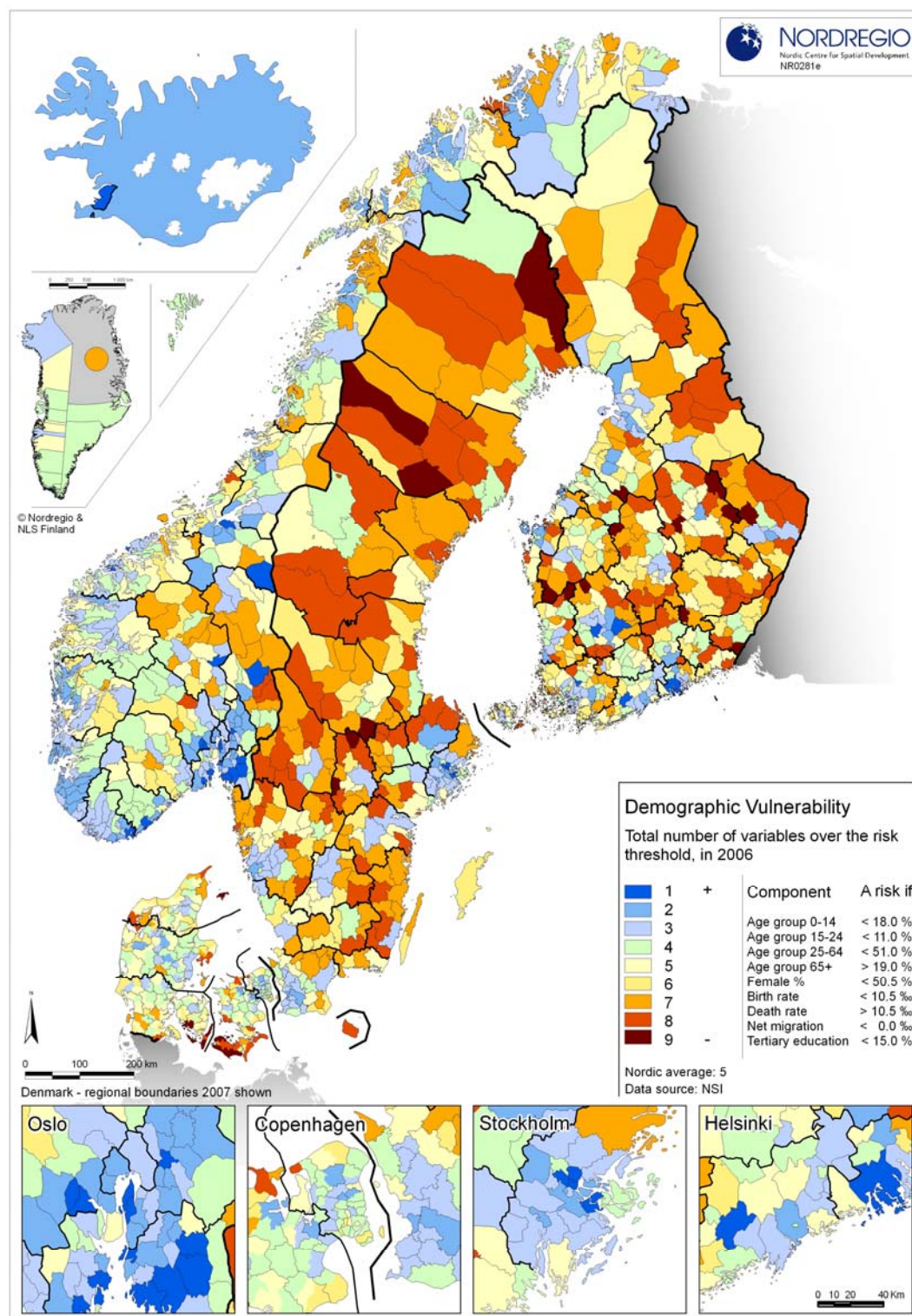
Table 11.1 Thresholds and regulated thresholds for the risk analysis.

Component	Threshold	10% tolerance
	Will Be at risk if	
Age group 0-14	Below 18%	Below 16%
Age group 15-24	Below 11%	Below 10%
Age group 25-64	Below 51%	Below 46%
Age group 65+	Above 19%	Above 21%
Females	Below 50,5%	Below 49,5%*
Birth rate	Below 10,5‰	Below 9‰
Death rate	Above 10,5‰	Above 12‰
Net migration	Below 0‰	Below 0‰*
Tertiary education	Below 15%	Below 13
* Does not comply with the 10% tolerance		

The choice of components has been based on their contributing to both the cluster analysis and the principal component analysis presented in the previous chapter, i.e. how decisive they have been in the clustering process, and their weight in the two first axes of the *principal component analysis*.

For each of the chosen components, the Nordic municipal average of each of the components has been calculated, rounded to the nearest integer. This value has been considered to be a threshold – i.e. a limit – below or above which the situation in a specific municipality is considered to be at risk. If the age group of 0-14 year drops below 18% a proper reproduction rate comparable to the Nordic standard will not be maintained, and the population will drop unless compensated for by other factors such as, for instance, in-migration.

Figure 11.6 Identification of vulnerabilities based on threshold values



Similarly a female rate below 50.5% (the municipal average for the Nordic countries) results in a distorted gender structure which reduces the natural reproduction rate, just as it, with the present pattern of educational choices, will have implications for the labour market.

To allow some variation a calculation of thresholds allowing some slack, determined as up to a 10% deviation, has been calculated and rounded to the nearest integer. The only exceptions, i.e. components where tolerance has not been accepted, are two. On the one hand

the male/female rate where the national gender balance has been viewed as necessary in maintaining the national reproduction rate, and on the other, the net migration rate where net-out-migration has been considered unacceptable.

With some measure of offset in these thresholds, a grouping has been conducted based on calculations for each of the municipalities whether or not they deviate from the Nordic municipal standard. As such, all municipalities deviating negatively from the average values are identified as being 'at risk' for each of the components. In the moderated threshold analysis the threshold values are calculated such that they allow a 10% deviation from the averages. As a consequence, the first analysis will enhance the number of municipalities exposed to risk conditions, while the latter will move the focus to municipalities which are seen to be in really difficult situations.

Based on the identification of risk/non-risk for each of the components, the integrated risk has been determined simply by adding the number of components at risk. One or a few components at risk can be compensated for by other components in more favourable situations. But municipalities with many components 'at risk' will probably not be able to compensate, and therefore require special attention.

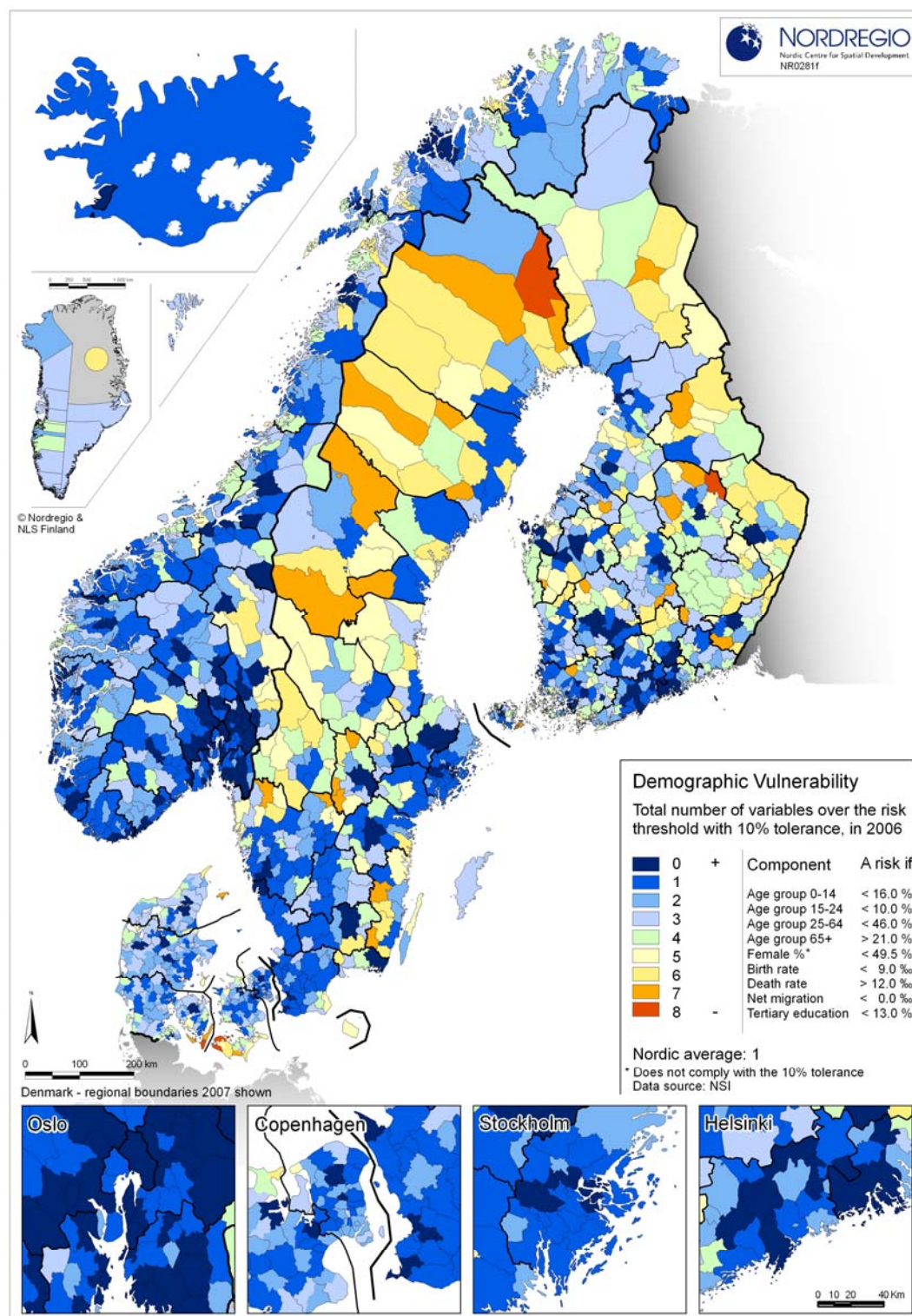
The first analysis (Figure 11.6) identifies areas in all vulnerability classes except situations with 0 identified vulnerabilities as such municipalities do not exist in the present material. So according to this analysis all municipalities are exposed to at least one factor deviating negatively from the average conditions.

The blue colours show areas with 1 to 4 factors at risk, and cover most of Denmark, southern Finland, coastal Norway and the southern part of Sweden. But surprisingly they also include the most northerly part of Sweden and Norway, as well as dominating the North Atlantic region. These are basically the demographic growth regions, either due to natural population growth or due to high in-migration rates compensating for natural reproduction. In both cases the influx of young generations maintains a more stable population structure. Contributing to this is also the influx of women in and around the larger cities, which adds to the level of higher educated persons in the municipalities.

The major problem areas are situated in the Danish periphery, especially Lolland-Falster and Bornholm, the interior parts of Sweden, Norway and Finland and for the latter the municipalities on the border with Russia in particular. Several municipalities even reach the level of 9 factors at risk, which may characterize them as being, population-wise, unsustainable.

The second analysis (Figure 11.7) has a classification deviating somewhat from the former. The colour codes are the same, but in the latter the starting point is a rather large number of municipalities in class 0, i.e. municipalities where there are none of the parameters at risk. The 10% tolerance is enough to move a substantial number of municipalities into this category, and it basically indicates that the sharp definition of classes should be used carefully. While at the other end of the scale there are no appearances in the top group of 9 incidences. The distribution of the most exposed municipalities confirms some of the patterns appearing in the first analysis. There is a clear divide between the interior areas and the coastal zones, while the northern Swedish and the Finnish border zone with Russia show the highest degree of vulnerability. At the same time a number of features appear which did not show up on the first analysis. One of the most striking is related to the infrastructure, especially in southern Sweden and in Finland where some of the major highways run between the most vulnerable municipalities, in Sweden North/South, and in Finland East/West. Here once again several of the municipalities on Lolland-Falster as well as the islands of Langeland and Ærø turn up as red, confirming them to be the municipalities in Denmark most at risk.

Figure 11.7 Vulnerability classes allowing a 10% tolerance



The vulnerability analysis identifies where major existing problems may be accelerated due to severe and vulnerable demographic conditions. The challenge, then, is to consider which policy measures could be taken in order to cope with this.

12. Future demographic challenges

The demographic trends

Chapter 1 showed that no unified and general theory on fertility, mortality and migration existed. Rather, a number of separate theories and models are used when these issues are analysed. The theoretical approaches to fertility, mortality and migration are quite different in terms of their explanatory power. All are, however, important in the selection of indicators and in arguing for certain analyses.

In chapter 2 we showed that it is migratory movements that cause regional differences in age structure. Despite common perceptions, differences in population structure are thus not only a function of differences in fertility rates. There is then a connection between natural population development and migration – a fact that is often neglected or downplayed in the analyses of the so-called ‘population crisis’. Migration intensities are highest in ages 20-30, which have differing impacts on in- or out-migration regions. The ‘population crisis’ can then seemingly take on rather different forms in various parts of a country, or within the EU as a whole, due to this. In some regions, low fertility rates have traditionally dominated, while in other parts the problems have been connected with out-migration and lopsided age structures – particularly the out-migration of younger women.

The ageing population is often explained by reference to low fertility levels, higher average life expectancy and the out migration of young people which aggravates the problem and creates depopulation and other problems. In the third chapter we showed that research already exists which potentially adds a new dimension to this development. When analyzing population development the different cohort sizes have a large impact on future development. The logic here is quite simple as large cohorts will naturally reproduce large cohorts and vice versa. Therefore current developments cannot be explained by low fertility rates and the out migration of young people alone. Long term changes in the economy and in social conditions more generally have, and will continue to be, of great importance for age structure development.

The findings of chapter 4 indicate that a convergence at a national level has taken place between the Nordic countries over the period 1960-2004 in respect of periodical TFR. At a regional level Finland shows a regional divergence in the TFR during the period 1991-2004, while Denmark and Norway show a regional convergence for the same period. In Sweden there is a regional convergence for 1991-1999, and a divergence for 1999-2004. The latter divergence is related to a ‘baby-boom’ in the larger cities.

The analysis also indicated that the TFR is higher in smaller regions in Denmark and Finland, while no indication of this ‘size-effect’ is visible for Norway. In Sweden the size-effect has diminished: from a higher fertility level in smaller region to a state where no size-effects of significance are visible. When the fertility patterns in the Nordic regions are compared to the theory of the demographic transition the large differences in fertility rates indicate that all Nordic regions have not yet entered the fourth phase.

The differences in fertility between different nationalities of foreign-born women are significant, but even women from countries with a very high TFR adjust rapidly to the low Nordic fertility level. The higher fertility can be explained by an over-representation of those in fertile ages and by the fact that foreign-born women are married or cohabiting to a larger extent than native women. When the age-specific fertility patterns are analysed foreign-born women actually have a lower fertility than native women.

The Nordic countries are in many ways world leaders when it comes to high life-expectancy levels and low mortality levels (chapter 5). There is undoubtedly however uneven development

across the Nordic countries. The situations in respect of Finnish men and Danish women are closely linked to socioeconomic factors which, in turn, affect people's lifestyles. Furthermore the differences in educational levels proves to be a pivotal factor underlying the development of life expectancy and mortality and as mentioned previously these differences can be as much as six years. On the whole the differences between men and women as well as regional differences seem to converge but this development will not continue if social differences are polarized with time and the socioeconomic and educational factors are the main contributors to changes in life-expectancy and mortality. In the future the now ongoing and growing problems with obesity will pose new demographic challenges as this, in a long term perspective, will affect life-expectancy and mortality. A similar development was noticed during the 1960's when cardiovascular diseases grew among men due to unhealthy lifestyles and possibly obesity is likely to have the same effect in future.

Chapter 6 looked at internal migration in the Nordic countries. The findings show that migration remains dominated by the movements from the peripheral regions towards the metropolitan zones. Study shows that it is young adults that dominate domestic inter-municipal mobility. Every second domestic migrant is aged between 20-35 years. That is due to the fact that the younger population favours capitals and larger cities including regional centres. During the ten last years the peripheral population declined in all Nordic countries. The composition of domestic migrants is fairly similar in all Nordic countries and is rather sustainable over time. The ongoing out migration of young people to regional and national centres and low birth rates aggravate the problem of keeping population numbers stable. Many international studies show that the costs and benefits of migration are gendered. Women gain less from migration as compared to men in terms of careers and incomes.

The *seventh chapter* analysed international migration to the Nordic countries. Sweden has historically been the prime country of destination for immigrants and remains so today. Indeed, Sweden even now attracts almost half of all immigrants to the Nordic countries. In general, the typical immigrant to a Nordic country is a native citizens who is returning home, and, or secondly, is a Nordic citizen moving to another Nordic country. Immigrants from neighbouring countries to Norden (e.g. Germany, Poland, the UK, or Russia) are placed in the third biggest group of immigrants.

While the net migration rate is negative for native citizens in the Nordic countries, and has been so over time, the net migration rate for foreigners is positive, and has been so over time. A majority of the immigrants settle down in the metropolitan areas and in the major cities, which means that they are not spread evenly over the Nordic regions.

If labour immigration is used as an instrument to 'solve' the labour demand in the peripheral parts of the Nordic countries, it would be interesting to see where labour immigrants tend to settle down. This is however a neglected research issue; the settlement patterns of refugees have been studied but not labour immigrants' settlement patterns.

Implications and causality

Demographic ageing is not a phenomenon that has suddenly emerged. This was clearly shown in *chapter 8*. During the 20th century, fertility has fallen sharply in most of the countries in the Western World while life expectancy has increased as people live longer. One indication of this is the higher median age in the population. This trend was pointed out by a number of demographers as far back as the 1940s. We would like to stress that there is no clear-cut evidence that one demographic development will lead to a certain economic development. As such, a population decline could lead to positive as well negative economic development, and *vice versa*. The key factor is *the ability to adjust* to the new situation. The Nordic countries have however been good at doing this historically.

Depopulation is also linked to the size and scale of the geographical area. Historical occurrences of population decline with a possible depopulation potential have probably most typically been a small area phenomenon in Europe and it has been a rare phenomenon in the

Nordic countries. To what extent the demographic processes we are experiencing today will actually lead to depopulation is however unclear.

Despite common perceptions, labour shortage is not a homogenous concept – at least three separate types can be identified, namely, partial, general and geographic labour shortages. A central factor in dealing with labour shortages here is whether it is a labour shortage caused by business cycle fluctuations (short term perspective) or by structural problems (long term perspective).

Immigration can mitigate the bottlenecks in the labour market, but immigration can neither change the population structure, nor solve the fiscal deficits in the public budgets. Immigration can only offer a short-term solution, but the problems ahead are structural in nature and require long-term solutions. Prominent scholars in the field argue that the relative success of immigration in the USA is unique. If the USA is an exception, it can be questioned whether the American experience can be transferred to the Nordic countries.

Many potential indicators can be used in an analysis of economic performance and demographic change. The indicators, however, tell us little themselves unless they are placed in a socio-economic context. It is also of the utmost importance that these indicators are used clearly to distinguish between the causes and effects of ageing. This may sound trivial, but it is something that is often neglected in analyses of the economic implications of demographic change.

There is a shift here over time from many children and few elderly people to few children and many elderly people. This is not observed when analysing the dependency ratio only, but analyses of the pre-active and post-active dependency ratios are needed to detect this shift.

In chapter 9 it was shown that many of the policy implications linked to demographic changes are already well-known. From time to time they have been successfully dealt with. Often ignored is the distinction between short- and long-term implications of different policy implications. Given some assumptions, e.g. a labour immigration can be positive in the short-term, but negative in the long-term perspective. Without taking this distinction into consideration when implementing policy measures, outcomes may be neither expected nor desired.

The discussion in chapter 9 also highlighted the existence of intrinsic goal-conflicts or dilemmas in the policy implications. Is it possible to have a high female labour force participation rate and at the same time have a high fertility rate? Is it socially sustainable to import foreign labour while domestic labour with an immigrant background is already being rejected on the labour market? When discussing migration, should the short- or long-term effects of migration be prioritised? These few examples illustrate well the intrinsic goal-conflicts or dilemmas in the policy implications and how difficult it is to deal with them.

The challenges

Two cluster analyses were made in *chapter 10* to present the similarities between municipalities and to identify which municipalities are most alike, and then to arrange them in clusters. The cluster analyses are built on demographic variables. The level of correlation also indicates the level of affinity between the different components; the more alike, the higher the probability they fall into the same group. (a) A simple grouping into clusters resulted in one cluster of pure rural areas and one cluster of areas identified as urban areas and ‘urbanized’ areas with a marked urban influence. The result can be interpreted as one cluster of areas which are experiencing demographic stagnation and decline (the 1st group) and a cluster of areas which are directly or indirectly experiencing demographic development (the 2nd group). (b) The cluster analysis of seven clusters shows a more nuanced picture. The basic pattern in two distinct developments is however still present: clusters 1-4 depict rural areas while clusters 5-7 depict urban areas. The result indicates that some areas face demographic problems, while others do not.

A *principal component analysis* or a *factor analysis* was made to confirm (or reject) the findings. The analysis is based on a mathematical procedure that transforms a number of possibly correlated variables into a set of new variables, where the first principal component or the first factor accounts for as much as possible of the variability of the data, while the second component accounts for as much as possible of the remaining variability of the data, etc., until all variations in the original data are explained. 81% of all variation of the first axis is explained by five variables which can be subdivided in two groups. The first three variables basically define demographic transition, namely birth rate, death rate, and net growth. In addition to this the two age groups closest to birth and death, namely children in age group 0-14 and old aged persons in age group 65+ contribute to describing the first component. In the second axis three of the variables and a total of 70% of the variation are related to education. Approximately 30% is described by the share of women with higher and high education, and 28% by the total percentage of persons in high and higher education. The last 13% is explained by the group of persons age 15-24, usually involved in educational activities. The last variable – net migration – at least to a certain degree could be ascribed to the educational component, as the group of persons in education is generally mobile, and therefore contributes to the net migration pattern.

The findings indicate that the challenges are not solely connected to demographic issues and are in line with the findings from other studies. Although the focus here is on the dependency ratio, this indicator does not tell us much about who is feeding whom. An economic dependency ratio such as the modified dependency burden reveals the real burden for society (Landgren Möller 2007, Kautto 2002, Rauhut & Malmberg 2003). Factors other than demography must be taken into account when analysing the implications of demographic changes. 'What policymakers can do to make the economic dependency ratios less pressing is to operate within domains other than demographic factors' (Kautto 2002: 77).

The applied population projection method in *chapter 11* is based on the main population components (births & deaths and immigration and emigration together with internal migration) and composition (by sex, age groups and life expectancy). All the assumptions are measured equally. This estimation is purely demographic. It does not seek to estimate social, economic or other such factors on development. The estimation shows that the total population in the Nordic countries will increase by 5.5 million inhabitants, from 24.8 million to 30.3 million, by 2020, i.e. with an annual growth rate of approximately 0.4%. In general, the fastest growing regions are located in the most densely populated areas in capital and big city regions, but there are exceptions. The fastest increase can be found in small island societies of the Faroe Islands (1.1%) and Åland. This can partly be explained by the small populations in these areas; even modest absolute population increases will show as a large relative population increases. The Nordic regions with a negative population development will have decreased by 2020 and this decrease will, in general, be smooth.

The result of this 'pure' demographic forecast suggests that the current nature of demographic development poses no demographic challenges. As stated above, this projection does not take into account anything but demographic variables. It is common knowledge that demography is influenced by socio-economic aspects, so the result may be different if such variables are included.

More than just demography?

If the demographic challenges are not only about demography *per se* what other types of challenges are related to them? One such challenge relates to the production and financing of the welfare state another to the functioning of the labour market.

In welfare production three actors/institutions are of utmost importance: the state, the market and the family. Kiander (2005) points to two major threats to the Nordic states and to the Nordic welfare model: integration and globalisation. The *integration* of the European Union diminishes the autonomy of national economic policy in respect of the regulations of

monetary union and the coordination of fiscal policy.³² Ageing will burden the public finances in all EU countries, but since the Nordic countries already have high public welfare spending and a high tax pressure their manoeuvring space is further limited. In addition *globalisation* has a negative impact on the Nordic states and their particular 'welfare' model. International tax competition is a threat to the Nordic countries: high taxes will potentially scare off companies and labour. '[I]n the future increasing mobility induced by general economic liberalization – call it globalization – may have deeper impacts on traditional welfare systems by intensifying competition for skilled labour and factor mobility. There is already evidence that economic integration has forced most countries to cut their taxes on corporate profits and capital income. The Nordic countries are no exception to this rule; they have also reduced their corporate taxes, but the taxes on labour and private consumption have stayed at a high level and even increased in the 1990s' (Kiander 2005: 233).

In the Nordic countries women have been empowered to combine their roles as mothers and workers in a unique way as compared to other modern welfare societies. Anttonen (2005) argues that the shift in care services from the family to other sectors has led to a 'monetisation' of these services, which means that their costs are revealed and they have to be paid for. In the Nordic countries these services are generally produced by the public sector. In recent years other non-public actors have however begun to produce welfare services. A problem however arises here, which Anttonen (2006) does not touch upon: how do market solutions work in sparsely populated areas? In the cities and relatively densely populated areas, the private sector can compete with the public sector in producing welfare services. It is unlikely that this will be the case however in all sparsely populated areas since the 'market' will be scattered over huge distances. A labour shortage will press wages upwards, especially in the sparsely populated areas. If the real costs of these services are revealed and have to be paid for on a market, it can be assumed that the demand for these services will decrease. The public provision of these services, especially in sparsely populated areas, can be seen as a response to market failure. Still, the question remains: if the public cannot produce care services and the market is not interested – who will?

The family pattern and household structure has changed significantly over the last 30 years compared to many European countries. When the family cannot provide for some welfare services, either the market or the state has to provide for them instead and this development has been seen as desirable, especially from an ideological perspective. There are however some implications. 'Single parents are more often in need of support for housing, income and care [...] The weakening role of the traditional family in the Nordic countries would thus increase the demand for both income transfers and services' (Kautto 2002: 73).

When we turn our attention to the labour market there are several processes which need to be solved. In chapter 8 we argued that the concept of labour shortage in itself is vague and often hides other labour market problems. The so called issue of 'labour shortage' does not refer to being short of labour or suggest that the labour does not exist. The major problem here appears to be a quite different one, namely, matching problems on the labour market. We identified some of the most interesting causes of matching problems:

- Geographic mobility is low and sometimes flows in the wrong direction.
- The insider-outsider dilemma is especially related to the phase of establishing oneself on the labour market. The best way to get a job is to have a job and if a person fails in this, their position in the social security system will be just as weak.
- Locking in processes to a certain profession or employer (or both!) leading to health problems, long-term sickness and early retirement.

³² Although Iceland and Norway are not members of the European Union they are affected by the integration of the European Union.

- Exclusion from the labour market, which often persons who have an immigrant background experience together with labour over the age of 50, as do single mothers and young adults.
- A segmented labour market, with three segments, does not improve the matching process. The first segment is attractive, the second is attractive when needed, and the third is unattractive. Even if there is a shortage of labour, the labour in the third segment will not be asked for.

If a school cannot get teachers and the elderly care cannot get assistant nurses, does this mean that there is a labour shortage? No, it does not. It means that given the offered wage level no teacher or assistant nurse is willing to accept the jobs offered. If the wages are raised in these jobs the price elasticity will alter (decrease) the demand for these services. If well-paid jobs were offered to young adults in non-urban and non-metropolitan areas they would probably not move to the cities and metropolitan areas. As it is today, there are very few such jobs outside the cities and metropolitan areas. Besides the matching problem, labour supply is further limited due to the fact that people spend longer periods in education and enter the labour market for their first time later in their life-cycle (Magnusson 2006).

To solve the problems over matching issues on the labour market mobility in general has to be increased to reduce bottlenecks. The current approach is not sustainable in a social perspective. While vacancies cannot be filled, a large share of the labour force is excluded from the labour market and has a weak position in the social security system. Others have little or no ability to change employer or profession. In either case the costs are burdensome for the tax payer..

These are problems challenging the welfare institutions of the Nordic countries independently of the issue of demographic change. It is however obvious that demographic change will make the situation even worse, but these demographic changes are not however the root cause of the problems currently faced or envisaged.

Are there any solutions?

The relative size of the population in the working ages will decrease and so will the relative size of the age group 0-19. The relative size in of persons aged 65+ and especially aged 80+ in the total population will however increase in the coming decades. This is not a controversial statement. While a consensus exists over future demographic development, the opposite can be said about the implications and how to solve, or at least how to mitigate, the implications of it. First, *knowledge is rather limited* in respect of the causality between demographic changes and economic performance. It is difficult to discuss what effects demographic change will have on economic performance, the welfare systems and the functioning of the labour market as long as this knowledge does not exist or is very fragmented. In the Nordic countries the population has been gradually ageing since the mid-18th century. Nobody can argue that the last 250 years have been a stagnant economic period in the Nordic countries! A lot more research is thus needed to fill the knowledge gaps regarding the relationship and causality between demographic change and economic performance.

The second point deals with how to deal the *challenges*. As we have argued, these perceived demographic challenges are only to a minor extent 'demographic'. If central institutions, such as the labour market and the welfare systems/models, are dynamic, they will be able to adjust to the challenges ahead. We have identified some of these challenges: (1) The Nordic tax systems are pressured by international tax competition and globalisation. (2) The integration of the European Union imposes restrictions on national economic policies and fiscal policy. (3) The household structure, with a relatively high share of single adult households, is dependent on the welfare transfers of the welfare state. Whether and if so, how, dynamic these institutions are remains to be answered.

There is no universal solution to the challenges faced – demographic or otherwise – though several partial solutions may be evident. All Nordic countries, except Iceland where double occupations are frequent, have a large share of persons in the labour force who are on long-term sick leave and a relatively high share of persons retiring early. Persons with an immigrant background also have higher relative unemployment rates than natives in the Nordic countries. In Iceland foreigners in the labour market are usually of a more temporary character, and therefore contribute less to unemployment totals. Getting these groups back into work will have a significant impact on the economic dependency ratio. Even if the demographic dependency ratio worsens, an improvement of the economic dependency ratio can offer a partial solution to the problem.

Another partial solution is to actively work to solve the mismatch problems in the labour market and, needless to say, fight unemployment. In addition, the widening of labour market regions, a more flexible labour market, and zero tolerance towards all kinds of discrimination can also be seen as partial solutions. Measures to raise fertility constitute important partial solutions. Given a number of conditions labour immigration can also provide a partial solution too.

It is however of utmost importance to distinguish between long-term and short-term problems in respect of labour supply. Situations of long-term labour shortage have led to labour being replaced through technological, institutional and organisational changes historically, leading to productivity improvements. As a result they have resulted in increased growth, and the creation of an economic surplus through economic growth is a condition of welfare. Short-term labour shortage is a constantly recurring problem. If the distinction between long-term and short-term problems with labour supply is not made, the risk of policymakers attempting to solve long-term problems with short-term measures, and *vice versa*, increases. If so, the challenges – demographic or otherwise – may become even more troublesome.

Does one size fit all?

The previous discussion focused on communalities in regional structures, i.e. to what extent there are common regional characteristics which might require the same analytical and policy approaches. A general question, however, remains to what extent the same characteristic always require the same remedies? Or, formulated in another way, is it possible that may different processes in some situations lead to the same characteristics, but require different policy approaches?

Basically, chapters 10 and 11 emphasized three very different conditions for change. The first condition was the process of natural changes, i.e. changes induced by the fundamental demographic parameters of reproduction rates and ageing. The second condition was the process of choice expressed in migration characteristics in relation to specific challenges, for instance the question of options for education, differences in labour market characteristics, or differences in gender-based perspectives. And the third condition was the level of uncertainty expressed by the concept of vulnerability, and the reactions this may have both at the individual and the collective level.

The response to natural change requires an understanding of the cyclical nature of change, depending on the parameters of mortality and the reproduction rate in combination with the age structure of the population. Some of these may be compensated for at a collective level. Mortality for instance through improvements in health services or improvements in the working environment etc. Or at the individual level through campaigns against health hazards such as smoking, the promotion of healthy eating, regular exercise etc. Many of these campaigns are successful, but often produce unforeseen effects – for instance the increasing number of young women who smoke – thus resulting in unexpected side effects. Increased reproduction may be promoted collectively through different compensation measures in connection with child births, better childcare measures, improved education facilities etc. Many

of these measures are however often introduced as attractive measures in growth regions. So in the end actions in relation to age structure maintenance easily become competitive measures where declining regions continue to lose out.

The response to such challenges is primarily expressed through migration, and in order to uncover usable measures it is necessary to recognize the characteristics of the different challenges and their consequences for demographic change. Three components have been emphasized, two of them generally recognized, namely education as a key force in connection with the age group 15-24, and job opportunities as the main driving force in relation to the workforce 25-64. And in both cases these measures are well known and tested: Innovation as a fundamental means in relation to job creation, and the establishment of educational opportunities as a means of attracting the younger age groups. In both cases, however, the attraction of diversity and (perhaps presumed) quality in the larger urban settings remains a challenge to the periphery. For instance, in spite of good efforts to establish universities and colleges in the Northern periphery, problems remain in maintaining these organizations as competitive and attractive, creating situations where the attraction of foreign-citizen students has become essential to their continued existence. A third component seems likely to be an important – and as yet rather under-researched – player in the demographic game in the years to come, namely the differences in gender approaches to change. As emphasized in the analysis, gender differences in relation to education in combination with an obvious difference in mobility seem to raise a new and potentially decisive challenge. On the one hand because of the obvious consequence for reproduction rates and thereby the processes of natural changes in the municipalities. And on the other, through the challenge of being able to present relevant opportunities in rural settings in particular which may be considered attractive. Thus far the pole of attraction has firmly been that of the urban – or perhaps rather the urbanized – settings.

The response to uncertainty raises the question of the ability of individual municipalities to cope, or to what extent joint efforts through compensation may be the right way forward. As discussed in connection with the analysis of vulnerability, the marked differences in the complexity of vulnerabilities pose the regions with very different challenges. Regions experiencing none, or perhaps just a few, of these challenging demographic components may be able to focus on these and respond with relevant policy measures. Regions, however, exposed to five or more different demographic challenges may easily be in a situation where policies in relation to one component may require policy measures in relation to several others. Increased reproduction requires the presence of women, but to become attractive the traditional measure of offering childcare opportunities and sports facilities is no longer enough. Attractiveness requires measures in relation to educational and job opportunities based on higher education, and very few municipalities are able to cope with such demands. Ongoing municipal reforms, though, where both service functions and political and administrative activities are delegated to the larger municipalities seem to increase the needed job opportunities, and may be a useful measure in this context.

In relation to response measures, it is quite clear that there is at least one major divide which needs to be recognized, namely that between municipalities or regions where the response can be concentrated on one or a few demographic challenges, and municipalities or regions where much more complex measures have to be taken. In the first instance individual measures may be enough, but in the second instance collective action is needed. At the same time it has become quite clear throughout the whole report, but especially in connection with the identification of typologies and in relation to scenario building, that measures at the municipal level seldom serve as an adequate basis for the outlining of policies directed to dealing with problems generated by mismatches in demographic components. Where the municipalities could previously serve as an adequate framework for dealing with most socio-economic as well as demographic components, increases in mobility have led to a situation where places of work, leisure time activities, second homes, education etc., are often situated in municipalities different to places of residence. As such, municipalities are increasingly tied to

each other through functional interaction, leading to situations where differences in demographic characteristics may be compensated for and vulnerabilities in one community balanced by strongholds in others. In consequence, policies in relation to demographic changes can no longer be viewed as individual municipal problems, but should rather be seen as increasingly reflective of the expanding level of functional regional relations..

Some final remarks

This report has identified four areas where there is a strategic knowledge gap.

(1) The relationship between demography and economic performance is not clear. Neither are the causalities between demography and economic performance. Different theories based upon different assumptions and using different indicators, end up with different conclusions. At this stage it is difficult to state convincingly which predicts a true picture of the future and which is not.

(2) The impact of e.g. ageing, a changing welfare burden and dependency ratios on the Nordic economies and their welfare states are neither evident nor clear. The populations in the Nordic countries have been ageing for centuries in parallel with experiencing a significant rise in economic performance levels; the dependency ratios do not show a clear and unified picture of its impact on economic performance; the welfare burden depends more on the actual number of persons in work than on the share of population above a certain age.

(3) Immigration is seen by many politicians, planners and administrators as a means to solve current population problems, especially outside the metropolitan areas. The settlement patterns of refugees have started to be analysed by researchers and scholars in the field, but the settlement patterns of labour immigrants are still unknown. If they prefer to look for jobs, as does the general population and refugees, in the metropolitan areas and big cities, labour immigration will *not* solve the problems in the rural and peripheral parts of the Nordic countries.

(4) Gendered regional development has, as discussed in chapter 11, developed into an important factor in the present development pattern. This is particularly so because of the high level of out-migration from rural areas, and the dominant role women have taken in connection with higher education and qualified jobs. Not much research has thus far contributed to an in-depth understanding of which mechanisms are driving this process, and what the likely short and long term consequences may be.

This report has also touched upon the question of whether demography can be seen as an independent variable in the economic development of the Nordic countries. Are the demographic challenges really about demography, or are they instead about the prevalence of a static economic structure in the Nordic countries and thus their inability to adjust to a new population structure? Another question worth asking here is then whether the problem is one of a declining population for a few decades, or whether the problem is actually about the significant population growth after World War Two? These questions simply cry out for further research.

Appendix A: The status of the Nordic municipal population 2006

On the following pages the status of the major population characteristics is presented at the municipal level. Throughout the previous chapters reference has been made to the figures, so in this appendix comments will be reduced to the most important characteristics.

A.1: Birth rates: As discussed in chapters 2 and 4, high fertility is based on a number of socio-economic processes, and high birth rates can basically indicate three main factors: On the one hand they are related to a relatively high proportion of the population in the most fertile age groups giving a general population characteristic similar to a cone shaped rather than to a reverse cone shaped distribution (figure 3.1). This is the situation in the case of Greenland, as well as in several of the municipalities of what could be characterized as 'the periphery'. Another important factor here is an influx of population in the fertile age group, and therefore a close connection exists here to the migration component. This situation characterizes several of the growth centres in the Nordic countries, such as the Capital regions and larger cities, but also those regions characterized by the existence of educational and research centres, for instance the Oulu and Tromsø regions. A third factor relates to specific regional characteristics connected to, for instance, cultural or religious traditions.

A.2: Death rates: High mortality rates are primarily connected with the general ageing characteristics of the population, and thus are closely connected with stagnating municipalities. This is either due to low reproduction rates or to a situation where out-migration is altering the population structure. The highest level of mortality rates are found in the central areas of Norway, Sweden and Finland, and in the case of Finland especially in the border regions with Russia. Differences remain between individual municipalities, but the overall trend seems to be quite clear. In the case of Denmark it is manifest in the most southerly islands – Lolland, Falster, Ærø and Langeland – in particular where it constitutes a special problem in connection with housing. A declining population leads to empty houses, and in order to solve social problems in Copenhagen and other cities, people dependent on social support are encouraged to move to these areas where very affordable accommodation is available. This however causes significant pressure on these municipalities where taxable income is very limited and available funding therefore absent.

A.3: Net migration rates: Migration is the third component in describing the 'natural' demographic processes characterizing regional development, as discussed in chapter 6. On the map red colours indicate municipalities with net out-migration, while blue colours show regions with net in-migration. The different characteristics of the migration pattern between Norway and Finland on the one hand, and Sweden and Denmark, on the other should however be stressed. As indicated, the difference is partly due to the existence of a larger urban centre in or close to many of the latter countries municipalities, and this evens out - and thereby disguises - some of the marked differences between urban and rural areas. The more diverse structure of differences between urbanized and rural municipalities in Norway and Finland tends however to magnify these differences. A clear pattern of rural and urban municipalities emerge, the former characterized by out migration, and the latter by in-migration. The larger towns and cities in particular are decisive as regards this pattern, but larger communication lines seem also to influence the migration pattern.

Figure A.1 Birth Rates in the Nordic Countries 2006.

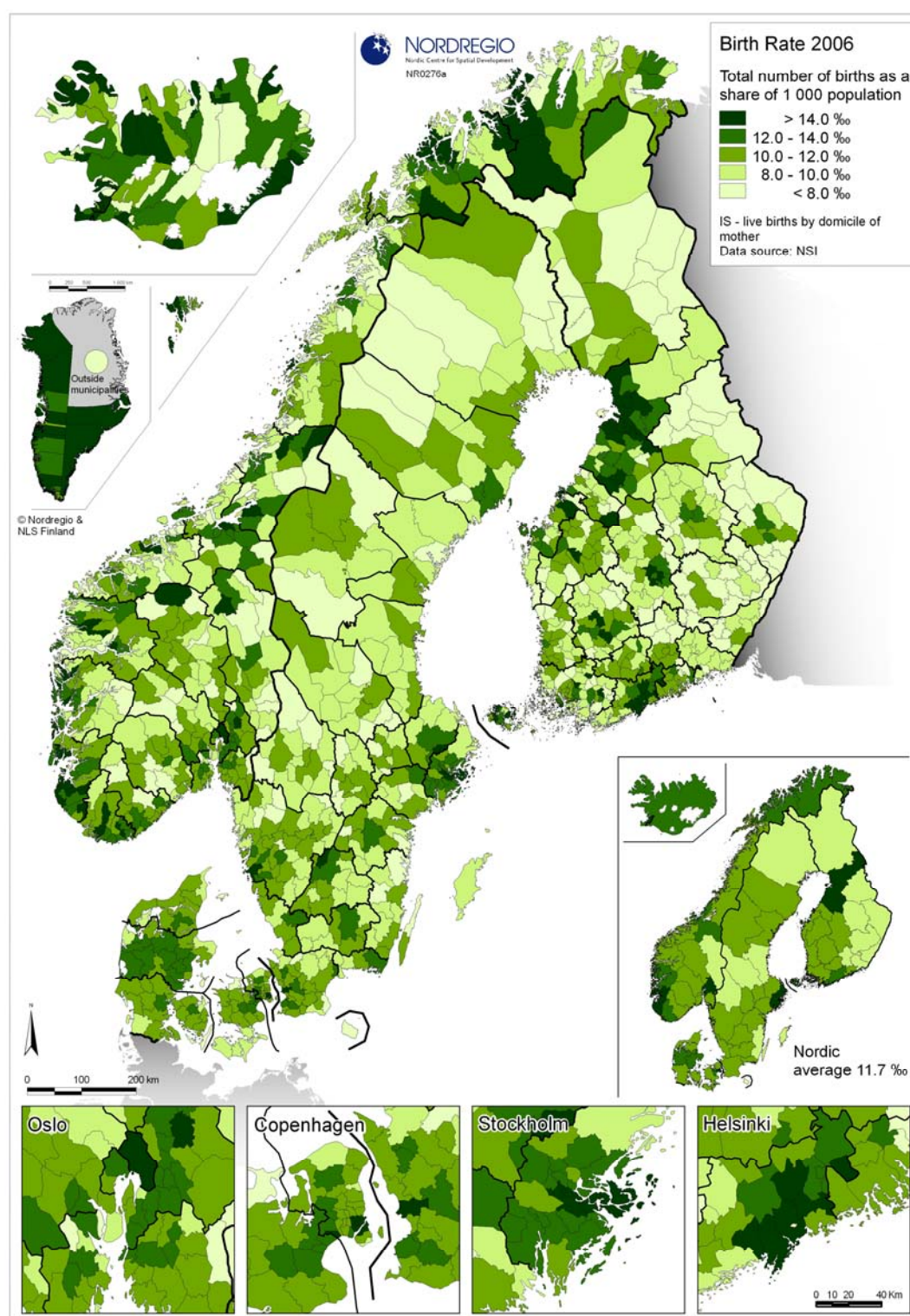


Figure A.2 Death rates, the Nordic countries 2006

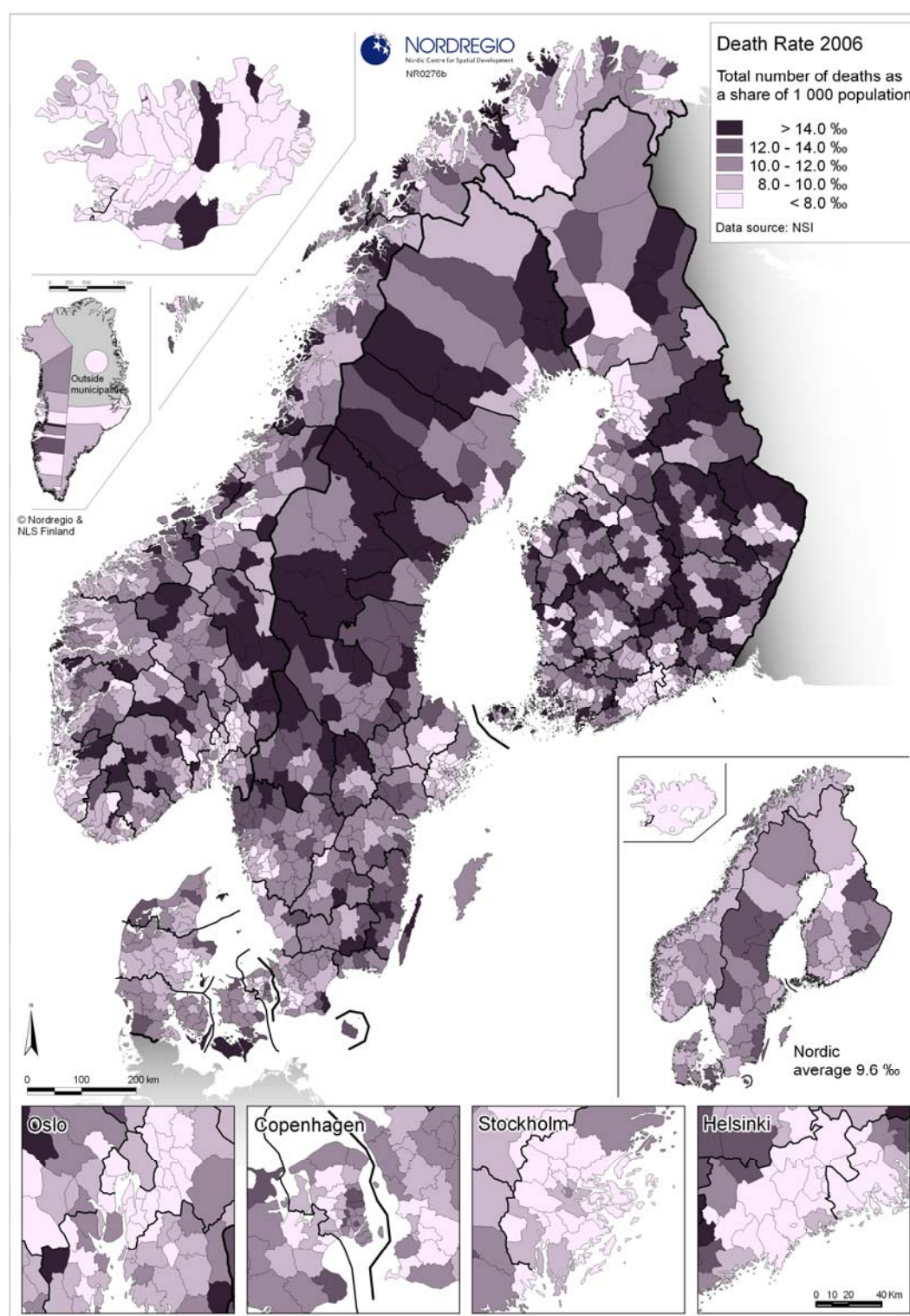
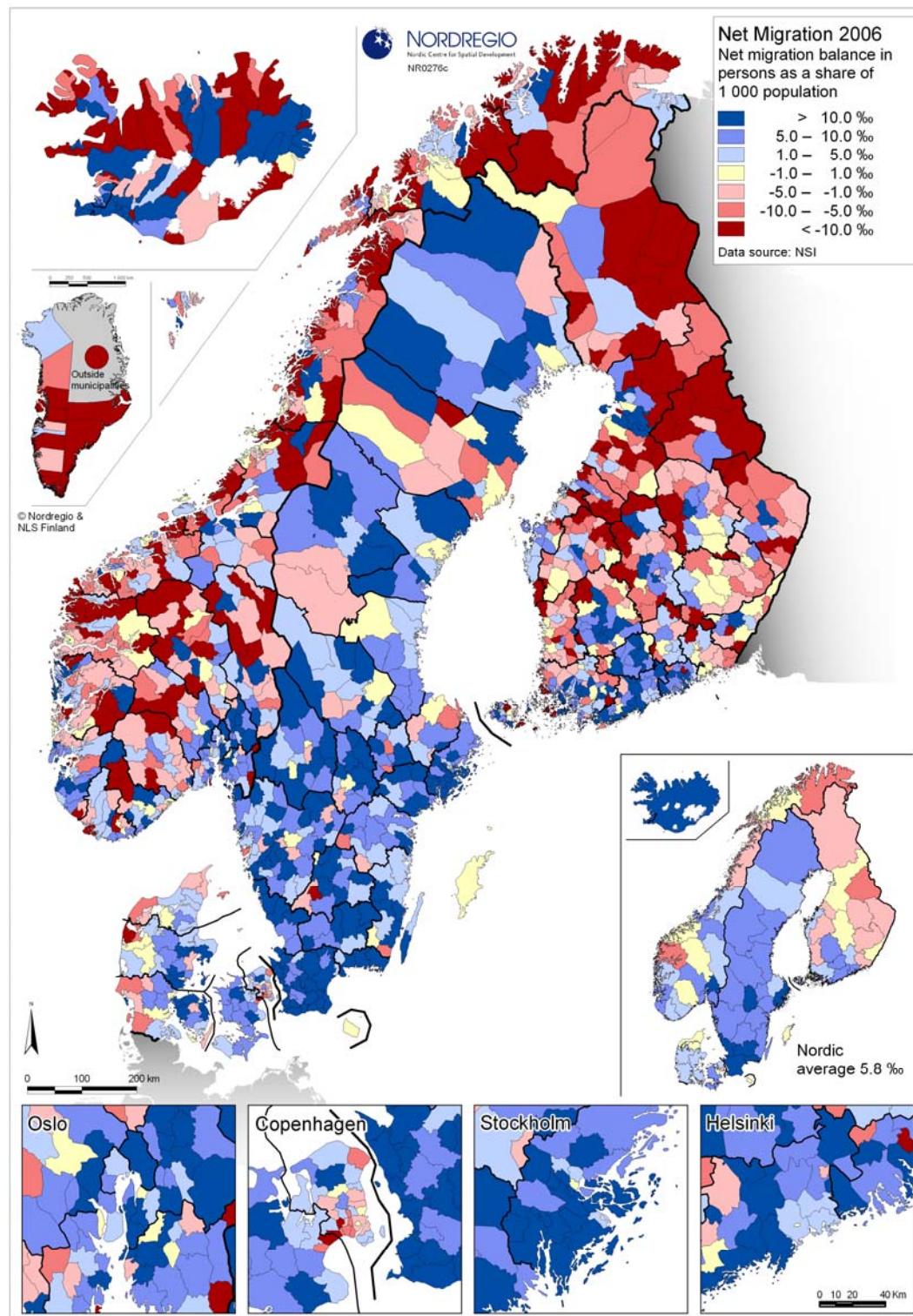


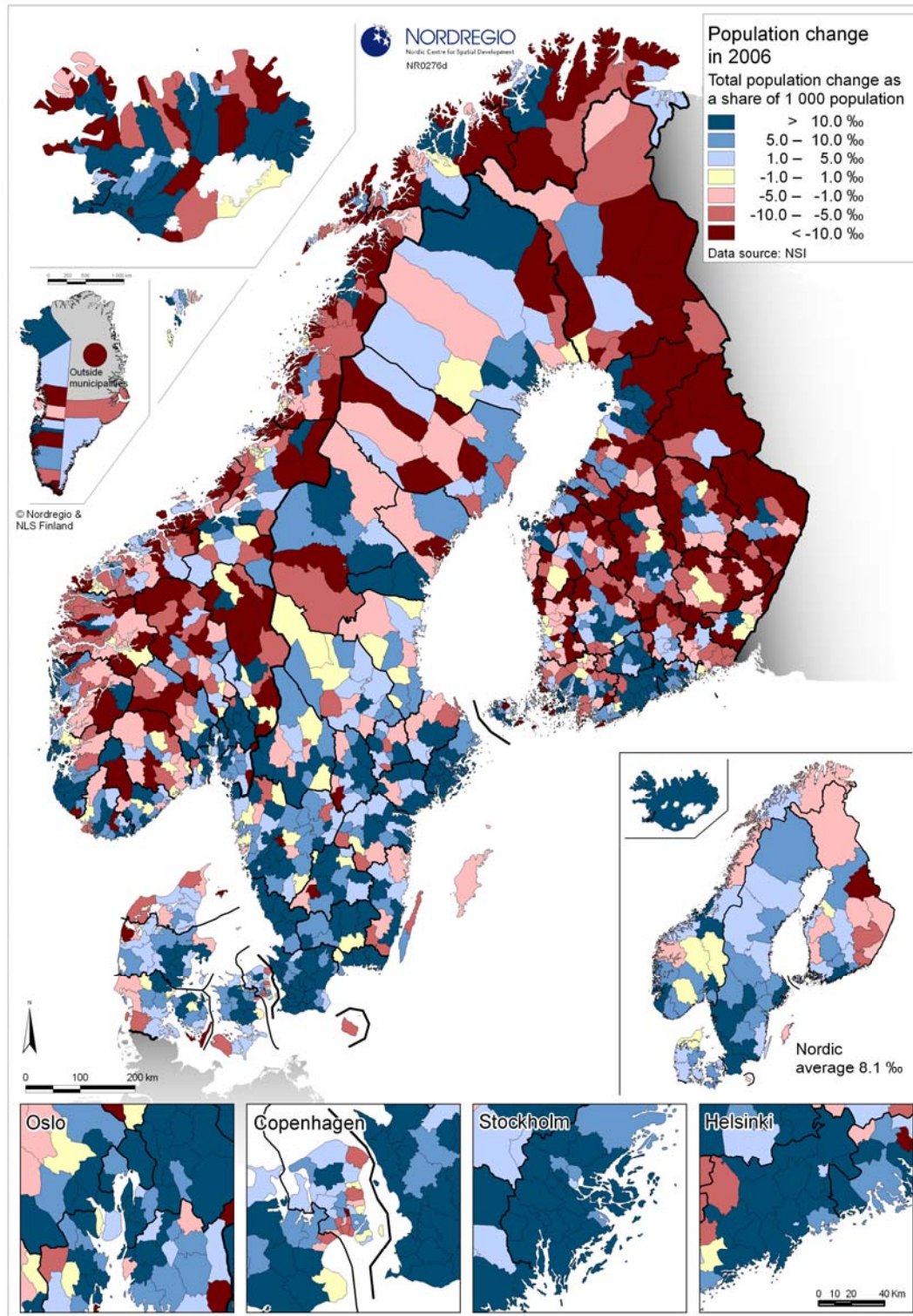
Figure A.3 Net migration rates, the Nordic countries 2006



A.4: Net growth rate: The results of the three basic parameters are shown with yellow and green colors showing net growth situations, while blue and red colors show different levels of decline. Besides the obvious development of urban centres, a north/south divide seems to characterize both Sweden and Finland, a clear east/west divide exists in the case of Denmark, while urban centres and coastal communities seem to be the growth regions in Norway. Another marked trend is the ‘urban sprawl’ process, very clear in the case of Denmark where the major

city areas have been occupied for the last 20-30 years, and therefore only allowing for rather limited growth. Instead, high growth rates are found in concentric circles around the two largest cities, Copenhagen and Aarhus, and especially through very high growth rates in larger towns situated where major transportation lines cross these rings. Similar patterns, however, are also visible around the capitals of the other Nordic countries.

Figure A.4 Net growth rates. The Nordic countries 2006



A.5 and A.6: Change in population and change in population by main components

1990-2005: During the last 15 years³³ the total population increase in the Nordic countries has been stable, at an annual level of approximately 0.4%. This is above the European Union average of 0.3%. Regional differences are however significant. In this period a third of the Nordic regions grew faster than the Nordic average, while a third of regions experienced a notable decline in population. All together some 85% of the Nordic population lives in regions experiencing population increase. In general the capital and other big city regions are the best performers, while sparsely populated and more peripheral regions lose population. The strongest population growth rates are recorded in the capital regions of Höfuðborgarsvæði (Reykjavík), Oslo together with Akershus and Uusimaa (Helsinki). Together with Suðurnes (IS) and Rogaland (NO) each of these regions saw annual average increases of 1.0% or more. Stockholm region is also among the best performing Nordic regions. Population increases have also been rather high in the regions that surround the capital regions, as they are a part of these capital-region's labor market, areas such as Vest- and Østfold in Norway and Itä-Uusimaa in Finland fall into this category. In addition, the Øresund region is also counted among those areas with the highest population surpluses. Sjælland (excluding Copenhagen itself) and the Swedish regions of Halland and Skåne have grown due to considerable in-migration both from other regions and from abroad. The latter group mainly comprises Danish citizens moving to Skåne mostly for economic reasons. There is a labor shortage in Copenhagen, and higher wages than in Sweden, while housing prices are considerably lower in Malmö and other parts of Skåne (Neubauer *et al* 2007).

The least well-performing Nordic regions are mostly located in sparsely populated areas in eastern Finland and northeast Iceland. Vestfirðir (IS) region has, during the period concerned, annually lost approximately 1.7% of its population, whereas Kainuu (FI) the second worst performing Nordic region annually lost 'only' 0.8%. Population development has also been negative in many regions without a big centre (i.e. Satakunta, Gävleborg, Bornholm) and in many of the northernmost regions of Finland, Norway and Sweden (i.e. Lappi and Norrbotten). However, in recent years the population increase has smoothened. In the period 2002-2005 the Nordic capital regions (excluding Copenhagen) remain among the fastest growing Nordic and European regions, though all but the Oslo region are growing slower than in the 1990's. At the same time other big city regions and some which are (partly) located in proximity to capital labour markets are growing faster, such as Södermanlands, Itä-Uusimaa and Østfold. This is also the case in western and southern Sjælland. At the same time the most peripheral regions in Eastern and Northern Finland and Bornholm are performing even worse, while regions such as Nordjylland (DK) and Sogn og Fjordane (NO) are now experiencing a negative population development.

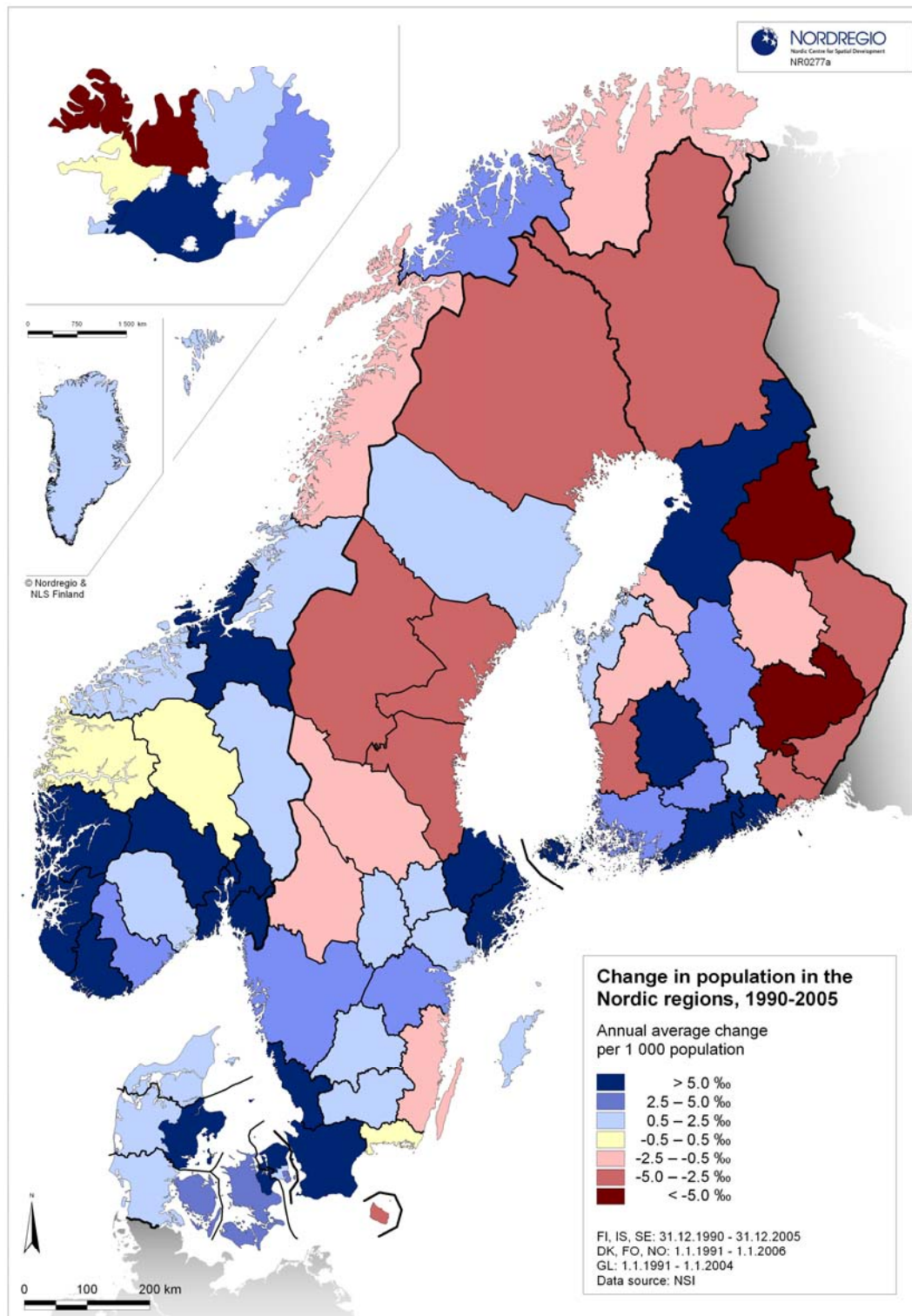
Regions with population increase outside the central capital and metropolitan regions are growing mostly because of one or two very fast growing municipalities. This municipality is in many cases also the only city in the whole region. This is the case in Oulu and Pohjois-Pohjanmaa, Umeå and Västerbotten, and in Tromsø and Troms. This pattern was also discussed in the previous section, where a marked difference between Sweden/Denmark and Norway/Finland was identified.

On intraregional level there is a very clear central – periphery polarization. In general almost all the university cities, and their labour markets, are among the fastest growing Nordic municipalities, whereas the most sparsely populated areas continue to lose their population. In recent years (2001-2005) the capital regions have been the best performing regions, particularly Stockholm. In terms of the other regions the net natural change has, in general, decreased. The best performing regions, especially in Norway, are no longer however growing so quickly in natural terms.

³³ In this chapter population figures refer to 31.12.1990/2001 -31.12.2005 for Finland, Iceland and Sweden, and to 1.1.1991/2002 – 1.1.2006 for Denmark and Norway

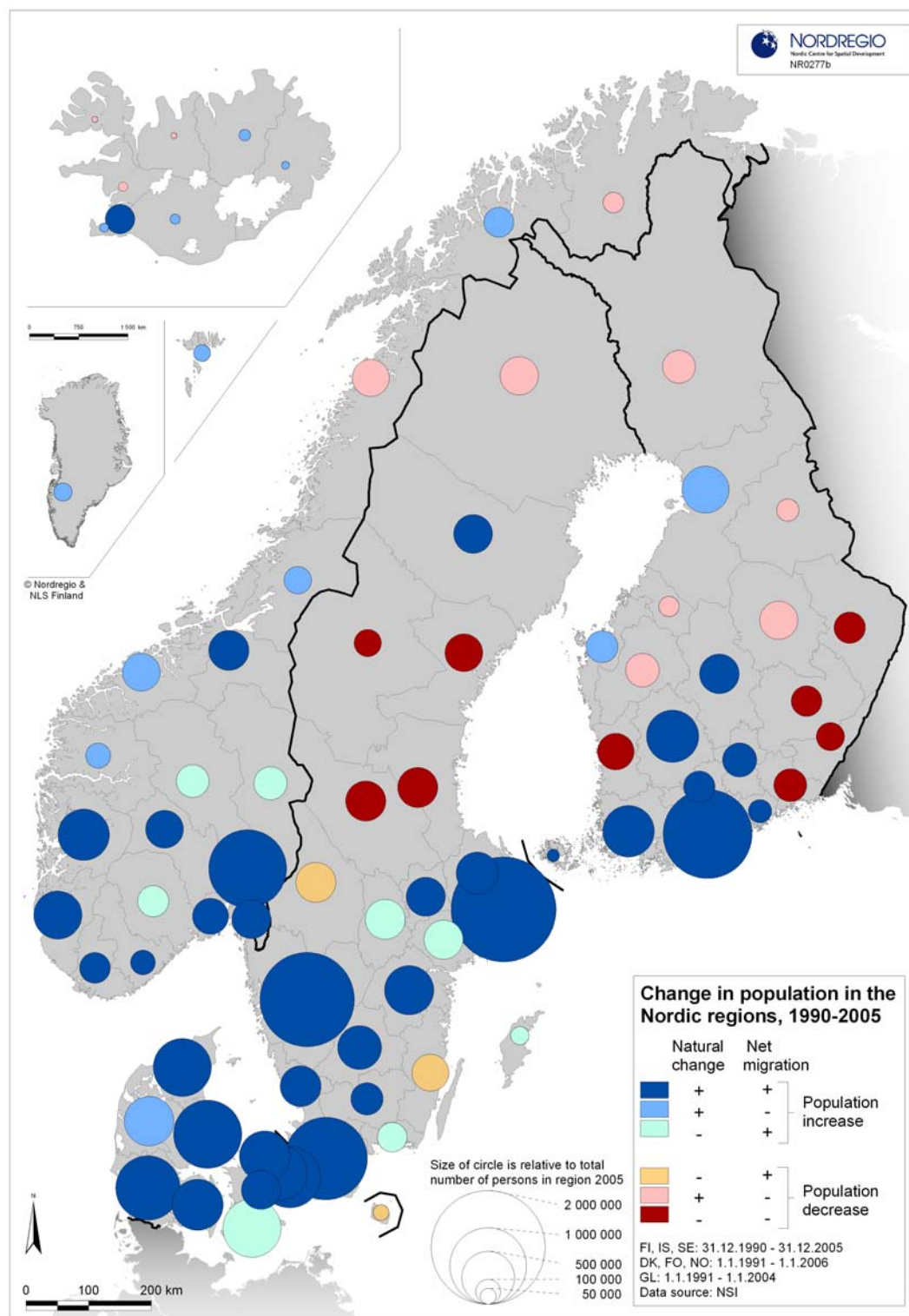
The main direction of migration in the period 1990-2005 has been towards the capital labour market regions in and around Reykjavík (0.7%), Oslo and Helsinki, and in Øresund region excluding Copenhagen itself. Moreover, out-migration has been fastest in Kainuu and Lappi (FI), Finnmark (NO) and in West Norden excluding Reykjavík region, Vestfjörður (IS) being the worst performing Nordic region with a -2.6% annual change in net migration.

Figure A.5 Change in population in the Nordic regions 1990-2005



Compared to total population change, it is interesting to note that high levels of in-migration have an even stronger demographic effect than natural population change in Denmark and in southern parts of Norway and Sweden. Moreover all the Norwegian regions with a negative migration balance have positive natural change.

Figure A.6 Change in population by main components in the Nordic regions 1990-2005



In the period 2001-2005 in-migration has been remarkable in those regions located in proximity to the capital regions, such as Itä-Uusimaa (FI), Akershus, Vest- & Østfold (NO), and Södermanland (SE), and in the Øresund region (Halland & Skåne in Sweden and Syd-Vestsjælland in Denmark). On the intra-regional level the main winners have been the regional centers and their labor markets.

Dependency age grouping: A common classification in respect of the age structure is that into three major classes based on dependency where 0-14 indicates young persons dependency, while 65+ indicates old age dependency. In this classification the age group between 15 and 24 is considered to be a part of the productive age group. This grouping worked well in times where the bulk of educational activities took place during the main years of school attendance, but as discussed in the next section, however, the advent of the 'knowledge society' and the need for 'life-long' or 'continuous' learning calls for some adjustment to be made to this approach.

The training and study activities of the age group between 15 and 24 has become a general trend, and by identifying this group as an indicator of future contributors to the knowledge economy, an important parameter can be identified. One way of coping with this could be to consider this age group as an extension to the group of children/adolescents, as they in many countries are dependent on their families through the receipt of funding for their study activities from their parents. In the Nordic context, however, when adolescents leave school they are considered to be independent of the economy of their parents, and instead dependent – or partly dependent – on government grants and support during their education. Consequently, it may be reasonable to consider them as a group of their own.

In the context of the current analysis it has been considered advantageous to work with a division of the age group in two major sections. On the one hand the group of dependent persons, basically the group of children from 0 to 14, and the group of old aged persons in the age group 65 and above. And on the other hand, the group of labour market active persons, divided between the economically active persons from 25 to 64, and the group of persons from 15 to 24 training to become economically active through vocational or academic study activities.

A-9: Age group 0-14. Two factors seem to be influential on the distribution of the age group 0-14 years. Urban areas show a rather high proportion, in the range from 20% and above, and reflect a relatively young population, among other things influenced by a significant and continuing influx of people. In addition those areas in close proximity to more urbanized areas tend also to show a high proportion of children. The other factor here is the position on the Demographic Transition model, as discussed in the previous section. The communities in the West Norden region – Greenland, the Faroe Islands, Iceland and coastal NW-Norway – are characterized by a population structure with a high proportion of children. In that sense they reflect stages II or III of the Transition model. In the case of Greenland all municipalities except Nuuk are situated in the highest class. Please note however that Greenland data shown in the National park does NOT reflect the situation in this uninhabited part of the country, but shows data for persons outside the municipal structure, such as data from the bases, stations etc.

Municipalities with a low number of children dominate the northern part of Sweden, but also parts of interior Finland, and a few municipalities in interior Norway. As mentioned previously, urban areas generally exhibit large proportions of children. This, however, is not the case in northern Sweden, and a similar pattern appears in the two regional capitals of Aalborg and Odense in Denmark.

A.10: Age group 65+: The pattern of old age persons is to a certain degree a mirror-image of that shown on the previous map. Urban areas are generally characterized by a relatively low percentage of persons in this age group while rural areas are generally characterized by the

relatively high proportion of old aged persons. A few cases however see rather patterns emerging. In many instances however this relates to the presence of educational institutions attracting a high proportion of younger persons.

Figure A.7 Age group 0-14 in per cent of total population

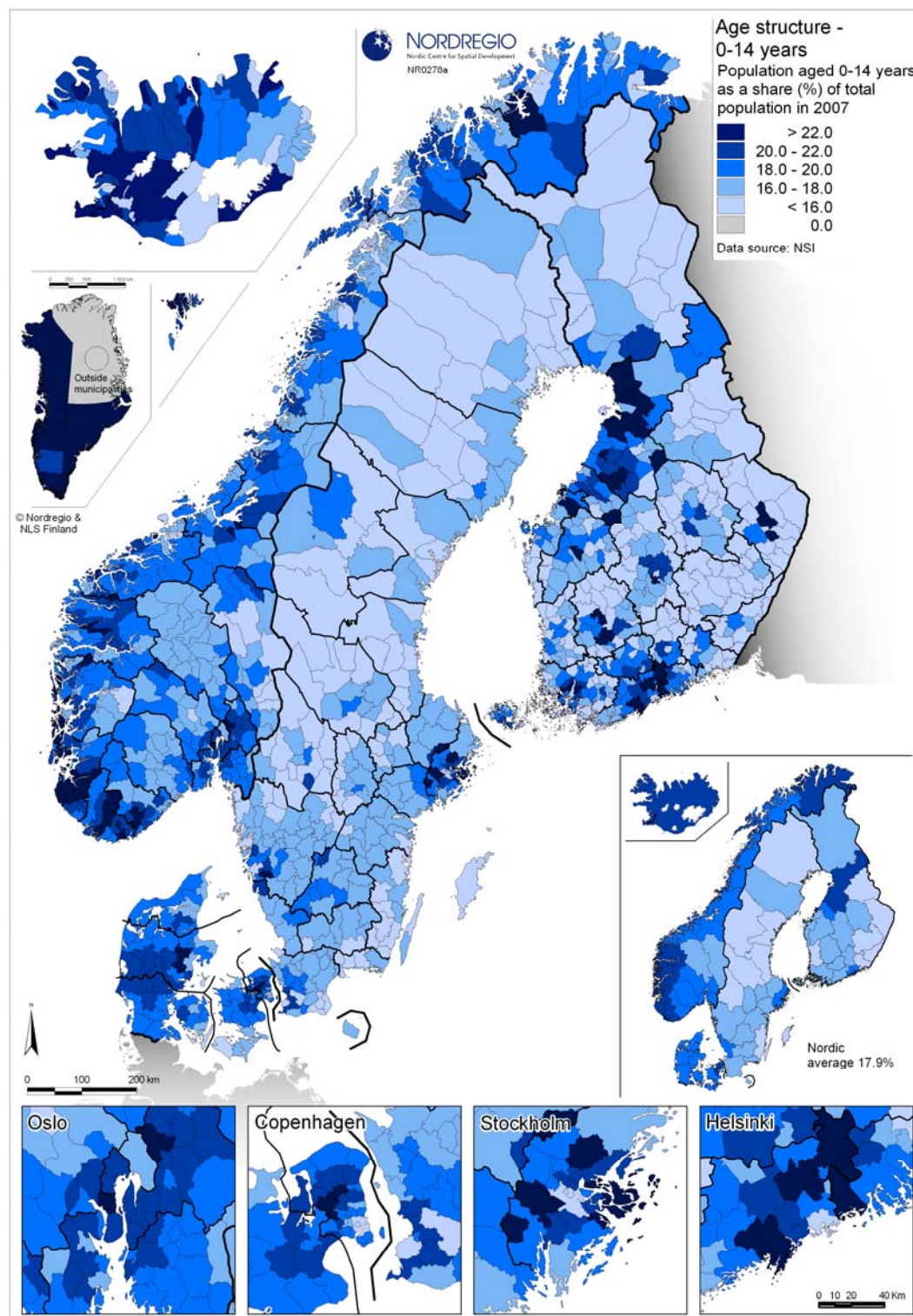
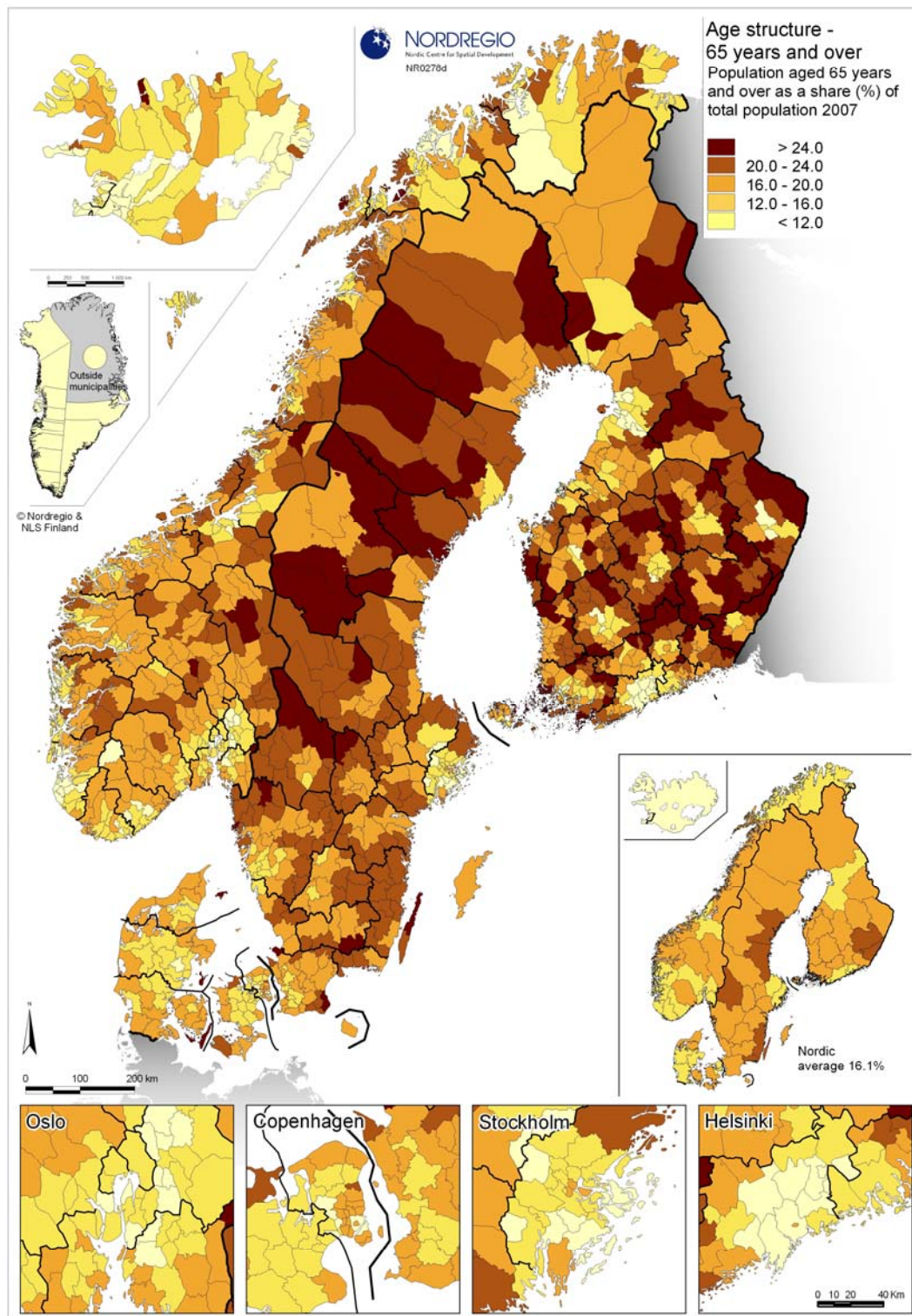


Figure A.8 Age group 65+ in percent of the population in the Nordic countries 2006.



A.9 and A.10: Young and old age dependency: In 2005 the total age dependency rate in the Nordic countries was 51.7. The rate is, in general, lower in Finland and Iceland than in Denmark and Sweden. But the dependency rate is spread unevenly between the regions (figure A.16). In all Nordic capital regions (Copenhagen city 38.0), Pirkanmaa (FI), Uppsala (SE), Østjylland and Greenland the dependency rate was below 50.0. In contrast the highest rates can be found in Sogn og Fjordane (58.8) and in Kalmar (57.8).

In general, the Danish population has grown in all age categories, and at the same time the dependency rate has grown everywhere (excluding Copenhagen city region). This growth has been most powerful in Nordsjælland where the number of carers has increased, annually by approximately 2.0% over the last 15 years. In Finland and Iceland the dependency rate has become smaller in all regions – even in the regions with population decrease. This development has been repeated in Norway and Sweden, though the northernmost regions in these countries now have higher dependency rates than in 1990.

There is a huge difference in whether the dependency rate is high or low because of high/low share of retired persons or young age groups. The young age dependency rate is highest in West Norden (the Faroe Islands 35.7) and Western Norway. The rate is lowest in the regions with high population decrease (Etelä-Karjala 23.3), but also in city regions of Copenhagen area, Pirkanmaa and Uusimaa (FI). The old age dependency rate is lowest in the capital regions (Höfuðborgarsvæði 17.3), northern Norway and West Norden, and highest in Etelä-Savo (32.9) and central Sweden.

In Denmark, Norway and West Norden the young age dependency rate is higher than the old age dependency rate in all the regions excluding Bornholm (DK) and Hedmark (NO). In Finland only the capital area, Keski- and Pohjois-Pohjanmaa have a clearly higher young age dependency rate. The highest imbalances between the young - and old age dependency rates can be found across West Norden, and in Rogaland (NO) and Pohjois-Pohjanmaa (FI).

All of these regions have young age dependency rates over 10 units higher than the old age rate. In Greenland the difference is striking 36/8. In contrast all the regions with old age dependency rate of 30 or over have an old age dependency rate at least 4 units higher than the young age dependency rate with Etelä-Savo being the highest with 24/33.

Figure A.9 Dependency rate in the Nordic regions 2005 (Capital region marked with darker colour)

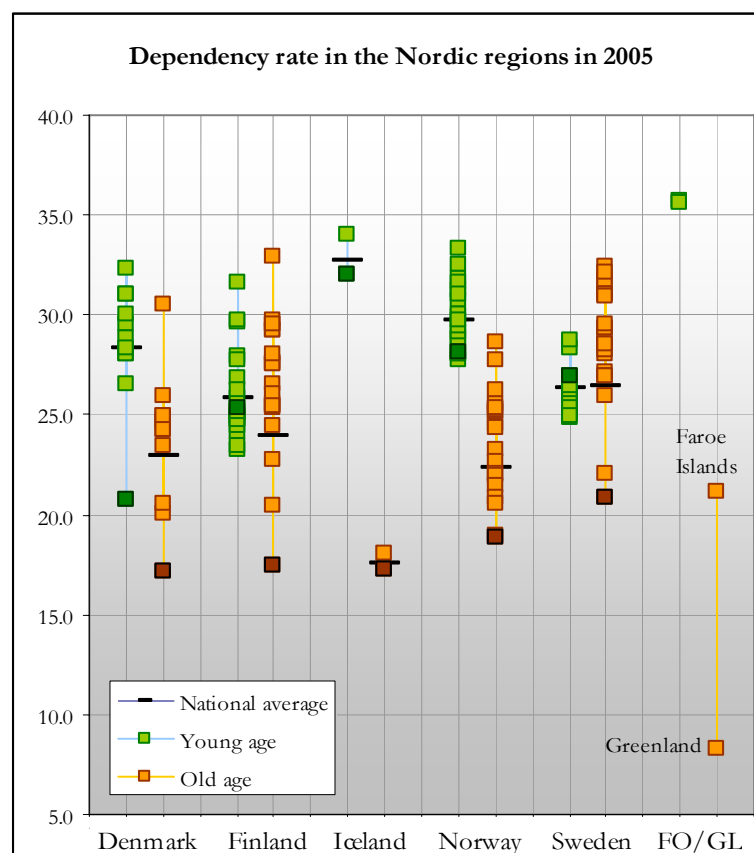
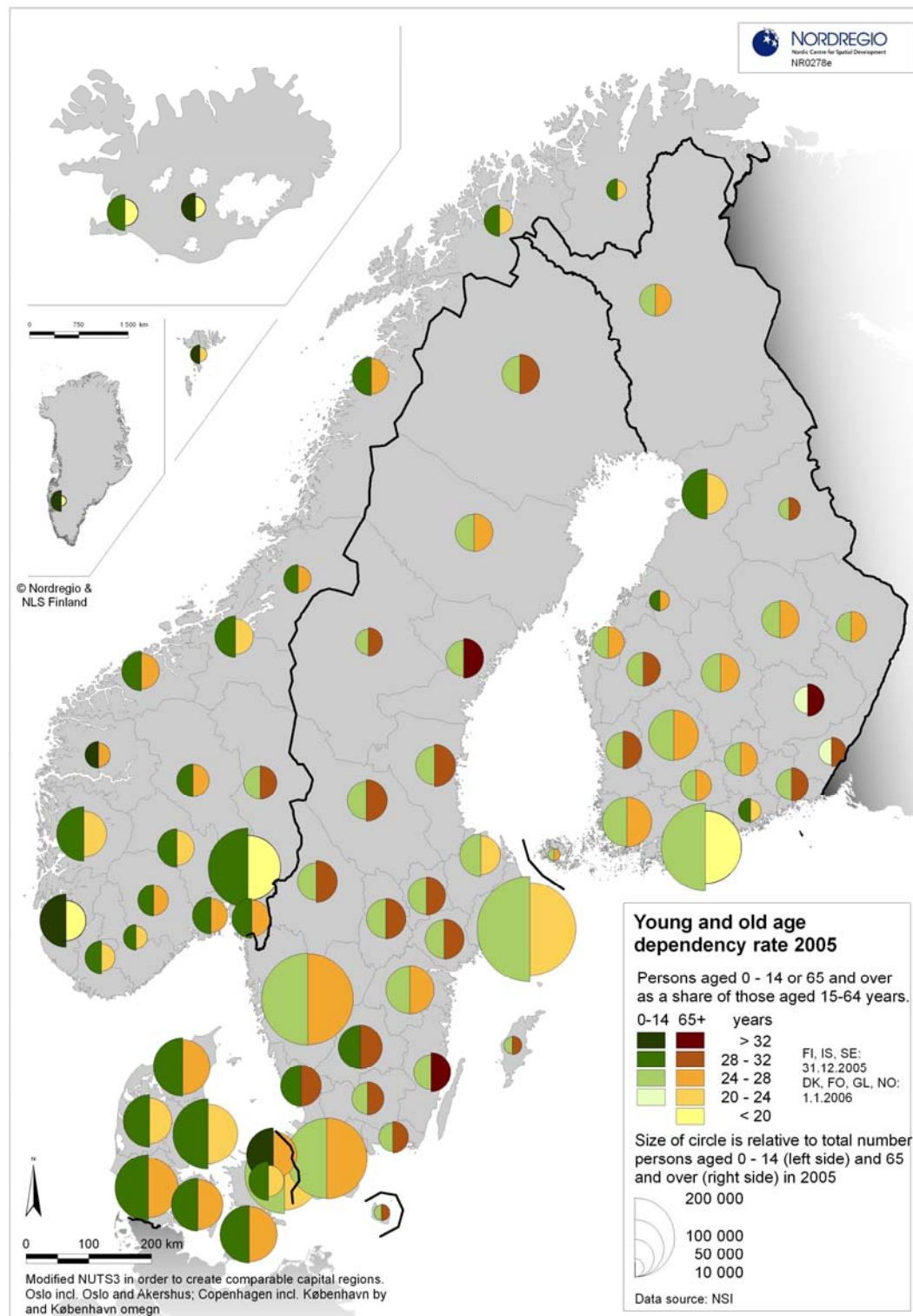


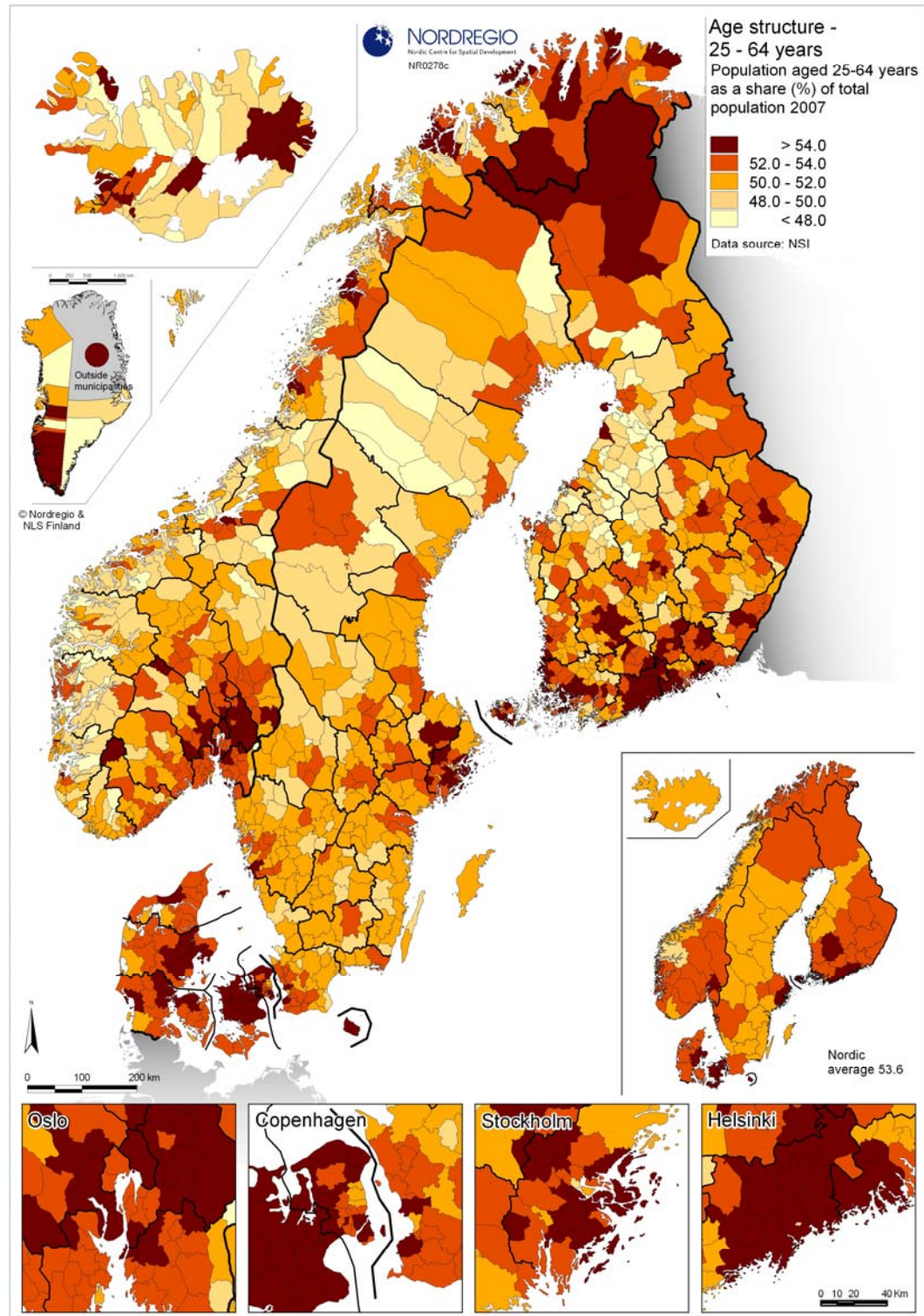
Figure A.10 Young and old age dependency rate in the Nordic regions in 2005



A.11: Main labour force, age group 25-64. The advent of the concept of the ‘Information Age’ has some implications for workforce characteristics. Usually adolescents and adults in the age group 15-24 will be in situations where the acquisition of skills and knowledge will require them to be in connection with institutions related to vocational training or to academic training in one way or the other. At the same time the Nordic welfare model and its focus on support

to education has given a basis for this age group switch from a dependency on family incomes to dependence on public support. Consequently, the available workforce in reality today has been reduced to persons in the age group 25 to 64.

Figure A.11 Main labour force, age group 25-64



The map is first of all characterized by the high concentration of persons in this productive age group in urban and urbanized centres, where job opportunities provide a significant attraction,

and at the same time an opportunity for people, enabling them to stay. Not only urban centres alone, however, but also the suburban structures around these urban centres, where the main communication lines tend to be visible due to higher concentrations of persons in the active age group. Another concentrating element has been a number of more isolated economic activities, for instance larger mineral and energy extraction sites, as well as specific activities such as military installations of substantial size. But also single industries, producing products of national and even international importance, enables some municipalities to maintain a high level of workforce in the productive age group, even when surrounded by rural municipalities.

A.13: The age group 15-24. The younger part of this age group will generally still be living with their family, so the distribution pattern is clearly influenced by the previous map. The distribution, however, is also very much influenced by the availability of education and training opportunities. So the highest concentrations are clearly in the Capitals of the Nordic countries. Many smaller towns are however also able to offer specialized educational opportunities and, as such, are consequently attractive to this age group. The distribution pattern then shows several rural municipalities with high concentrations of this age group. The question of decentralizing education facilities has a certain impact on the patterns, just as accessibility plays a role in this context. The situation in Denmark illustrates how commuting to the major educational cities from the adjacent municipalities – for instance around Copenhagen, Odense, Aarhus and Aalborg – is not considered an option for students, while distances to Western Jutland seems to be more acceptable, and consequently result in a more dispersed structure in these areas.

A.14: Percentage of persons with tertiary education. Education is a key qualification, and the pattern is quite clear, as the general level of education is closely connected to two factors, on the one hand to the population concentration offering qualified work opportunities, and on the other to towns and cities offering higher education opportunities. These places are ‘sticky’, tending to be attractive to industries relying on access to a continuous supply of qualified persons.

A.15: Gender distribution in municipalities. The map shows in yellow all municipalities with a balanced gender structure ($50 \pm 0.5\%$), while red colours illustrate a female surplus (more than 50.5%), and blue colours a female deficit (less than 49.5%). In absolute numbers there are a total of 606 or 42% of the municipalities with a balanced gender structure, while there are 526 or 37% with a female deficit and only 298 or 21% with surplus of women. The regional distribution is also marked, with northern and rural areas dominated by a medium to high deficit of women, while the municipalities with a surplus of women are predominantly to be found in urban areas and in the more densely populated areas. The very extreme female deficit areas are usually those connected to highly specialized male activities, primarily mining, but also activities related to military installations. Some of the northern municipalities with an even distribution or even a female surplus, on the other hand, benefit from a marked influx of women, especially from Russia, which for a period of time compensates for the general pattern of female out-migration.

A.16: Women and education. Women have become dominant in medium-high and high education, and this has important regional consequences. The high level of migration of women to urban areas has increased their involvement in jobs requiring this level of qualification. The consequences of this have however been much more remarkable in rural areas where the dominance of women with higher education is marked, contributing to the shaping of the future labour market.

Figure A.12 The age group 15-24. Adolescents and adults in training. Nordic countries 2006.

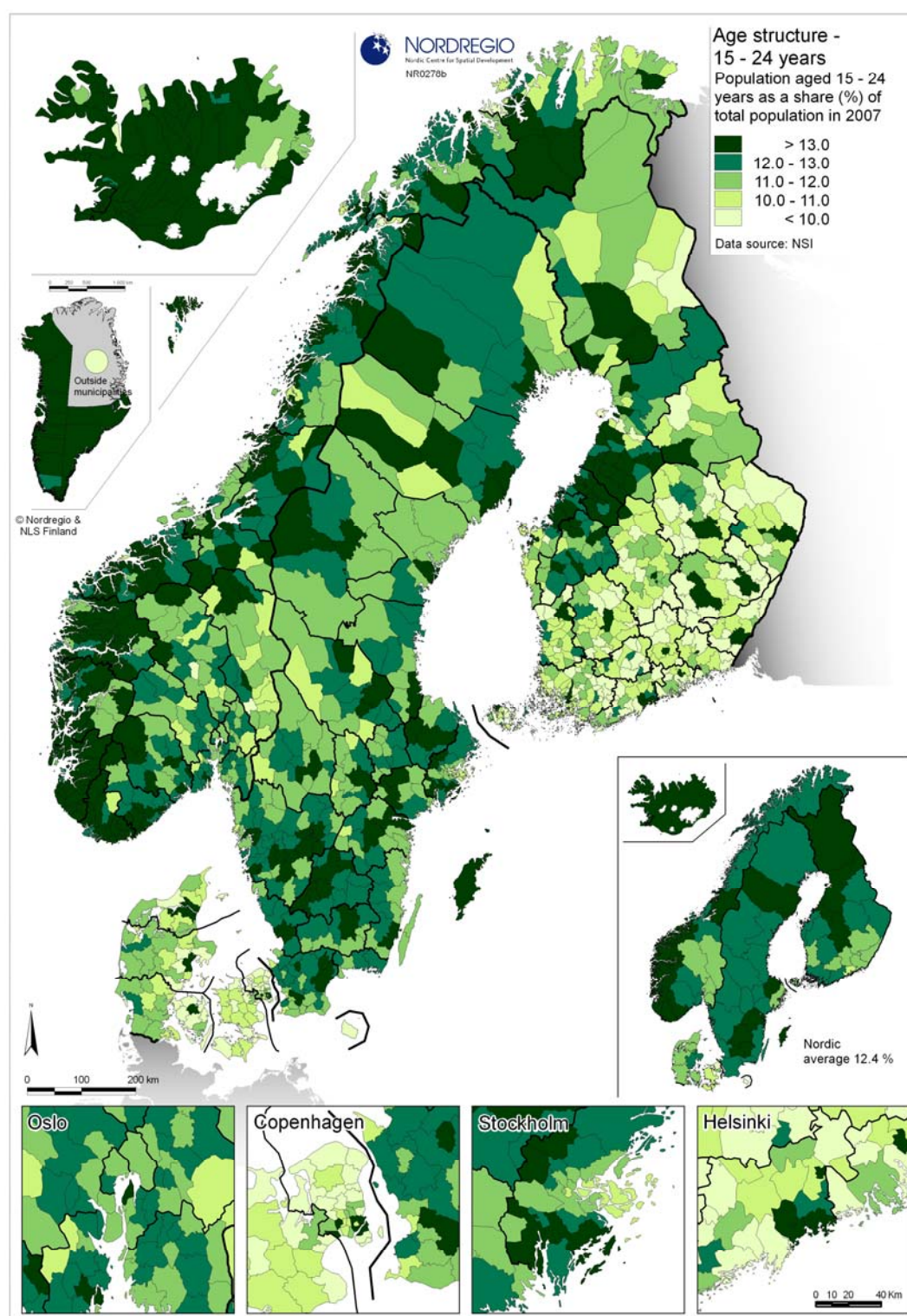


Figure A.13 Percentage of persons with a tertiary-level education in the Nordic countries

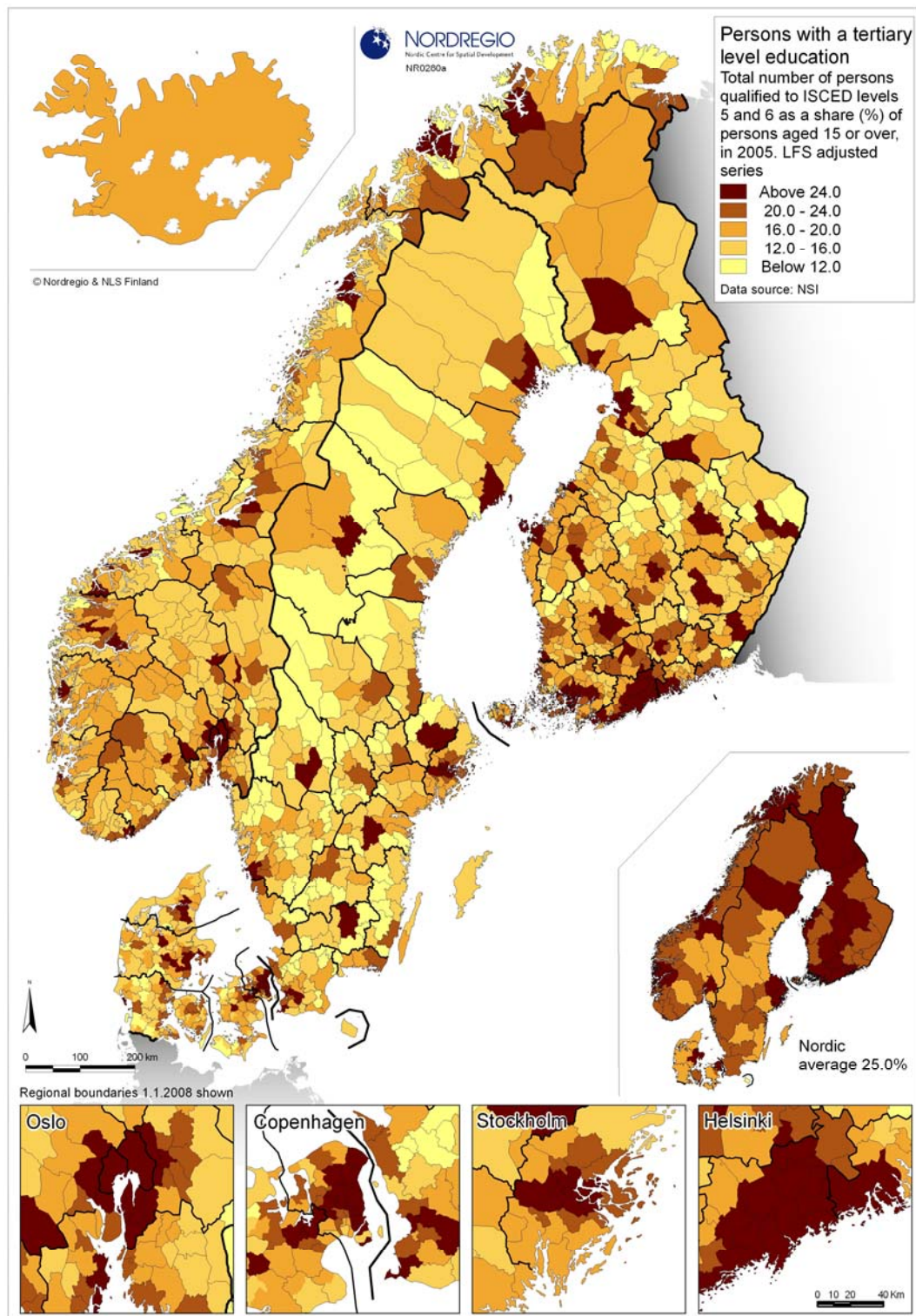


Figure A.14 Gender distribution in municipalities in the Nordic countries

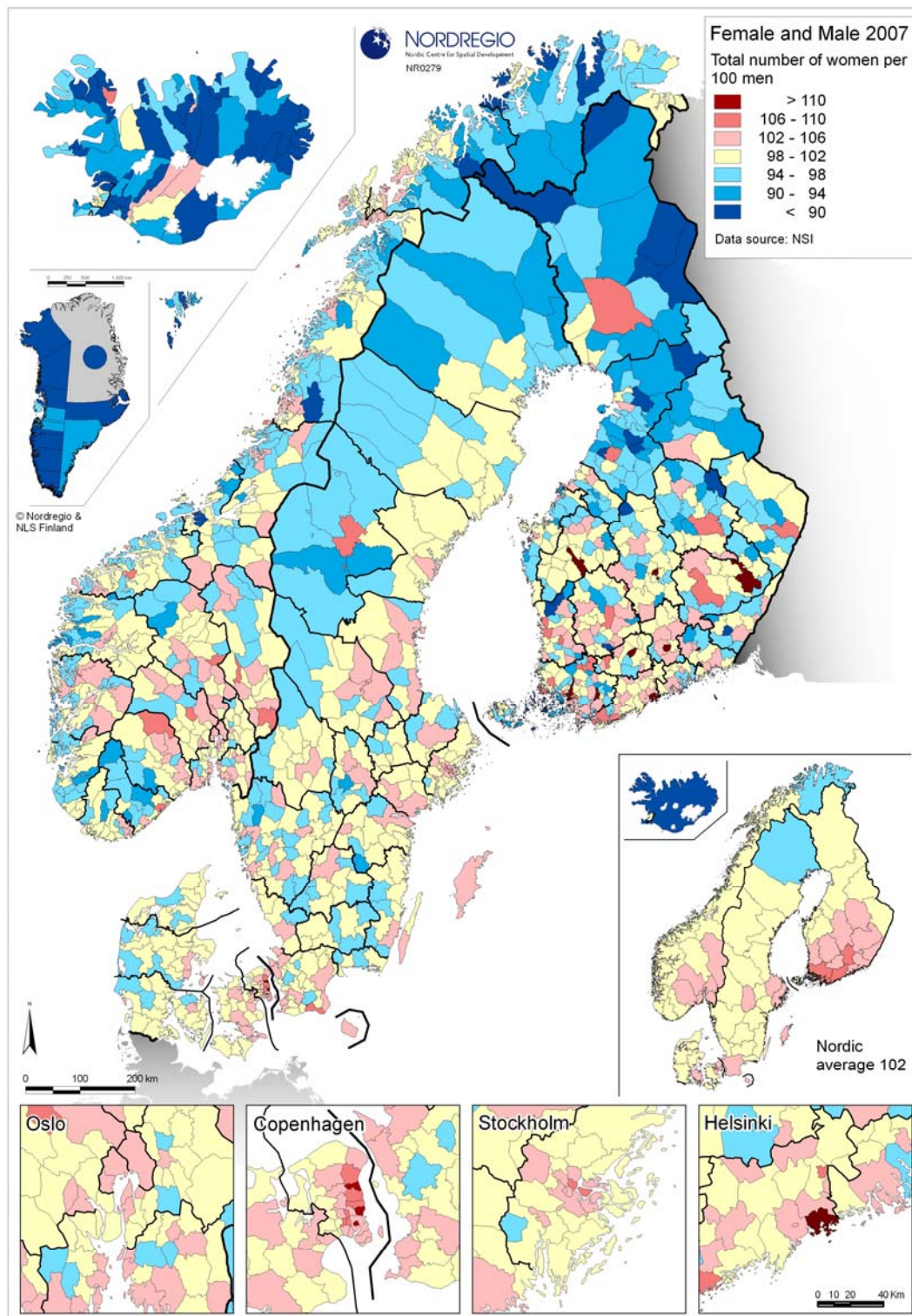
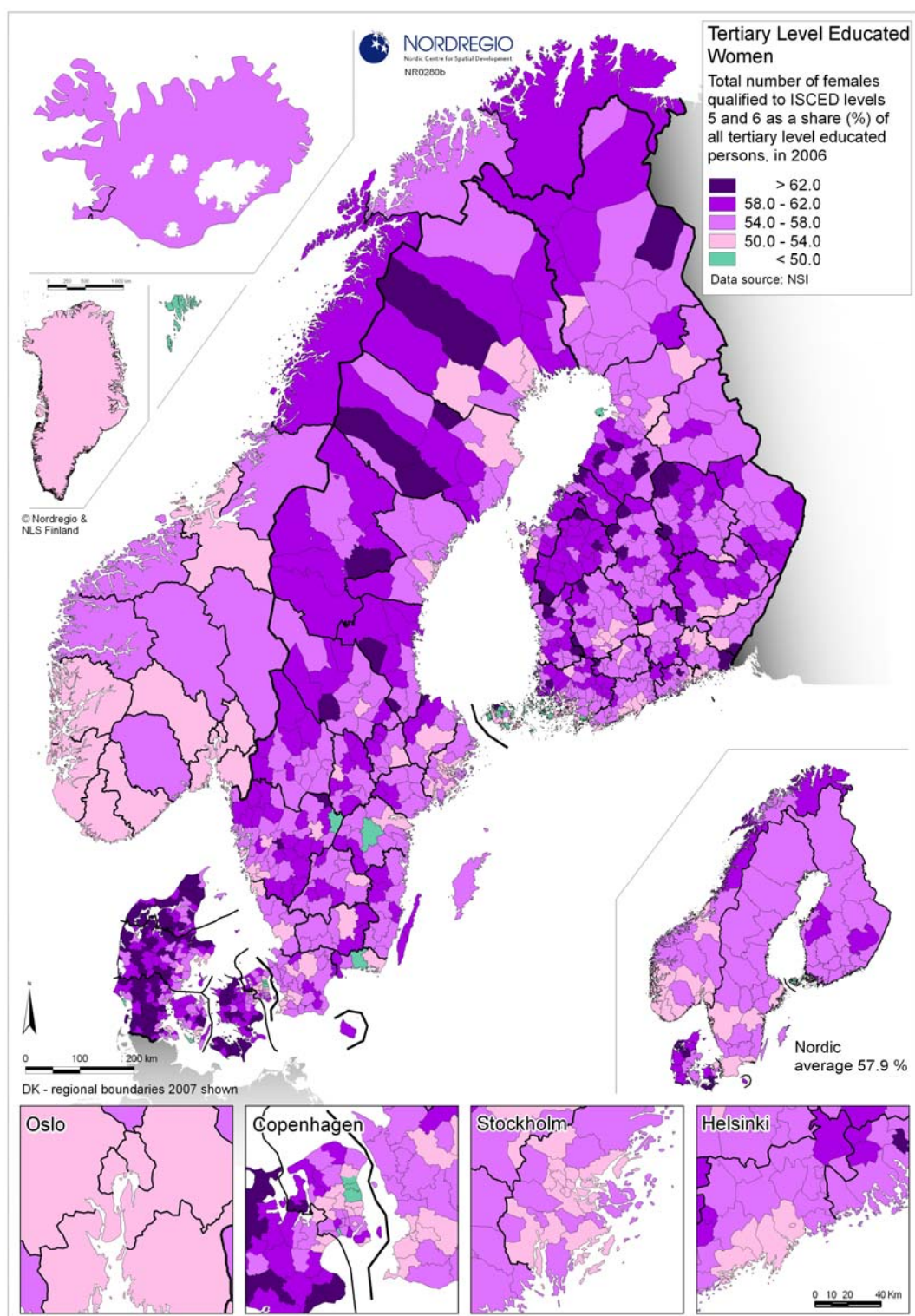


Figure A.15 Women and education. Women as a percentage of those with a tertiary-level education



Appendix B: A Specification of Models

Cluster analysis

Of the 11 components included in the analysis (11x11 correlation matrix) a total of 13 combinations generate significant correlations, i.e. above +0.3 and below -0.3. The components and their respective correlation coefficients are listed in table B.1 below:

Table B.1 Significant correlation

Significant correlations			
Net Growth	0,93	Net Migration	
Death Rate	0,59	Pct 65+	
Net Growth	0,56	Birth Rate	
Birth Rate	0,50	Pct 0-14	
Net Migration	-0,30	Death Rate	
Pct 25-64	-0,39	Pct 14-24	
Net Growth	-0,44	Pct 65+	
Death Rate	-0,52	Birth Rate	
Birth Rate	-0,53	Pct 65+	
Death Rate	-0,53	Pct 0-14	
Pct +65	-0,55	Pct 25-64	
Net Growth	-0,58	Death Rate	
Pct. Tert. Edu	-0,67	Women Higher Education	
Pct 65+	-0,82	Pct 0-14	

Only limited surprises emerge in terms of the correlations. By far the largest level of correlation is between net growth and net migration rate ($\rho=0.93$), a situation which has already been indicated in the previous analysis. The numbers here simply confirm that migration is the most important single element in relation to the population dynamics of the municipalities. Similarly, the two basic components of birth rate ($\rho=0.56$) and death rate ($\rho=-0.58$) show that these components are important in terms of overall dynamics, although not at the same level as migration.

In respect of the correlations between the different components, a number of obvious relations become evident. For instance the fact that there is a close connection ($\rho=0.59$) between death rates and a high proportion of the population in the old age group. Or similarly between birth rate and the net growth rate ($\rho=0.56$), just as there is a clear negative correlation ($\rho=-0.82$) between the proportion of children and old age persons, just as one would expect. As is the case with the negative correlation ($\rho=-0.58$) between the net growth rate and the death rate.

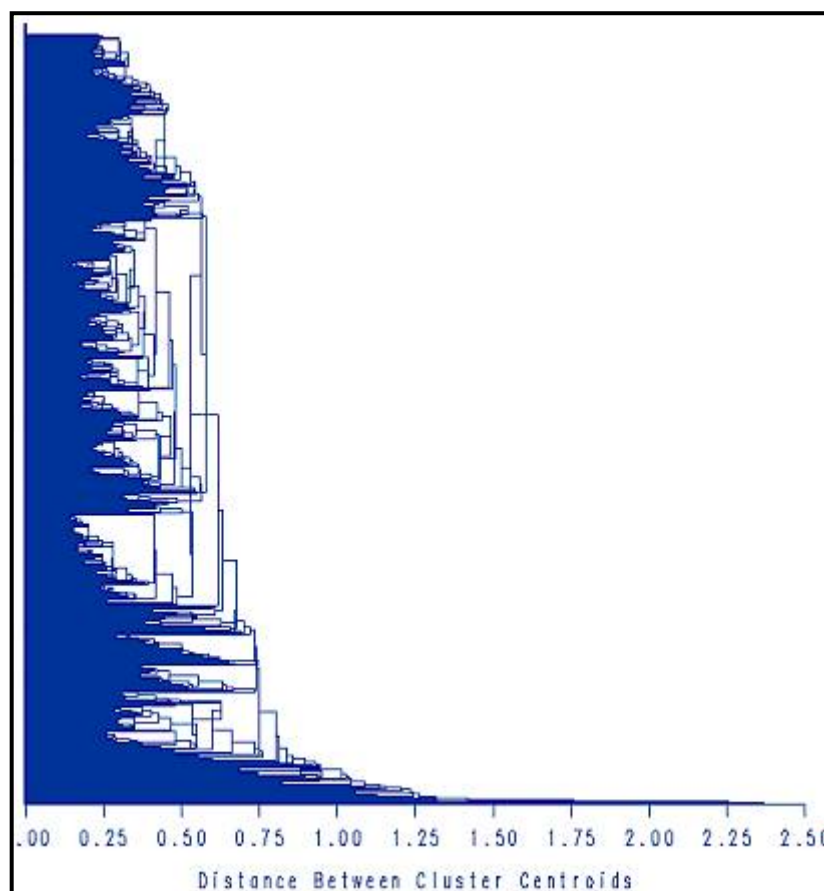
It may seem surprising to see a significant negative correlation ($\rho=-0.67$) between the total number of persons with a tertiary-level education and the number of women with higher education, as one might expect the two components to be more or less parallel, i.e. that municipalities with a high proportion of persons with higher education would include both males and female. But as was shown in the section on gendered-regionality, even though women with a higher education have become the majority in all the Nordic countries, they are particularly dominant rural areas and smaller cities and in villages where the total proportion of persons with a higher education is low, while their dominance is more limited in the larger population centres where the total proportion of those with a tertiary-level education is substantially higher. Consequently, there is a clear negative relationship between the proportion of women with a higher education, and the total proportion of persons with higher education.

Individual correlations, as described above, may provide a hint of where to look for similarities and differences between municipalities, and using these interpretations in identifying municipalities we can see which are alike, and which differ. As such, one way of presenting similarities between municipals is to identify which municipals are most alike, and then arrange them in clusters. The level of correlation also indicates the level of affinity between the different components, and it is important in connection with the process of clustering the many municipalities into a few classes. The more alike, the higher the probability they fall into the same group.

In practice, the method applied in the analysis has been a grouping based on distance to cluster centroids. The process of clustering starts out with finding the two municipalities which are most alike regarding all components included in the analysis. The level of 'aliveness' is determined by calculating distances between all observations, and the two with the shortest distance are the two most alike. These two municipalities are then grouped, and the mean value for each of the components is calculated, becoming the values of the group. The next step is similar to the first one, except that there are now $n-2$ municipalities and one cluster in the calculation. The process continues until a specified number of clusters have been reached, or all municipalities are grouped together in one cluster.

The 'cluster tree' on figure B.1 below shows the effects of the clustering process, starting from the left with all the individual municipalities, and ending with a total grouping of all data into one cluster. During this process focus is on homogeneity, while variation in the data material is diminished. The result places emphasis on what is common for the municipalities within each of the groups, while at the same time stressing the differences between the groups.

Figure B.1 The clustering tree

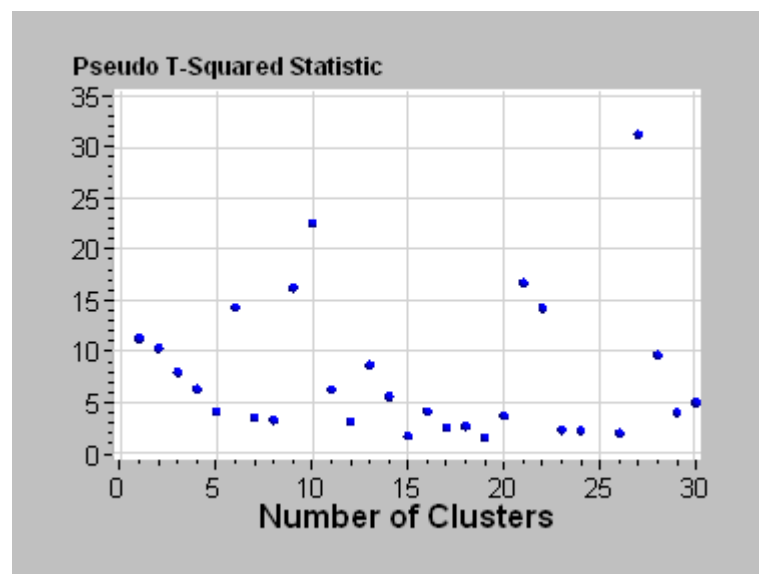


It is possible to choose to stop any arbitrary number of clusters, for instance to decide that three or four clusters would be appropriate. But as indicated in the graph, data tends to fall

into characteristic groups, with significant differences between the groups, and a high level of congruence.

Decisions regarding cluster level can be supported by breaks in the *T-Squared Statistics*, where marked changes in values indicate an important shift in clustering, while constant values or limited differences indicate minor adjustments. Clusters just before the break, therefore, are the ones to choose, as this is where the major grouping takes place. In the dataset shown in figure B.2, the major breaks within groupings from 1 to 30 are at clustering levels 1, 6, 9, 10, 13, 21, 22. In order to get a manageable number of clusters, two cases have been selected with a limited number of groups, namely cluster levels 2 (i.e. just before the final grouping of all municipalities in one cluster) and 7 (i.e. just before the major break at 6 clusters). The results are presented on the maps in chapter 10.

Figure B.2 Decision base for choice of cluster level



Principal component and factor analysis

Another way of putting a new view on a dataset is to apply a *Principal Component Analysis* or a *Factor Analysis*. Both types of analysis are based on a mathematical procedure that transforms a number of possibly correlated variables into a set of new variables, where the first principal component or the first factor accounts for as much as possible of the variability of the data, while the second component accounts for as much as possible of the remaining variability of the data, etc., until all variations in the original data are explained.

The resulting components or factors do not reflect just one of the original parameters, but a combination of several of them, and generally a set of original parameters that show a high degree of correlation. The result is not a simple grouping, such as the result of the cluster analysis. Instead it results in a map showing high and low values in relation to the principal components or principal factors, and thus reflects the interaction between several of the original data.

The defining characteristic distinguishing the two approaches is that in *principal components analysis* it is assumed that all variability in an item should be used in the analysis, while in *principal factors analysis* only the variability in an item that is in common with the other items are in use. In most cases, these two methods usually yield very similar results, but *principal components analysis* is often preferred as a method for data reduction, while *principal factors analysis* is often preferred when the goal of the analysis is to detect structure. In this case the PCA has

been chosen, and maps 10.19 and 10.20 show the first two principal components with the following characteristics.

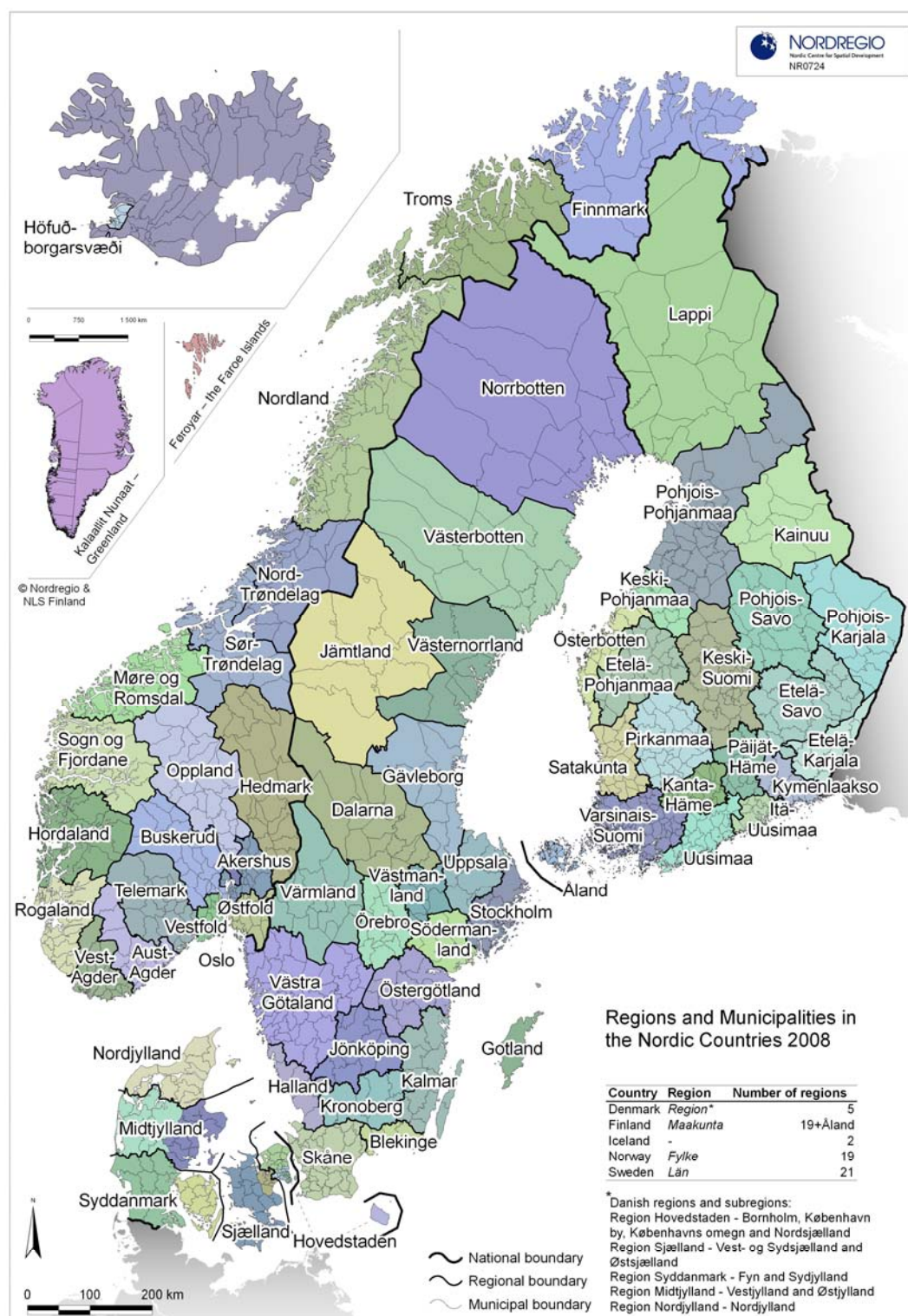
Table B.2 below shows the extent to which the new axes are able to describe the variations in the original data, and as indicated the first new component is able to describe a total of 35% of the total variation, while the second axis is able to describe an additional 16% of the variation. By focussing on these first two axes it is possible to show more than 50% of all variation in the 11 original parameters.

Table B.2 Data explained by new components

Data explained by new components		
Cumulative	Pct	Component
35	35	First axis
51	16	Second axis
65	14	Third axis
76	11	Fourth axis
84	8	Fifth axis
89	5	Sixth axis
94	5	Seventh axis
98	4	Eight axis
101	3	Ninth axis
101	0	Tenth axis

Due to this, only two maps are able to show more than half of all the variation identified in the original datasets, and these maps are shown on the following pages. When interpreting the maps it is important to focus on whether or not specific municipalities are within the same groups or not, as well as the distance between the groups in the relative values given on the legend, as the latter shows whether the municipalities are very similar or very different. The values, however, cannot be converted into absolute numbers in relation to the components that constitutes the axes.

Appendix C: A map over the Nordic regions



Appendix D: List of concepts and abbreviations

Abbreviations

c.v.	Coefficient of variation (a measure of dispersion of a probability distribution)
ESDP	European Spatial Development Perspective
ESPON	European Spatial Planning Observation Network
ISCED	Unesco International Standard Classification of Education
ISCED 5	First stage of tertiary education
ISCED 6	Second stage of tertiary education
NLS Finland	National Land Survey of Finland
NSI	National Statistical Institutes
NUTS	Nomenclature des Unités Territoriales Statistiques (=Nomenclature of Territorial Units for Statistics). A geo-code standard for referencing the administrative division of countries for statistical purposes on European level.
NUTS2	Refers to national (DK, IS)/ regional level (FI - lääni, NO & SE – group of fylkes/läns)
NUTS3	Refers to regional level (DK – amt/landsdel, FI – maakunta, IS – regions, NO – fylke, SE – län)
OECD	Organization for Economic Cooperation and Development
PCA	Principal component analysis (a technique used to reduce multidimensional data sets to lower dimensions for analysis)
STD	Standard deviation
TFR	Total Fertility Rate, i.e. the number of children per woman

Geographical areas

Atlantic Rim	the Faroe Islands, Iceland and Greenland
Norden/ the Nordic Countries	The five Nordic Countries (Denmark, Finland, Iceland, Norway, Sweden) including the autonomous areas (the Faroe Islands, Greenland, Åland)
West Norden	the Faroe Islands, Iceland and Greenland
Øresund region	Hovedstaden and Sjælland regions in Denmark, Skåne in Sweden

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