

Demography in the Nordic countries

– A synthesis report

Klaus Georg Hansen, Rasmus Ole Rasmussen and Johanna Roto

NORDREGIO WORKING PAPER 2011:9



Demography in the Nordic countries
– A synthesis report

Demography in the Nordic countries – A synthesis report

Klaus Georg Hansen,
Rasmus Ole Rasmussen and
Johanna Roto

Stockholm 2011



NORDREGIO
Nordic Centre for Spatial Development

Demography in the Nordic countries – A synthesis report

Nordregio Working Paper 2011:9

ISBN 978-91-89332-83-6

ISSN 1403-2511

© Nordregio 2011

Nordregio
Box 1658
111 86 Stockholm
Sweden
nordregio@nordregio.se
www.nordregio.se
www.norden.se

Text and analyses: Klaus Georg Hansen, Rasmus Ole Rasmussen and Johanna Roto
Maps: Johanna Roto

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.

The Nordic Council

is a forum for co-operation between the Nordic parliaments and governments. The Council consists of 87 parliamentarians from the Nordic countries. The Nordic Council takes policy initiatives and monitors Nordic co-operation. Founded in 1952.

The Nordic Council of Ministers

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.

Nordregio – Nordic Centre for Spatial Development

works in the field of spatial development, which includes physical (spatial) planning and regional policies, in particular with a Nordic and European comparative perspective. Nordregio is active in research, education and knowledge dissemination and provides policy-relevant data and analysis. Nordregio was established in 1997 by the Nordic Council of Ministers. The centre is owned by the five Nordic countries and builds upon more than 40 years of Nordic cooperation in its field.

Contents

List of tables and appendixes	6
1. Preface	7
2. Introduction	8
The aims and the conclusions of the report	8
The structure of the report	9
Workshops and Handbook	9
3. Tools: influencing demographic development	10
New directions in regional development paradigms	10
Proactive and reactive tools	12
4. Demographic Challenges	14
The major challenges	14
The sparsely populated areas	15
National and international migration	16
Aging	18
Educational desires, needs and possibilities	19
5. Basic Demographic Parameters	21
Settlement	21
Age	22
Gender	22
Total population change	23
6. Complex Demographic Parameters	25
The dynamics of settlements	25
Drivers and indicators in the process of demographic change	26
7. Prognosis	30
Predictions, prognoses, forecasts and projections	30
Total population	31
Age structure	32
Regional consequences	34
Simplicity versus complexity	37
Complex modelling	38
The role of turning points	39
References	42

List of tables and appendixes

Tables:

Table 1:	An illustration of the urbanisation process and different approaches to it	11
Table 2:	A matrix of the urbanisation process and different approaches	11
Table 3:	The matrix of categories of challenges and analytical parameters	15
Table 4:	A generalised illustration of the challenges caused by in-migration	16
Table 5:	Young-old balance ratio as of 1 January 2011	22
Table 6:	Regions in each country with the highest positive population change and highest negative population change	23
Table 7:	Natural population change in 2010 for selected regions in Norden	24
Table 8:	Net migration in 2010 for selected regions in Norden	24
Table 9:	Examples of socio-economic parameters	27
Table 10:	Simple forecast of the total population in the Nordic Countries 1990-2050	31
Table 11:	Population projections for the Nordic countries	33
Table 12:	Population projections for Swedish NUTS2 regions from 1990 to 2050	35
Table 13:	Change in settlement structure in Greenland due to the introduction of a large aluminium smelter in one of the major towns	36
Table 14:	Projected long-term population consequences of the introduction of an industrial site in a Greenland centre town	37
Table 15:	Main components in the modelling of demographic changes	38
Table 16:	Durability of “Steady state” forecasts	39
Table 17:	Fertility comparison of 23 EU countries	40
Table 18:	Comparing trends in fertility rates in Norway, Sweden and Denmark from 1950 to 2003	41

Appendixes:

Appendix 1:	Thematic maps illustrating demographic statistics for the Nordic countries 1990-2011
Appendix 2:	Predictions, Prognoses, Forecasts and Projections

1. Preface

The Nordic working group on third generation policy (working group 3) under The Nordic Council of Ministers' Nordic Committee of Senior Officials for Regional Policy (EK-R) has asked Nordregio, Nordic Centre for Spatial Development, to produce a synthesis report on the current status and likely development of as well as the future prognosis for the demographic situation in the eight Nordic countries.

This synthesis report is based on the most up to date demographic data from the national statistical agencies in the eight Nordic countries* and on the numerous research rapports recently produced by Nordregio, the OECD and other institutions on various demographic themes.

The report's maps were created by Johanna Roto, who was also responsible for the text in Appendix 1. Rasmus Ole Rasmussen provided the prognosis for the demography of the Nordic countries in 2040 or 2050 while also contributing the text in Appendix 2. Klaus Georg Hansen was responsible for the text and the analysis in the main report working in close cooperation with Rasmus Ole Rasmussen and Johanna Roto. The quality assessment tasks were undertaken by Ole Damsgaard and Lisa Hörnström.

The aim of this synthesis report is to provide an updated and comprehensive overview of the

knowledge currently available on demography in the Nordic countries

The purpose of conducting this knowledge overview on demography in the Nordic countries is to use this as a basis for creating a handbook with tools and 'good practice' descriptions enabling national, regional and local authorities to work more effectively with issues in relation to the emerging demographic challenges they face and the future possibilities that stem from this.

A draft edition of this report was published in August 2011. The title was "Demography in the Nordic countries – a synthesis report. Draft edition for the workshop 23 August 2011 at Nordregio" (Nordregio Electronic Working Paper 2011:4).

The draft edition was discussed in the workshop on 23 August 2011 at Nordregio. The comments received both during and after the workshop have been incorporated into this final report.

One of the major additions to the draft edition is an elaboration of the complexity of forecasting the development of the demography of an area.

Ole Damsgaard
Director
Stockholm, November 2011

** The word "Countries" is in this report used as a form of 'short hand' for the eight national units in Norden. They are the five states Finland, Sweden, Norway, Denmark and Iceland together with the two countries Faroe Islands and Greenland and finally the autonomous territory Åland.*

2. Introduction

Increasing urbanisation is a global trend. Across the world people are moving from rural areas to smaller and eventually bigger towns and cities.

Often the pattern here is something of a stepping-stone process where people move from small communities to a local town, then from the local town to a bigger town in the region. From the regional town the next step is a large city and eventually the metropolis area, which is often the capital. A further step could be to an even larger metropolis area in another country.

This is also the case in Norden. Indeed, this has been the flow pattern of people for decades. Since the turn of the century, however, this trend has escalated significantly.

Another challenge is the ageing of the population. This is also a global trend. For more than 100 years life-expectancy has steadily increased. Together with the decrease in birth and death rates during the industrialisation era, people were living longer and longer.

The retirement age, the age when people exit the labour force has not kept pace with increasing life-expectancy. The proportion of non-productive elderly citizens has thus increased significantly in recent and will continue to do so.

This will increasingly affect, among other vital societal parameters, the labour supply and the dependency burden and thus the social welfare system.

The aims and conclusions of the report

This report aims to:

- Identify the major ongoing and upcoming challenges generated by the demographic changes outlined herein.
- Thereby providing the basis for the creation of a set of tools from which to develop policies that can enable both the regions and national governments in the Nordic countries, as well as through joint Nordic initiatives, to realistically meet the challenges faced.

The overall conclusion when looking at demographic change and the trend towards greater urbanisation in the Nordic countries is that this raises two major challenges.

First, growing net out-migration from the sparsely populated regions is now beginning to threaten societal sustainability in these regions. From a broader European perspective real sparsely populated regions are an almost unique Nordic phenomenon. Only in the Nordic countries can we find such vast areas with such sparse populations – eight out of nine NUTS2 level regions with a population lower than 12.5 inhabitants per square kilometre are located in Norway, Sweden or Finland. The ninth is found in Scotland. The combination of out-migration and vast sparsely

populated areas is thus almost unique to the Nordic countries.

Regions similar to those in these Nordic areas with a sparse population are also to be found in the Arctic region. Comparisons between the Nordic sparsely populated regions and similar regions in both the North American and the Asian Arctic are of high significance as, for instance, was shown in the “Megatrends” report newly published by the Nordic Council of Ministers (Rasmussen 2011).

Secondly there is a growing mismatch between what, in population terms, is needed for stable societal reproduction and who is actually living in these sparsely populated areas – both in respect of the labour market and the family structure.

The mismatch on the labour market goes both ways. That is; on the one hand the younger generations are increasingly gaining an education for which sparsely populated regions have little demand – typically university degrees. On the other hand the labour market is continually looking for skills which are increasingly unavailable locally. This situation applies equally to the specialised vocationally educated workforce and to academicians like medical doctors.

As for the age structure in all European – and even in all OECD – countries the population will gradually grow older with smaller young generations and larger older generations. In the Nordic countries this trend is, moreover, clearly more pronounced in sparsely populated areas than for the population in general.

The immediate consequence of these trends for the sparsely populated areas may see the real possibility of a growing number of regions becoming effectively depopulated from a residential perspective. These regions will probably still retain some human activity but this will primarily be in relation to extraction industry and to recreational activities. The depopulation of such regions is likely to become a significant trend all over Europe, but it will be most pronounced in the Nordic countries with potentially huge areas being left without any significant residential settlements or a basic societal structure.

The urbanisation process will also have serious consequences for the regions receiving the migrants creating significant planning challenges for

the expansion of urban areas.

The current trend shows a flow primarily towards the major urban regions offering a wide range of educational opportunities. The largest urban regions tend to attract more women than men. This is reflected in the fact that there is a small surplus of women in these regions which is not reflected in other Nordic regions which generally have a majority of men. International immigrants also to a greater extent settle in urban regions rather than rural ones.

Politically the spectrum of options goes from doing nothing at all and just letting the global trends play out, through facilitating and supporting the trends, to directly moving against the trends with the aim of keeping the sparsely populated areas healthily populated.

Independently of the strategies to be chosen however, the global trend towards increasing urbanisation will challenge policymakers in one way or another. The challenges will be different depending on which strategies are chosen and depending on the type of region concerned.

The structure of the report

The demographic challenges pose by these developments and how to deal with them is the connecting thread running through the report.

With a view to highlighting to policymakers the best available tools to use in their responses to the challenges posed by ongoing urbanisation chapter 3 provides a discussion of the potential tools available to influence demographic development, dividing them into reactive and proactive tools referring to the type of challenge they are designed to address.

The following chapters further elaborate on the empirical statistics and the rationalities for the tools presented in chapter 3.

In chapter 4, the six major categories of

demographic challenge are identified. The six categories are analysed and discussed on a general level from different thematic perspectives.

This subject is discussed further in chapter 5. The basic demographic elements which were identified in chapter 4 – settlement, age, gender, birth, death and migration – are then presented and analysed in specific relation to the Nordic countries. Chapter 6 focuses on the more complex socio-economic elements including a discussion of the drivers of demographic change.

Based on the statistics and on the outlined demographic trends chapter 6 then discusses the prognoses for demographic development in the Nordic countries up to 2050.

Workshops and the Handbook

The report should also however be understood in a larger context as it also aims to provide the basis for a preliminary discussion of the challenges and the potential for policymakers to react to them. The kick-off meeting in this discussion took place at the demography workshop at Nordregio on 23 August 2011.

The outcome of the workshop generated a

good starting point for the ongoing work with a handbook on demography in cooperation with a reference group and other experts.

In the beginning of 2012 four regional workshops are scheduled to ensure the successful introduction of the first draft of demography handbook to national, regional and local administrations across the Nordic countries.

3. Tools: influencing demographic development

The purpose of this chapter is to introduce the discussion on the possible strategies and tools the local, regional and national authorities could apply in relation to ongoing demographic change.

The starting point is provided by a consideration of some recent OECD recommendations regarding new directions – some may even call them new paradigms – in relation to economic development where i.e. local

communities and rural and sparsely populated regions have been designated new roles in the development process.

This is then followed by discussion of *proactive* and *reactive* approaches to future challenges, outlining both the positive and the negative potential impacts of the approaches through using – often quite provocatively – examples from past and present regional policy approaches.

New directions in regional development paradigms

A 2001 OECD report, “The New Economy: Beyond the Hype” highlights the four factors which have contributed to increased growth:

- New capital, in particular ICT.
- Increased use of labour.
- Rising quality of labour.
- Greater efficiency in how capital and labour are combined or multi-factor productivity (MFP).

A set of recommendations published in a report by the OECD in 2006 more specifically aims at regional development in rural regions. The report “The New Rural Paradigm: Policies and Governance”, based on the analysis of regional development plans, points to a set of important new trends:

- a shift from an approach based on subsidising declining sectors to one based on strategic investment to develop the area's most productive activities;
- a focus on local specificities as a means of generating new competitive advantages, such as amenities (environmental or cultural) or local products (traditional or labelled);
- more attention to quasi-public goods or “framework conditions” which support enterprise indirectly;
- a shift from a sectoral to a territorial policy approach, including attempts to integrate the various sectoral policies at regional and local levels and to improve the co-ordination of sectoral policies at central government level;

- decentralisation of policy administration and, within limits, policy design to those levels; and
- increased use of partnerships between the public, private and voluntary sectors in the development and implementation of local and regional policies.

In one of the most recent OECD projects a focus on renewable energy as a driver for development in rural areas has been identified. This confirms the process of a paradigm shift in the OECD's development strategy in relation to regional development.

In two recent reports from Nordregio – “Perspectives on rural development in the Nordic countries, Policies, governance, development initiatives” (Hedström and Littke, 2011) and “Regional Development in the Nordic Countries” (Lindqvist 2010,) – these trends in the changing focus of regional development have been addressed further emphasising how paradigm shifts in regional approaches are a characteristic of the present development. Here it is illustrated how the role of regions is in the process of changing focus and position. This is especially influenced by the aftermath of the recent – and still ongoing – economic crisis which has revealed that new approaches are urgently needed.

At this point in time we will venture no further with these questions but instead point to the report by Lindqvist as a means of providing a more in-depth introduction to the new perspectives of regional development in the Nordic countries.

The main point in mentioning the changes here is first and foremost that any shift in development paradigms – like the ongoing paradigm shift – can, in principle, be met through two different parameters and within each of these parameters there are two contradictory approaches. Demographic changes can thus, on the one hand, be approached proactively or reactively and can either support or impede a specific development.

All such approaches have their advantages and disadvantages and they can all be seen in relation to current and previous differences in regional policies. Moreover, each of these approaches has important links to ongoing demographic change.

The complexity of proactive and reactive approaches together with their status as being either supportive or impedimentary is illustrated in Tables 1 and 2 below.

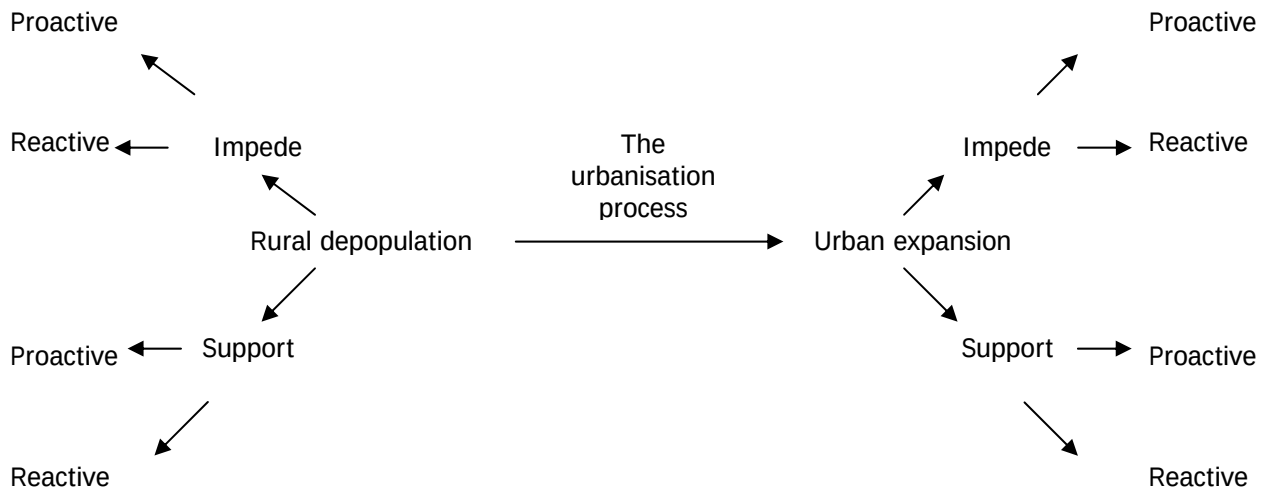


Table 1: An illustration of the urbanisations process and different approaches to it. Illustration of the interrelation between proactive and reactive approaches on the one hand and supportive and impedimentary responses on the other.

The urbanisation process		Rural depopulation	Urban expansion
Proactive (Before it happens)	Support		
	Impede		
Reactive (After it has happened)	Support		
	Impede		

Table 2: A matrix of the urbanisation process and different approaches. This is just another way of showing the interrelationship.

Proactive and reactive tools

The notion of “centre” and “periphery” has been linked to the development process since the 1970s. During the modernisation process after World War II each of the Nordic countries were at some point confronted by the question of how to deal with the division between centres and peripheries which inevitably arose as a bi-product of the industrialisation process and the need to concentrate labour and capital.

In the Nordic countries the responses to this dichotomy have been quite diverse. Several Nordregio-related reports deal with these issues, i.e. (Lindqvist 2010), (Hörnström 2010) and (Harbo, Rasmussen and Sørensen 201x). All of these reports however deal with these issues in much greater detail than can be done in the context of this publication. Nevertheless, inspired by these works in what follows we hope to be able to point to both commonalities and differences that emerge in relation to the regional development process.

The decentralisation of educational institutions, through the establishment of regional education opportunities, as a means of generating economic development in “peripheries” has been a common feature of all the Nordic countries and will be discussed further below. In addition, the approach to dealing with disparities generated through uneven economic development has also been very different, with Denmark and Norway representing two more or less opposite approaches among the Nordic countries.

The case of Denmark

Recognition of the so-called ‘regional problem’ in the Denmark of the 1960s was met by a firm belief that it could be solved by reliance on the concept of “growth poles”. The centralisation of the economic activities would, according to this concept, generate spill-off effects that would ensure a fair economic division of resources even to rural and sparsely populated areas.

When this did not generate the expected results the process of concentration was supported by a municipal reform process providing a municipal structure with better performance options, which was especially suited to the concentration of public sector services such as better educational provision in rural areas through the merging of the former village schools.

When this turned out to be insufficient – with regional disparities continuing to increase – the

next steps saw the introduction of different support mechanisms aiming at enabling industries to move to rural areas, as if a few examples of the export of public sector activities to towns in rural areas would significantly contribute to the resolving of the challenges associated with the changing nature of demography.

Recently a new attempt at municipal reform aimed at introducing a more potent structure with the option of taking responsibility for activities previously handled by the counties, and through the delegation of these activities again contributing to their economy in order to maintain at least some local jobs parallel to the disappearance of traditional rural activities.

In many ways the concept of reactive approaches to the development process reflects the Danish approach to development based on a firm belief that the general development process contains some basic rationales keeping development on track and that intervention should occur to resolve problems when obvious disparities appear. In principle, it provides openness and the acceptance of change, accepting the need for the reorganisation of administrative structures in order that they are able to meet new challenges while also accepting the need for the effective delegation of responsibility.

The case of Norway

In an academic sense at least developments in Norway have attracted much more attention than similar processes in the other Nordic countries. The debate has moved forward primarily through discussion of the North/South divide presented through the writing of Ottar Brox, not least “What skjer i Nord-Norge?” from 1966, and the more theoretically founded works such as the 1984 “Nord-Norge: Fra allmenning til koloni”.

The movement created through his approach in many ways helped to counteract the process of centralisation and remains to this day a crucial and generally accepted political element perhaps even the cornerstone of Norwegian “*Distriktspolitikk*”. This political approach essentially entails the introduction of various instruments enabling the maintenance of the settlement structure while also ensuring opportunities for the maintenance of settlements in those regions often characterised by peripherality. As far as “*Distriktspolitikk*” is concerned the goals are quite simple:

- All citizens should have the freedom to choose where to live,
- All should be ensured similar living conditions independent of their choice of settlement,
- “*Distriktspolitikken*” should contribute to ensuring that all resources in the country should be included in the economy,
- “*Distriktspolitikken*” should contribute to the maintenance and further development of multiple forms of living, culture and resources,

Ultimately, it should provide the population with wealth, work and welfare irrespective of their choice of location. It is, however, expensive, because a lot of costly initiatives are needed in order to maintain both jobs and persons in the most remote regions. Moreover, and rather paradoxically, it limits the options in terms of delegating responsibility to lower administrative levels because this might jeopardise the effectiveness of “*Distriktspolitikken*” implementation.

“*Distriktspolitikken*” indeed remains the cornerstone of Norwegian regional policy a consequence of which has been the maintenance of the municipal structure because only limited administrative responsibilities can be overseen by the generally rather small administrative units.

While the Danish system can, in many ways, be characterised as being based on reactive approaches, the Norwegian system is basically proactive. In order to be better prepared for unforeseen changes, the proactive system instead tries to foresee what is required by regional development thus providing the necessary tools – including the funding and centralised decisions – needed for the prevention of disparities.

A provocative question

While the outline above is highly simplified

and may be considered by some to be rather provocative. However, the purpose is to emphasise how the proactive and reactive approaches each have their own advantages and disadvantages. This leads us to the point of the argument laid out here where the question of demographic processes can be included.

In the supportive reactive approaches the ongoing demographic changes are seen as a “natural” process where measures should only be taken into consideration in situations where the results of the changes turn out to generate inappropriate consequences. Following this approach there are limited attempts in the regional development process to influence the ongoing changes. When the number of children declines, local schools are closed; when population density declines, public transport and service facilities are reduced. At the same time, however, the ongoing changes are met only when they happen, without attempts to influence them beforehand.

In the impeding proactive approach demographic changes are seen as processes that may be counteracted through political measures. For instance, the out-migration of young people can be met by increased support for them to be able study locally by covering the costs of getting a higher education if choosing to stay in one of the sparsely populated regions. Decreasing birth rates are met by support for mothers and childbirth, again, by covering the costs of establishing families and businesses in the regions otherwise exposed to the out-migration of both persons and businesses.

One of the obvious questions, however, is to what extent these measures are simply temporary delays in what could be viewed as “natural” adjustments to global trends and moreover to what extent this delay can be seen to be in the general interest of a society.

4. Demographic Challenges

The initial focus of this report is on the challenges faced the Nordic countries in meeting ongoing demographic change.

It is important however to be aware of the fact that these ongoing trends in terms of demographic change manifest themselves in different combinations globally. In this context then it is perhaps quite relevant to refer to the experiences of the other countries within the Nordic setting as well as those from across Europe and indeed globally.

This chapter, therefore, will first identify the major categories of challenges caused by the trends in the ongoing process of demographic change.

These major categories of challenges and the

corresponding trends can be analysed according to a set of parameters:

- The characteristics of the trends and how they will challenge society.
- The short-term and long-term potential consequences of the trends.
- The trends viewed in global, European and Nordic settings.
- The major policies which have been developed in the Nordic countries to deal with these trends.
- The possible measures and initiatives relevant in the different Nordic settings.

Based on these parameters this chapter will discuss examples of broader themes and how they are affected by ongoing demographic change.

The major challenges

The range of demographic challenges depends on the extent to which and how a region is affected by demographic change.

At one end of the scale we may have those regions with a significantly declining population and at the other end we have regions with a dramatically growing population. At both extremes the changes are striking but in between the extremes many regions experience change at a far lower level of intensity.

Such a superficial description of a region as either being a plus or a minus region is, of course, not enough to identify the real challenges facing a specific region. The specific elements involved must therefore be described in much greater detail.

The major challenges to the regions most significantly affected by demographic change can be organised into a typology consisting of six categories based on the components involved in the processes of change:

- Settlement
- Age
- Gender
- Birth and death
- Migration
- Socio-economy

The five first categories are basic demographic elements and are measured in numerical terms. The sixth category – socio-economy – is more complex in its nature. The socio-economic elements are thus explained both in terms of numbers and in terms of socio-economic relations.

All six categories will be elaborated in general terms in this chapter. In chapter 4 the five basic categories and in chapter 5 the more complex category – socio-economy – will be analysed and discussed more thoroughly within the context of a broader set of references to the Nordic countries.

Looking at and discussing each of the six categories independently will not reveal the full picture and thus the true challenges facing a region. It is not until the six categories are combined that a reliable picture of the consequences for a region will become visible.

The combination of the different challenges will create a very complex picture, which only in the prognosis can give us a reasoned scenario of a possible future.

Based on the scenarios we are however able to point to possible relevant initiatives depending on the general political strategies for regional development.

Demographic matrix		Categories of challenges					
		Settlement	Age	Gender	Birth & death	Migration	Socio-economy
Analytical parameters	Characteristics of the trends						
	Short-term and long-term consequences						
	Global, European and Nordic settings						
	Major policies developed in Norden						
	Possible measures and initiatives						

Table 3: *The matrix of categories in relation to challenges and analytical parameters.*

Based on the matrix broader themes within the context of demographic change can be analysed by including several of the categories and the parameters.

The broader themes to be discussed here are those considered to be among the most important in the ongoing context of demographic change.

The sparsely populated areas

After World War II sparsely populated areas across the Nordic region experienced a general trend of net out-migration. This was primarily in response to the combination of a surplus population and a labour market unable to provide enough job opportunities. Until the end of the last century this general process was not generally seen as a threat to the stability of these communities due to the prevailing higher net reproduction rate which helped to maintain stable local populations.

This situation – a high reproduction rate and a high out-migration rate providing a population surplus affecting the global population – is still the situation in many countries and regions globally, but it is becoming rarer. China, which used to be referred to as the big challenge due to its large population and population surplus is getting ever closer to a stable population, while even parts of India are moving in the same direction. On the continental level only Africa is still considered to be a generator of population surplus.

In the European setting there are still a few regions characterised by surplus population but the general trend is clearly reaching the point where surplus population is no longer the problem. The challenge is rather the opposite as what is now faced is a growing lack of input into labour markets.

In the Nordic setting then it is clear that in recent decades a similar trend as that which had previously occurred across much of the rest of Europe has taken place. The potential consequences of this have the potential however to be much more severe due to the vast sparsely populated areas of Norden. Left alone these sparsely populated areas

are experiencing a situation where out-migration is draining the areas of their younger generations and of many people of productive age.

Despite having had in place for many years a dedicated policy to enhance development in remote and rural areas, i.e. “*Distriktspolitikk*” this general trend is also now becoming a challenge even for Norway. The four largest cities in Norway are thus experiencing the highest growth of citizens in the age group 15-24 years.

Thus as an overall conclusion here we can point to the fact that the prospects for sparsely populated regions in the Nordic countries are not good and that through what we can describe as a ‘stepping stone’ process will probably go from sparsely populated to almost or indeed completely depopulated in the next 40 years.

This is the situation that local, regional and national policymakers are facing at the beginning of the second decade of the 21st century.

If policymakers do not intervene net out-migration will most likely continue until many regions are effectively abandoned, in terms of ‘normal’ civil societies. Such areas might retain isolated camps around extraction industries and even some seasonal recreation activities but it will become an ever more difficult challenge to adjust the surrounding society and its services to a constantly (and often practically unregulated) changing situation.

If, on the other hand, policymakers decide to act now and to facilitate the demographic changes, then they will basically face two very different options. Either they can decide to support the

structured and organised closure of (parts of) a region, or – if the political strategy is to keep a region viable with the current structures intact – the authorities can make a dedicated effort to revitalise

that specific region. A range of options designed to help stimulate the vitality and societal sustainability of a region or an area will be discussed in greater detail in chapters 5, 6 and 7.

National and international migration

Migration is one of the five basic categories identified above as core in the study of demographic change. Among these five categories, migration seems to follow more or less its own pattern.

When analysing settlement structures, age pyramids, gender distribution and the natural population change through birth and death – what could be characterised as the four basic demographic categories – it is striking how closely connected these four categories seem to be.

The reason why the category of migration seems not to follow the general pattern of the other four is the dynamic nature of migration as opposed to the rather more static nature of settlement, age, gender, birth and death.

In this way migration trends might to some extent reveal themselves as a foretaste of which way the demographic trends in general might turn. Analysing the category of migration trends provides us with a picture of how the other basic categories may develop over the coming years.

Migration and the mechanisms behind it are both economic and socio-cultural in nature and, as such, can be both structural and cyclical in character.

Some of the dominant economic push and pull factors here include demographic pressure and tough living conditions versus better paid jobs and prospects for economic wealth. The dominant socio-cultural push and pull elements include political oppression versus better prospects of gaining an education.

Even though the push and pull mechanisms are evident for many there are conditions which will make people refrain from moving anyway. Some of the intervening elements are poor health, emotional affiliation, the strength of existing social networks, the cost of travelling and distance to destination.

Migration is often divided into national or internal migration (people moving from one place in a country to another place in the same country) and international migration (people moving from one country to another).

The pattern for national migration shows only in part the same trends as the other four basic demographic categories (settlement, age, gender and natural demographic change), but the pattern for international migration shows a very different

pattern indeed one that is all on its own as it is driven by altogether different preferences and variables.

Besides, in influencing the other basic categories net migration contributes, in general, the same as net natural population change to the total population change in an area when looking at a period of a year or more. This means that in a region the total population change is, in general, equally influenced on the one hand by the in- and out-migration of a region and on the other by its birth and death rates.

Net out-migration in 2010 is seen in less than 10 % of the NUTS3 regions in Denmark, Norway, Sweden and Finland (i.e. Kainuu, Norrbotten, Bornholm) while net out-migration dominates in the Faroe Islands, Iceland and Greenland. This illustrates well the ‘stepping stone’ process on the Nordic level. The regions and countries with a smaller and more isolated population are losing out to their larger neighbours across the Nordic region in the ongoing migration competition.

Looking at in-migration at least two parameters are of vital importance here: Where are the newcomers settling and how old are they?

An illustration of some of the challenges in relation to in-migration is shown in Table 2.

<i>In-migration matrix</i>		<i>Destination</i>	
		<i>Rural</i>	<i>Urban</i>
<i>Origin</i>	<i>National</i>	Age Social service	Gender Education
	<i>International</i>	Gender Settlement	Emigrant type Settlement

Table 4: A generalised illustration of the challenges caused by in-migration. The type of challenge varies depending on the type of origin and the destination of the immigrants.

Older people, or early retirees no longer active on the labour market, who move to rural areas are moving to an area with a much more fragile infrastructure in respect of the needs these older citizens might require. This is a major challenge to the administrations in such rural areas. Several strategies have been tested. The main focus in dealing with this challenge has been the focus on higher efficiency and cross-sector cooperation.

Another group of in-migrants very different from the first is that of the young people moving to urban areas which provide educational opportunities. These young citizens require a wholly different set of facilities and type of infrastructure which is typically easier to meet in traditional urban areas as they generally display a wider range of possibilities.

These two groups of in-migrants are predominantly internal migrants, thus they know the basic structure of the social and educational systems, and they tend to be integrated in relatively uncomplicated ways.

When looking at international in-migration however we see migration both to rural areas and to urban areas. Typically migration to rural areas is undertaken in relation to major industrial activities and megaprojects such as mining, oil and gas offshore fields, and huge processing facilities like aluminium smelters, but to some extent also to low paid jobs in relation to primary production (fish processing, seasonal jobs in farming) and services. These migrant workers to rural areas often exist more or less isolated from the local communities in which they reside and they are, generally speaking, almost exclusively male. They will not have much affiliation with the local civil society and they tend to stay in the area only as long as there are such special jobs available. Thus the primary consequences of this type of migration are short-term and related to the period of time these migrants are in the area before activity moves to another site.

Migrant workers to urban areas – especially international migrants – create yet another set of challenges.

Historically, international migration to urban regions has been in response to a demand for an unskilled workforce from labour-intensive industries. Consequently the influx has generally been dominated by people with limited education. Larger influxes of certain groups of immigrants have resulted in long-term experiences such as immigration of older family members and eventually ‘ghettoisation’ and the eventual segregation of these migrants. Consequently, the issues surrounding ‘ghettoisation’ and segregation have been a focus theme for both national and local policymaking for decades. Indeed, this is recognised as a very complex theme cross-cutting several issues, particularly in relation to the socio-economic aspects involved in questions related to housing as well as social welfare, education and labour market structures and also development.

International immigrants can be divided into three basic types. The first type – encompassing the example given above – is the passive. They are

typically less integrated; they have only a weak affiliation with the labour market and the surrounding society. These immigrants are typically poorly educated even illiterate and older generations constitute a significant challenge.

Another group of immigrants is the instrumentally adapted to the labour market in their new country. They might, however, offer up a special challenge in terms of the educational system. The third group of immigrants is the focused innovators. They typically have an education and they generally integrate more quickly and to a higher degree. This group does not constitute a demographic challenge to the host society in any significant way.

A trend in the policy of the Nordic countries – as well as in the EU more generally – has in the recent years been to focus on attracting international migrants with a higher education. Thus, the value of international migration is seen more and more as an investment in human capital in the same way as investments are made in education itself.

For international migration, the picture for Denmark, Norway, Sweden and Finland shows that no single NUTS3 region has had a negative international migration balance. Only the three West Nordic countries, the Faroe Islands, Iceland and Greenland, show a negative trend for international migration in 2010 with more people leaving than moving into these countries.

Again, this is strong evidence of the effects globalisation has on the three smaller and remote Nordic countries (Greenland, Iceland and Faroe Islands). So far the four major Nordic countries have been on the winning side of globalisation with more people entering than leaving these countries. Since 2001, this trend of international in-migration to the four major Nordic countries has gained pace.

A very particular trend in terms of migration is however that of counter-urbanisation. One type of counter-urbanisation is caused by economic recession. Most recently, this can be observed in direct connection to the economic crisis as it is manifest in Greece. Young people in general no longer perceive an immediate future in the urban areas and protesting violently to the skyrocketing unemployment rates and thus to the growing challenges faced in merely maintaining a normal life. A similar situation could to some extent be observed in Iceland after the 2008 banking crisis there.

Another type of counter-urbanisation is also relevant here. It is related more however to periods of significant economic growth. Here housing prices and other living conditions become too heavy a burden, again, mostly for young families,

and they therefore tend to move away from the core urban areas and into the suburbs. Similarly, many new businesses experiencing the economic challenges of crowded urban environments often seek more affordable conditions in suburban environments and nearby settlements. This generally leads to the expansion of the commuting catchment areas around the larger cities and *metropolises*.

Ageing

Ageing has for several years been considered to be among the most important demographic challenges in Europe in general and in the Nordic countries in particular. In the EU the total population has increased by 6.5 % over the last twenty years, but the number of persons aged 65 years or more has increased by 34.8 %.

The process of ageing is not a new phenomenon. Since the beginning of the industrial era in the 18th century the average age of the population has steadily increased and this process is still ongoing. Death generally occurs later due to better hygienic and social conditions and above all due to better disease control. Parallel to the increased average age the fertility rate has dropped. This process describes the classic stages of what is termed, demographic transition.

The total population divided into age groups is illustrated in a population pyramid also called an age structure diagram. Over time the general diagram has changed from low and wide at its base to higher and narrower at its base.

This change has several societal implications. Small cohorts of children provide in their turn a smaller natural influx to the labour force and hence fewer people to generate future societal wealth. At the other end – at the top of the pyramid – the percentage of people belonging to the old generations is growing. Interestingly however the retirement age has not over time kept pace with the increased average living age. This discrepancy alone contributes significantly to the elderly dependency ratio.

In Norway regional differences in the overall age level are clearly visible, with the far north and the far south characterised by a lower relative number of old age persons compared to the regions in between. Out-migration for education and jobs is a common characteristic of all the Nordic countries and in a subsequent chapter we will highlight some examples from across the Nordic countries in connection with the development of prognoses on anticipated population development.

While The Greater Copenhagen area used to be Central Copenhagen and the adjacent municipalities, today it includes most of Zealand in Denmark and most of Skåne in Sweden as its suburban areas. People move to proximate urban areas with good infrastructure endowments so that, when required, travel to the most attractive leisure facilities of the city centre still takes up only a minimum amount of time.

In Iceland a pattern of ageing in the remote and rural regions is also quite visible while the capital region has maintained a relatively low level in a West Nordic context due to high levels of immigration of younger persons. Three regions, however, have experienced a clear process of ageing: Austurland, Vestfirðir and Norðurland Vestra.

In Greenland the ageing process is also ongoing, but the changes are not yet so apparent due to the previous low number of old persons compared to those in the younger age groups. One of the reasons for this is of course the relatively younger age characteristics of the country due to a marked higher proportion of young people compared to the rest of the West Nordic region. Another reason is an out-migration of older people to Denmark which generally reduces the older age group, and this trend has increased during the last decade. When retiring many Greenlanders choose to move to Denmark because many of them have children and grandchildren there who they prefer to be closer to in their old age.

The dividing age in respect of the old age group in the Nordic context is usually set to 67 years, but due to early retirement arrangements in Denmark the general age level of retirement is lower, which has become an important issue in the political debate.

Due to the legal arrangements pertaining to Denmark's relations with the Faroe Islands and Greenland it is possible to retire at the age of 60 years, and special arrangements for women mean that it can even be possible to retire at the age of 55. In the case of Iceland the general retirement age is 67, but seamen may retire at the age of 60 while in Greenland and the Faroe Islands the Danish system of early retirement from the labour market at the age of 62 can also be applied.

In Finland, as in the other Nordic countries, the share of elderly people will increase significantly in the coming years, when the large 'baby boomer' group born in the 1950s will retire as they reach their sixties.

Educational desires, needs and possibilities

It has become something of a modern mantra that highly educated citizens are the key to states playing an active role in the modern, globalised and knowledge-based world! This definitely also applies to the Nordic countries. As in many other parts of the developed world it is assumed that the Nordic countries are among the best educated nations in the world. This would of course be a good position to be in even if the perception would have to allow for improvements in order to ensure a proper response to the constant focus on improving the educational system and opportunities.

The reality, however, is that the Nordic countries are not undisputed in this assumed position. When focussing on the Nordic countries in a European-only setting they do perform well in an OECD context. But going beyond Europe the most recent statistics from the OECD (2008 data published in 2010) regarding education among the 30 OECD and 6 partner countries reveal a somewhat different picture.

In the OECD ranking, the five Nordic countries are listed as 7th, 9th, 11th, 18th and 19th in the list of 36 countries in terms of the percentage of the adult population in 2008 with a tertiary education.

The top-Nordic country is Finland placing 7th with 37 % of the adult population (age 25-64 years) in this category, but Finland is surpassed by countries such as New Zealand, the USA, Japan, Israel, Canada, and Russia which is on top with 54 %.

It is also argued that the Nordic countries have a high female participation rate in terms of educational attainment. As will be discussed below, this is definitely an important issue, both nationally and regionally. But the reality may again come as a surprise.

In relation to males and tertiary education, the Nordic countries are positioned 1st, 12th, 14th, 21st and 22nd in the list of 36 OECD members and partners. Denmark is at the top, sharing first place with Russia with a level of 50 %, of adult males having attained a tertiary education, while Sweden is as 22 in the list with only 27 %, which is clearly below the OECD average.

In relation to the female rate of tertiary education the five Nordic countries are positioned 8th, 9th, 11th, 13th and 14th – with Iceland at number 14 and Denmark at number 13. Best among the Nordic countries is Finland with 41 % and worst is Iceland with 34 %. So, all the Nordic countries are surpassed by countries such as Estonia, Japan, the

USA, New Zealand, Israel, Canada – and once again with Russia on top with a staggering 59 %.

Besides the fact that reality often differs from perception there are at least three other important issues here of note:

- Firstly, which educational skills are most needed on the labour market and where are they needed most?
- Secondly, what do young people want to study?
- Thirdly, how can these needs and desires be met and where are educational opportunities best located?

The combination of education and sparsely populated areas however poses a special multi-level challenge. The initial questions are numerous: What types of jobs are available in the region? Who is expected to fill these jobs? Can education for the specific jobs be offered in the region? Does the region have enough qualified and citizens of the proper age to go through the education system and apply for the positions? Does the local population want the local educational opportunities offered? To what extent should a region aim at being self-sufficient? To what extent should a region aim at attracting a workforce supply from outside the region? Where should they people be sourced from?

The questions are easy to list, but the appropriate answers are difficult to find. There are no absolute right or wrong answers, and many different circumstances must be taken into consideration for each region in question, as each always differs to some extent.

The questions to ask for sparsely populated areas are, in principle, the same as anywhere else, but the challenges are usually much greater as the infrastructure in these areas is more fragile.

The first question is one of needs in terms of educational skills and the options in respect of providing these skills locally. Traditionally an important part of providing opportunities at the regional level was the establishment of vocational training schools within the region. These schools are still an important part of the educational system and to some extent provide a semi-skilled workforce for the traditional industries connected to resource extraction. This may not however be enough to ensure the region's needs in relation to the pressures of globalisation and with innovation remaining a key issue.

At the same time, many of the large scale extractive companies are now providing their own special training and even directly sourcing the

workforce needed in connection with their own activities. This specialised workforce operates on a global scale and is thus typically not provided by local societies.

This challenge is closely connected to a further issue, namely, that of the individual needs and perspectives of young people in their quest for educational opportunities. While attending vocational training schools and becoming a skilled worker was previously an obvious way to develop the skills needed locally thus qualifying for the local job opportunities available, these traditional linear paths into the labour market are now changing with new types of jobs becoming more attractive to young people while neither the education nor the jobs themselves are accessible in most local areas.

In this context then it is important to address the question of gender. Looking at who demands what type of education if any at all, gender plays a significant and growing role. Despite the general male dominance among the educated part of the population it is now generally the case that women are becoming more and better educated than men. Even the traditional division between male-dominated technical education and female-dominated service educations is no longer evident.

This trend is seen with remarkable gender differences with women as the dominant partner in groupings with no long tradition of higher educational attainment in families. This is particularly evident for social groups like second and third generation immigrants and in traditionally small and isolated populations like those of the Faroe Islands and Greenland.

This can be illustrated by looking at all 18 NUTS3 regions in Norway, Sweden and Finland with a population density lower than 12.5 people per square kilometre. These 18 regions, which constitute 31 % of the 58 regions, occupy a huge part of the territory of these countries, but they are only inhabited by 17.2 % of the population in these countries.

All 18 regions are characterised by having a female-male ratio below 1, indicating that there are more males than females in the regions. Further, 11 out of the 18 regions have a female-male ratio lower than 95 % in the age group 15-64 years old. In other words, for each 100 men in these areas there are less than 95 women in that age group. This is a clear sign of some kind of mismatch and one of the main reasons for this is the lack of educational opportunities and job opportunities for women in the areas of education and jobs most sought after by women.

When the educational opportunities sought are not located in the region women will often

move to areas offering them. Moreover, after leaving the region it is unlikely they will return after finishing their education.

The big challenge in this context is related to the third question, namely, how can these wishes and needs be met?

This, moreover, raises the question of how we adjust the long term planning horizon as it relates to expectations over educational needs. Perhaps an even more difficult question is; how do we adjust to the short-term demands related to conjunctures and crises combined with the fact that adjusting educational provision to the demands of industry and business - by providing more technical and natural science opportunities - will not necessarily meet the expectations of young people.

Concerning gender differences, the encouragement to seek education, the type of education chosen and even the question of locational choice, young people are influenced by both cyclical fluctuation and trend oscillation. What is being promoted among one group of young people one year might have fallen out of favour only a few years later.

Young people may be more focused on current popular choices relating, for instance, to mass media, communication and 'soft' sciences than on what – from a planning perspective – would be viewed as being more durable alternatives.

A few examples can illustrate this. By 2011 it had become more attractive to study at the smaller universities in the provinces of Denmark than ever before and on a more general level as a response to the effects of the 2009 crises a growing number of young people are now beginning to study at the universities to gain a higher education.

Similarly, this raises the question of accessibility to local educational opportunities that might keep young people in sparsely populated areas rather than having to leave the region in order to attain a higher education, often resulting in the risk of them never returning.

Historically, the Nordic authorities have established higher educational institutions as an instrument in their regional policy strategies. This regionalisation approach was used extensively by all the Nordic countries to boost the educational capacity of a region from the 1960s to the 1980s. From the mid-1990s onwards however these institutions were increasingly merged on the administrative level, but they have retained their physically decentralised structure.

It is evident that higher education institutions can play a significant role in relation to regional development. Indeed, these institutions often play the role of "knowledge bridges" in their local region.

5. Basic Demographic Parameters

Schools are being closed because of the falling number of children in the area and because of the pressure on local public sector budgets and local shops and other private sector services are disappearing in small towns while new subway stations and residential areas are shooting up in the capital areas. Many of these daily life experiences directly relate to changes in demography.

To be able to plan for these changes all demographic descriptions have to be based on a set of basic measurements. These basic demographic categories are identified as:

- Settlement
- Age
- Gender
- Birth and death
- Migration

In terms of settlements the focus is both on the location and the size of the population in the settlement itself and the area around the settlement. As sparsely populated areas are so widespread in the

Nordic countries this is clearly one of the main topics of discussion here. This poses something of a unique challenge for the Nordic countries. At the same time however the Nordic countries are also characterised by large areas with a high population density. The general trend is that smaller places are getting smaller and the bigger places are getting bigger.

Both in the Nordic countries and in the other parts of Europe – and even in the OECD countries more generally – we tend to live longer and we tend to produce fewer children per woman. The consequence of this trend is that the population is gradually growing older. The main challenge in respect of gender is the uneven settlement pattern. With the exception of some major city areas few places see a surplus of women. The rest of the regions have a surplus of men.

The total population change in a region comes from the birth and death rates and the national and international migration rates. The challenge is to identify the parameters and causalities behind total population change.

Settlement

The EU defines a region with a population density lower than 12.5 inhabitants per square kilometre as a region with a low population density. It is also referred to as being a sparsely populated region.

From a broader European perspective the vast majority of those NUTS 3 regions designated as sparsely populated are found in the Nordic countries. Beyond Norden only a few NUTS 3 regions, primarily in Spain and in northern Scotland, are also characterised as sparsely populated.

The Nordic countries are characterised by having huge tracts of territory which is sparsely populated. Over the centuries the core regions have shifted but the overall image of where people live in the Nordic countries remains the same.

For the Nordic countries approximately one third of the NUTS 3 regions are sparsely populated. If the population density of 12.5 inhabitants per square kilometre is measured on the municipal level, i.e. smaller areas than the NUTS 3 regions then 46 % of Nordic municipalities can be classified as

sparsely populated. These municipalities cover 80 % of the ice-free land areas in the Nordic countries but these vast areas are only populated by 10 % of the total Nordic population.

The regions in the Nordic countries with a high population density (defined as a population density over 12.5) are primarily found in Denmark and in the southern parts of coastal Norway, Sweden and Finland and also around some larger northern cities like Reykjavik, Tromsø, Trondheim, Östersund, Sundsvall, Umeå, Luleå and Oulu.

In the sparsely populated areas two types of urbanism can be found. The first is those areas with one dominant city typically around some kind of real industrial activity. Examples here include Kiruna, Rovaniemi and Reyðarfjörður. Another type of urbanism is reflected in areas with only a few inhabited places and almost no rural housing. These areas are mainly categorised as urban because no real rural activity is possible there. Examples here include all of Greenland, the Ísafjörður peninsula

and the Varangerhalvøya area.

In each of Sweden, Finland, Norway and Denmark two core areas with both a high population density and a high degree of

urbanisation can be identified. They are Oslo, Stavanger, the Stockholm-Västmanland axis, the Øresund region (Skåne and Zealand), Aarhus, the Helsinki-Tampere axis and Vaasa.

Age

Regarding age structure, two groups (young and old) are generally viewed as incurring an economic expense for society expenses which must be covered by the age group 15-64 years, who are viewed as contributors, economically, to the society.

In terms of the demographic analysis, it is of interest to know the distribution between the different age groups, as they make different use of society's institutions. Obviously, the young use kindergartens/schools etc., while the elderly use geriatric care services. In addition the very young and very old are often the heaviest users of routine healthcare services.

There are at least two reasons for a region to have a high share of the youngest group. Either fertility is high which means more children per fertile woman, or the share of fertile women is higher in an area than in other areas.

Both of these scenarios can be found in the Nordic countries. The higher fertility rates can be found in rural areas in Denmark, Norway and Finland and also in general on the North Atlantic islands; Faroe Islands, Iceland and Greenland. The higher representation of fertile women is primarily visible in the capital areas of Helsinki, Stockholm, Copenhagen, Oslo and Reykjavik.

Regarding the productive generations, the image of the Nordic countries shows a generally older labour force in Finland and a generally younger labour force in the West Nordic countries.

For the older generations there is a tendency towards a higher share in the rural areas. This however goes for all countries.

For planning purposes, the balance between young and old (non-productive) part of the population on the one hand and the productive part on the other is also of interest.

Region	Share 0-14/65+	Ratio
<i>The Nordic countries:</i>		
Average	26.4/26.2	1.0
<i>Capitals (= among the highest):</i>		
Reykjavik	30.5/17.7	1.7
Oslo	27.4/18.8	1.5
Helsinki	25.6/20.2	1.3
Copenhagen	24.3/20.4	1.2
Stockholm	27.0/22.3	1.2
<i>Lowest ratio:</i>		
Hedmark (No)	26.2/29.6	0.9
Bornholm (Da)	24.6/36.8	0.7
Kalmar (Sv)	23.6/35.7	0.7
Etelä-Savo (Fi)	22.2/37.2	0.6
<i>West Norden + Åland:</i>		
Greenland	31.7/9.9	3.2
Iceland	31.3/18.4	1.7
Faroe Islands	34.2/23.6	1.5
Åland	25.1/28.1	0.9

Table 5: Young-old balance ratio as of 1 January 2011.

These young-old balance ratios show a young population in the West Nordic countries compared to the rest of the Nordic countries, while the capitals of the four major countries also have a relatively young population.

Gender

On average, 100 girls are born for every 106 boys, but the boys are a little more fragile as babies leading to a rough gender balance.

However, for many regions imbalances in gender distribution do exist, and there are at least two different reasons for this. One reason can be that more women than men are moving to a region. The reason for this may typically be connected to education. More women are taking a higher

education and thus we must expect to see this in the statistics with more women in regions with universities. This is the case in the five Nordic countries. It is most visible in the Helsinki and the Copenhagen regions.

Another reason for a region having a majority of women can be explained in reference to regions with a high average age. As women live longer than men, a majority of the old aged

population will be female. This is seen on a local level seen in some rural areas and on islands and indeed uniformly across the Nordic countries.

Research points to both pull and push factors in terms of women leaving sparsely populated areas and men deciding to stay. The pull comes from a desire for a pleasant life in the national metropolis with a broader supply of facilities and choices in respect of education, jobs and leisure.

For women the push factors relate to the fact that there are only a few interesting job opportunities for educated women in rural regions, so in order to get a job they must seek work elsewhere which typically means in the major cities.

The labour market in rural and sparsely populated areas typically favours men and often unskilled men. Thus, it is often possible for men to remain in these areas when women cannot.

Total population change

In order to be able to understand the process of change in the size of the population in a region two measures are required. On the one hand, we need to look at the characteristics of natural population change, which is determined by the number and

rates of births and deaths. On the other hand, we need to look at the migration characteristics, i.e. immigration – the number of persons moving in – and emigration – the number of persons moving out of the region.

Region or municipalities	1990-2011	2001-2011	2006-2011	2010-2011
<i>Norden (average):</i>	4.8	5.7	7.3	7.4
<i>Finland:</i>	3.8	3.7	4.6	4.5
Uusimaa – Nyland	10.8	9.9	11.0	10.0
Pirkanmaa – Birkaland	6.6	9.1	9.0	8.0
Kainuu – Kajanaland	-1.9	-8.6	-7.6	-7.0
Etelä-Savo – Södra Savolax	-4.1	-6.7	-7.2	-6.0
<i>Sweden:</i>	5.0	6.0	8.1	8.0
Stockholm	10.8	9.9	11.0	10.0
Skåne	6.6	9.1	9.0	8.0
Västernorrland	-1.9	-8.6	-7.6	-7.0
Norrbottnen	-4.1	-6.7	-7.2	-6.0
<i>Denmark:</i>	3.9	4.0	4.9	5.0
Copenhagen	4.7	11.2	10.4	16.0
Østjylland	6.7	8.0	8.8	9.0
Vest- og Sydsjælland	2.9	3.1	1.4	-3.0
Bornholm	-4.4	-5.3	-6.6	-8.0
<i>Norway:</i>	7.7	9.3	12.1	12.8
Oslo and Akerhus	12.9	16.7	20.2	19.0
Rogaland	12.0	15.2	19.4	19.0
Nordland	-0.4	-0.4	0.8	4.0
Finnmark	-0.5	-0.9	1.4	8.0
<i>Iceland:</i>	12.1	12.4	12.4	2.6
Höfuðborgarsvæði (Reykjavík)	16.4	15.3	16.0	7.0
Suðurnes (South-West peninsula)	16.7	27.6	35.0	-13.0
Austurland	-3.1	4.5	-20.4	12.0
Vestfirðir	-16.5	-12.0	-11.0	-31.0
<i>Åland:</i>	6.9	8.7	9.2	10.0
Jomala/Lemland/Mariahamn	8.8	11.5	12.9	10.4
Kumlinge/Kökar/Sottunge/Brändö	-6.8	-8.3	-10.6	-20.6
<i>Faroe Islands:</i>	0.8	5.3	1.6	0.0
Streymoy/Vágar	4.5	9.7	6.1	3.1
Sandoy/Suðuroy	-10.6	-5.0	-9.5	-9.4
<i>Greenland:</i>	0.6	0.1	-2.2	-3.0
Nuuk district	13.0	15.1	16.5	23.3
Kommune Kujalleq	-6.7	-9.1	-14.3	-42.2

Table 6: Regions in each country with the highest positive population change and highest negative population change. Two positive regions and two negative regions from the five big countries. One positive region and one negative region from the three small territories. All numbers are per 1000 inhabitants per year.

When looking at total population change all the Nordic countries show the same overall pattern. All countries have areas experiencing a negative population change i.e. a decline in the number of citizens and areas experiencing a positive population change i.e. a growth in the number of citizens.

Indeed, a clear 'stepping stone' process can be identified here on both the domestic and the Nordic levels. This means that people tend to move from smaller or more rural places to bigger or more urban places and often do so in stages.

Births and deaths

In Table 7 it is interesting to note that having a young/old ratio below 1.0 does not necessarily equate to negative natural population change as for Åland it is 1.9. On the other hand, the regions performing the least well in terms of natural population change all have a young/old ratio below 1.0.

Region	Natural Population Change 2010 in ‰	Ratio Young /old (Table 5)
<i>The Nordic countries:</i>		
Average	2.6	1.0
<i>Capitals (= among most positive):</i>		
Reykjavik (Is)	9.8	1.7
Oslo (No)	7.6	1.5
Stockholm (Sv)	6.9	1.3
Helsinki (Fi)	4.8	1.2
Copenhagen (Da)	5.0	1.2
<i>Most negative trend:</i>		
Hedmark (No)	-2.3	0.9
Kalmar (Sv)	-1.5	0.7
Etelä-Savo (Fi)	-5.2	0.7
Bornholm (Da)	-6.1	0.6
<i>West Norden + Åland:</i>		
Iceland	9.1	3.2
Greenland	6.5	1.7
Faroe Islands	5.8	1.5
Åland	1.9	0.9

Table 7: Natural population change in 2010 for selected regions in Norden. All numbers are per 1000 inhabitants per year.

Migration

Table 8 shows that the capitals are among the regions with the highest positive net migration in 2010. But rather differently from the young-old ratio and the natural population change it is, in part, another group of regions that are seeing the most negative trend in 2010. These regions constitute another group of peripheral regions.

Region	Net Migration 2010 in ‰	Ratio Young /old (Table 5)
<i>The Nordic countries:</i>		
Average	5.0	1.0
<i>Capitals (= among most positive):</i>		
Copenhagen (Da)	12.2	1.2
Oslo (No)	11.5	1.5
Stockholm (Sv)	10.4	1.3
Helsinki (Fi)	4.8	1.2
Reykjavik (Is)	-2.9	1.7
<i>Most negative trend:</i>		
Troms (No)	2.4	(1.2)
Norrbottnen (Sv)	-0.6	(0.7)
Bornholm (Da)	-1.6	(0.6)
Kainuu (Fi)	-4.7	(0.8)
<i>West Norden + Åland:</i>		
Åland	8.0	0.9
Greenland	-2.8	3.2
Faroe Islands	-5.8	1.5
Iceland	-7.0	1.7

Table 8: Net migration in 2010 for selected regions in Norden. All numbers are per 1000 inhabitants per year.

As an illustration of the complexity of migration, Norrbotten is the region in Sweden with the highest negative net migration. However, when looking at the level below the net migration, i.e. the national and the international migration, this reveals a remarkable contrast as the national migration is minus 7.2 % while international migration is plus 6.6 %.

6. Complex Demographic Parameters

The basic statistics on the demographic parameters are important as empirical evidence of change or stability in relation to the basic demographic characteristics outlined above. Understanding what leads to these specifics, however, requires an in-depth understanding of the inter-relationships between the parameters and their relations to the general drivers of societal change.

A key issue here is the notion of change itself and the dynamics that cause it. The classic demographic transition model has, until recently, successfully described the demographic changes related to the era of industrialisation as going from high birth and death rates to low birth and death

rates. Now, statistical evidence from the basic demographic parameters shows that some groups – especially those that are better off economically – have begun again to have more children. This is a significant change in habit based on prestige and on both economic and social capital. These kinds of changes are very difficult to predict and thus to incorporate into strategic planning.

Nevertheless, they are important to include because they are decisive in respect of both short-term and long-term development trends. A few examples can usefully illustrate this.

The dynamics of settlements

Most people tend to assume the number, the size and the location of settlements, towns and cities is ‘as it has always been’, but history tells us differently.

On the small island of Stora Hestnacken in the archipelago east of Stockholm was a small local society built up around a brickyard for about 100 years from around 1730. Today no one lives on the island and indeed almost all trace of previous activity has been erased by nature and time.

Many similar stories can be found all across the Nordic countries. These communities were based on fisheries, brick production, lumber rafting and so forth. They existed over a period sometimes of many years and while they were still viable it is likely that no one thought that the place would ever be ‘reclaimed’ by nature again.

Such communities were more likely to disappear if they were relatively far removed from other communities and thus this proximity dynamic has historically been more prevalent in sparsely populated regions.

The modern economic driver for communities to emerge or to disappear is predominantly based on the industrial extraction industry and activities relating to fishing.

If a mine were to be opened to extract a local mineral deposit most likely a full town with schools and other essential public services would have been

established in the area surrounding the mine to support the mining activities with a labour force and other broad societal needs.

This traditional model of settlement development has however changed dramatically as today new mining activities will very often be based on a workforce which lives in a camp while working and then leaves the area and goes home during periods when not working. Importantly here, “going home” can be almost anywhere in the world because of the shift in the nature of the workforce which is now no longer usually local but instead one which is often based on national or even international recruitment.

The reason for this change in the nature of workforce recruitment is due to a combination of several issues such as the continuing reduction in the opportunities for manual work due to technical changes, a much higher level of work specialisation in the labour market and the fact that most new mines are expected to have a working life lasting less than 30 to 50 years.

The ‘ghettoisation’ process in many cities is in a way part of the same new settlement pattern. The groups of immigrants most likely to form the ghettos which have been created since the 1960s are the same groups that can be labelled modern diasporas. They are – as noted previously – the type of immigrants who are characterised as passive.

They generally retain the original identity of their country of origin. Some Somali and Turkish immigrants are perhaps good examples of those settling according to cultural parameters and of thus not only strictly in line with economic parameters. This type of settlement pattern is fairly complex to deal with in strategic regional planning terms with strategies addressing this demographic challenge generally being economically based.

The *dispora* process also works in the opposite direction. Out-migration from the sparsely populated areas and other isolated regions especially in Greenland, Iceland and the Faroe Islands has spiked from time to time. This was last seen in Iceland in relation to the Icelandic banking crisis of 2007-08. But both the Faroe Islands and Greenland have witnessed spikes in out-migration such as those in the 1990s. Some years later there seems to have been a counter-migration process back into the regions which initially saw the depopulation. This counter-migration can be explained as a consequence of the fact that the out-migrating group had retained its mental identity and social networks and social ties connected to the place they had left and then – when it became opportune – those that are able return to the old region. Typically, moreover, it is the older generations who are mentally and socially most attached to the region they once left, and thus it will typically be the older generations who will return. The younger generation often establish new networks locally in their new home region, through their educational institutions, through marriage etc., which eventually become what, in demographic terms, are characterised as “intervening conditions”.

There are indications of the counter-migration being of a varying nature in different regions. While, in terms of counter-migration to the Faroe Islands, it is characterised almost solely by age the lesser level of counter-migration in Greenland also has a touch of social bias as it is the less well off part of the older generations who are most likely to move back whereas the more well off tend to stay in their new regions.

Yet another ‘logic’ behind settlement patterns can be found in the perceptions of the attraction attributed to a specific region. These perceived values might not be of an economic nature in the first instance but they can, in the longer term, actually add to the economic development of a region.

Stockholm has for many years promoted itself as the capital of Scandinavia. This label in itself cannot be said to have any value. Only when it begins more generally to be perceived as a true statement will it possibly be able to make a material difference. This point may now however be within sight as for the first time Stockholm recently recorded a higher growth rate than Copenhagen when looking at international companies settling in the Nordic countries.

This is one of the mechanisms the tourist industry is using in its various strategies when promoting a region with the potential for capacity building. An example of this kind of regional development strategy can also be found in Northwest Jutland in Denmark where the special wave formations in the North Sea off the village of Klitmøller have a reputation among surfers for being ‘world class’ – as in Hawaii. So what could then be more natural than developing the concept of “Cold Hawaii” which is exactly how the tourist industry is marketing the region. Similarly, some large winter tourist resorts in the sparsely populated parts of Finland (i.e. Levi) and Sweden (i.e. Åre) have also become regional growth nodes in terms of population increase and the registration of new companies.

If industrial clusters are present in a region, they will also have an effect on the settlement structure. Well known clusters include the pharmaceutical industry in the Øresund region and the ‘new’ media industry in South West Sweden.

Even though it is a complex task the dynamics of existing settlement structure in a specific region must be accounted for in the context of strategic regional planning.

Drivers and indicators in the process of demographic change

In 1735, almost 300 years ago, Carl von Linné published his *Systema Naturae*. He was subsequently to be recognised as the Father of modern taxonomy. But what is perhaps less well understood

by the casual reader is that for Linné both nature and society were static, unchangeable and “created by God”.

If so, predictions would probably be easier,

Socio-economic parameter	Driver	Indicator	Demographic policy implication	Policy tools
Process of analysis →		→ Process of policy development		
<i>Ageing</i>	Longevity Declining birth rate Out-migration ...	Decline in the percentage of the population in the labour force	Change in retirement age Stimulation of birth rate Reduction of out-migration Increasing in-migration ...	Higher retirement age Birth bonus Easy migration Protective measures ...
<i>Family structure</i>				
<i>Education</i>				
<i>Employment</i>				
<i>Income</i>				
<i>Housing</i>				
<i>Health</i>				

Table 9: Examples of socio-economic parameters. The socio-economic parameters can be attributed to drivers, indicators, demographic implications, policy tools and much more. The attributes to the age structure in the table are only illustrations of possible attributes. The first suggested policy tool assumes a positive response to increased immigration. Where a negative attitude was assumed the policy response could include measures to limit and even prevent future immigration and instead point to the raising of the pension age to a level higher than currently.

but the knowledge regime of today first of all perceives nature and society as dynamic and ever changing, not static. Secondly when analysing changes in society it will, on the empirical level, be insufficient only to count on one single driving force.

Driving forces are usually the result of the interaction between several components, some being interdependent – for instance longevity due to improved health conditions – others being independent, for instance the choice of the number of childbirths in relation to longevity. All three elements are, however, important in relation, for instance, to the evaluation of the future available labour force at a specific point in time. Therefore it is preferable that data on all three variables should be available when decisions on future policies in relation to ensuring a sufficient labour force is available in the future. As soon as we move into dealing with more complex problems however the possibility of providing sufficient and detailed data would be limited. Instead a number of indicators might be able to do the job. A good indicator is expected to be able to reflect the dynamics of the interaction between several socio-economic

components, and therefore not only reduce the level of complexity for the analyst but also ensure proper reflection on the dynamics behind it.

In table 9 above a matrix illustrates how to proceed from the complexity of describing socio-economic parameters to the identification of potential policy tools.

The starting point to the left is the dynamics connected to the socio-economic processes of change, here just identified by a simple concept, but often described through a more complex description of ongoing processes of change.

If we assume that the challenge of dealing with it is to ensure an accessible labour force one of the socio-economic parameters could be the ageing of the population.

Among the drivers listed above are ‘longer life due to better health’ and ‘reduced birth rates leading to fewer newcomers into the workforce’. Several other drivers could be mentioned, for instance the role of national migration patterns leading to the regional out-migration of younger members of the labour force.

If our only concern is ensuring that access to a sufficient labour force is available an obvious indicator would be – as noted previously – the decline in the labour force.

Among the implications of such a situation might be one where the labour market becomes attractive for outsiders, for instance on the international labour market, and one consequence could be – as shown in the “Demographic implication” column – an increase in in-migration from other countries due to the availability of jobs.

More international immigration may be required both to supply the labour force by replacing retiring citizens and to assist in the healthcare system and in the elderly care system which will need extra capacity.

Several other implications may follow, and each would require consideration in respect of possible policy measures.

The example above may seem trivial but in reality it has been kept simple for the sake of argument. The table is not generated with the intention of becoming a matrix of all possible combinations of socio-economic changes and potential policy measures. The idea is instead to provide an approach where a complex reality through subdivision into a few drivers may point to a limited number of simple indicators which, when presented, could become useful in relation to the identification of possible policy measures and tools. An important message in this context is that it is essential to select indicators that are measurable.

In the example, one of the outcomes would be growing pressure on the existing welfare system and the age structure can therefore be seen as an indicator of the socio-economic parameters of the “welfare system”. In all Nordic countries however there are also other drivers and indicators putting pressure on the welfare system as it is not only due to age that people are losing contact with the labour market. A growing group of people are now being registered as early retirees. This can be prompted by attrition from hard physical work though people are also increasingly leaving the labour market after suffering many years of stressful working conditions. Another group of people who lose contact with the labour market are the long-term unemployed and those on long-term sick leave.

Together these various issues set out a significant challenge to the Nordic welfare system as it currently exists. All the Nordic welfare systems are to some extent based on the principle that all citizens are entitled to social services on the basis of need. The Nordic welfare systems are tax financed as distinct from welfare systems which are built on individual insurance systems. Thus benefits from

the Nordic welfare system are not dependent on a person's attachment to the labour market. This leads to greater pressure being placed on systems like these when the ratio of tax payers to primary welfare recipients, such as retirees, grows.

In spite of the similarities between the Nordic countries' welfare systems the drivers and the indicators are not however always the same from one Nordic country to the next. In Denmark a special indicator could be the number of people on “*efterløn*”. This is an indicator that does not exist in the other Nordic countries though similar if not equivalent regimes exist in the other Nordic countries. Thus the policy-tools as an answer to the pressure on the welfare systems have i.e. been different combinations of cost savings, increased efficiency and increasing restrictions on the access to services.

As noted previously one of the best indicators referring to the age structure is the decrease in the labour force. If the policy is to maintain the same productivity then, again, increased efficiency is one of the tools but it is clear that, on its own, this will not be enough.

Another tool is to promote the increased inflow of people to replace those who leave the labour force. Stimulation of the birth rate is one way to plan for increased inflow but such a policy is definitively long-term in nature as a new born citizen will not join the labour force until perhaps the age of twenty five.

Then there is the possibility of encouraging migrants to move to the country. In this respect the challenges of migration have already been discussed above.

Taken together this illustrates the diverse and significant challenges the Nordic countries face when looking at several of the key socio-economic parameters.

Future studies

When the analysis gets more speculative in respect of potential future drivers and indicators however, support can be found in disciplines like future studies. Here qualified ‘guessing’ is made into a formula. This report will not pretend that it is able to analyse the weak images in the crystal ball but a series of qualified pinpoints can nevertheless be identified with a view to precipitating further discussion.

When working with regional planning one must ask not only what happens if the largest workplace in the region closes down or another workplace just as big were to be established, what

happens if the rate of out-migration doubles, or what happens if the educational system is restructured? These are important questions but sometimes they need to be of an altogether different character.

Climate change has been on the agenda for some time. Development plans are beginning to include such challenges which now clearly embody a clear demographic dimension. For example do the development plans focus sufficiently on low-lying areas and areas with a history or an increasing susceptibility to flooding problems when it rains heavily?

As with climate change also green growth has now become a new theme on the agenda. It emphasises that economic growth and development should continue to provide the resources and environmental services on which our well-being relies, meaning investment and innovation should be encouraged towards sustained growth and new economic opportunities without jeopardising the next generation's opportunities. It is generally agreed that this approach opens up new opportunities not least for rural areas.

But *what if* the green growth trend becomes dominant and it starts an unforeseen counter-migration from the urban regions to the rural regions? It might even be reinforced by the new

critical global economic situation. Furthermore, *what if* the emerging trend among industry to withdraw from Asia and again locate industrial production in Europe takes hold? Might that be of any comfort to depopulating regions? Another question could be; *what if* we see sudden changes in international migration flows? Today the biggest Nordic international migration flows are between the Nordic countries themselves with secondary flows to and from neighbouring countries like the Baltic States, Poland and Russia.

Naturally, not all wild assumptions should be taken into account. Some of the scenarios touched on above are more likely to happen than others.

Back in the real world, not everything has to be about guessing. Some elements can be influenced politically on a regional or a local level. One of these elements is the range of services offered. It has been used strategically to attract specific fragments of the population. One example has been to offer guaranteed room for children in day care for families moving to a region.

In that way, local or regional policymakers can aim to stimulate demographic development in a certain direction and in a way that is in line with the broader political planning for the region.

7. Prognosis

Predictions, prognoses, forecasts and projections

In addition to highlighting the empirical characteristics of the current demographic structure, the availability of systematic statistics provides an additional opportunity, namely, the generation of prognoses, forecasts or projections—indications of likely or possible future development trends on the basis that such analyses can, ultimately, be viewed as predictions.

The development of prognoses is the art of predicting with a reasonable level of certainty about what may happen in the future. The toolbox in that context includes a set of components which are used synonymously with the concept of prognoses, i.e. projections, forecasts, and predictions.

Projections are a kind of scenario-building exercise based on information about a likely future and often based on generating trends from existing information such as time-series data.

Forecasts are assumptions about expected development trends which have not yet been verified but where the assumptions are based on the observation of specific development characteristics that may be likely to occur. Often forecasts are based on one or more projections.

Predictions are assumptions about expected development trends where the basic assumptions are considered verified to such an extent that the outcome is expected with a high degree of certainty.

In some situations forecasts may be useful as the basis for decision-making regarding specific policies. The challenge, however, is to establish a reasonable level of certainty in relation to the parameters behind the forecasts or prognoses. And in relation to demographic processes changes in the major parameters do not occur overnight, enabling the generation of prognoses in relation to 20-30 year forecasts. In relation to longer trends, however, prognoses are almost always proven wrong because some of the parameters considered stable at one point of time may change in connection with major social and economic changes.

To mention but one example in this context 50 years ago forecasts on population development in China foresaw a more or less exponential development of the Chinese population. Such forecasts were however simply unable to take into consideration how one-child policies and the present pace of economic development totally altered the demographic situation. Current prognoses foresee a stagnating population in China within the next 20 years, and in the next 40 years it is expected that Africa will be the only continent with the exponential population increase which was foreseen in the 1960s and 1970s where discussion of the “population bomb” based on the Malthusian theories of population growth were re-introduced.

Besides being a useful tool in communicating expectations about the future, prognoses are often generated in order to show a specific development, primarily as a tool for generating “what if ...” bases for discussion on means and measures in connection with policy development. And in that context the development of simple computer-based models of, for instance, demographic development processes is a very useful tool in the planning process because carefully prepared datasets enable instant response to such “what if ...” questions, providing planners with immediate responses to many questions. Note these are not responses in the sense that the computer is able to determine what the future will show, but rather it is able to set out a number of likely outcomes on the basis of a specific set of assumptions.

The following examples are included primarily in order to provide a starting point for further discussion on means and measures in relation to the development of a specific “demographic toolbox” useful for planning purposes while at the same time creating an awareness of what precautionary measures should be taken before including these tools in real planning process.

The presentation of the examples goes through four levels: From the simple prognosis exemplified by the expected total population

development in the Nordic countries where simple – but useful – forecasts can be conducted with standard software; the next step is a more complex model showing how the age structure may develop over time nationally. The data for this analysis is based on the different national statistical agencies' prognoses; the third example shows the results of a Nordregio prognosis for the regional gender and age structures in Sweden where demographic

dynamics are used in determining the projected regional structures up to 2050. The final example is similar to that model applied in Greenland, but is used in connection with the introduction of a labour demanding major industrial complex in one part of the country simulating the consideration of potential consequences for the other regions across Greenland.

Total population

The following table reproduces an example of a simple forecast up to 2050 of the population development in the Nordic countries based on a stepwise auto-regression of population data from 1990 to 2011 from the Nordic Statistics Yearbook. Missing from the table are the Åland Islands as their statistics were not included in the Yearbook. Further details are available in the appendix where a set of graphs show two versions of the simple projections. As indicated on the graphs the method which has been used is a simple stepwise auto-regression meaning that the data from a certain time period is projected – on the first page by means of a simple linear regression, while the second page shows the same data, but now by using a cubic regression where the previous trend is not assumed to be linear, but including complexity that should be reflected in the forecast.

The red lines on the graph show the interval between where there would be a 95% certainty in the result as long as the assumptions behind the trend are not changed. And as shown the linear data provides a

much clearer picture in that respect while the more complex cubic regression is able to show much more detail in the dataset behind it and therefore also a much higher degree of uncertainty in the results.

The challenge inherent in this kind of projection is to be able, on the one hand, to have an overview of the processes behind the development process and on the other, to generate output with a reasonable level of detail where variations are visible and interpretable. With more layers of detail the more difficult it becomes to properly interpret the results.

The results highlight the existence of some important differences between the Nordic countries in relation to projected developments as regards population development over the next 30 years which will continue the trends of the previous 20 years.

By far the largest change will be found in Iceland with a 40 % increase, followed by Norway where a 25 % increase has been projected. Both increases are very high in both a Nordic and a broader European setting with the changes related to two different

Simple forecast of total population in the Nordic Countries 1990-2050							
	Iceland	Norway	Finland	Sweden	Denmark	Faroe Islands	Greenland
1990	253 785	4 233 116	4 974 383	8 527 036	5 135 525	47 770	55 558
1995	266 782	4 348 410	5 098 754	8 816 381	5 215 831	43 644	55 732
2000	279 049	4 478 497	5 171 302	8 861 426	5 330 119	45 353	56 107
2005	293 577	4 606 363	5 236 611	9 011 392	5 411 405	48 337	56 969
2010	317 630	4 858 199	5 351 427	9 340 682	5 532 874	48 568	56 452
2015	331 561	4 974 253	5 431 512	9 472 729	5 615 741	48 702	56 930
2020	348 803	5 106 321	5 511 966	9 611 477	5 724 087	49 880	57 374
2025	365 427	5 254 229	5 596 008	9 774 312	5 818 828	50 623	57 724
2030	382 166	5 405 124	5 681 073	9 944 113	5 919 763	51 310	58 054
2035	398 883	5 556 583	5 766 430	10 115 929	6 018 036	52 204	58 379
2040	415 604	5 708 147	5 851 870	10 288 328	6 117 402	52 954	58 704
2045	432 325	5 859 732	5 937 333	10 460 895	6 216 339	53 742	59 028
2050	449 046	6 011 320	6 022 803	10 633 511	6 315 437	54 553	59 353

Table 10: Simple forecast of the total population in the Nordic Countries 1990-2050. Data from Nordic Statistics Yearbook. The forecast (marked in light blue) is based on a stepwise auto-regression of the population data 1990-2010 (marked in dark blue). The yearbook did not include data for Åland, which is the reason why it is not included in the overview.

conditions characterising Iceland and Norway. In both cases these countries show high birth rates and low death rates but in addition a very high return rate of Icelanders from other countries adds to the high level of increase there. The return rate has been closely connected to the economic boom during the 1990s and the beginning of the third millennium. The aftermath of the economic crisis from 2008 will probably create substantial changes to future forecasts for Iceland.

Denmark, Sweden, Finland and the Faroe Islands are much more in line with the general development trend in Europe. A projected increase in population of between 12% and 15% is comparable with the European mean values and it is interesting to see that the lower birth rates in the Nordic countries are compensated through net in-migrations. In this respect Greenland shows major deviations, while the projected population growth is as low as 5% for the next 30 years despite Greenland being among the Nordic countries with the highest birth rates. The explanation for this relates to the very high net out-migration rates which represent a general trend in Greenland for several decades.

Age structure

The following table shows the expected development of the projected age structure to the total population from 2010 to 2040 across the Nordic countries. The projections are based on the National Statistical Agencies' projections of the expected demographic changes with graphed versions of the data shown in the appendix with individual projections for each country as totals for the Nordic countries as such. The data is taken from the Nordic Statistical Yearbook 2010 where projections for the Faroe Islands are, unfortunately, unavailable and not all projections are available up to 2050. As regards the prognoses, the methodologies differ to some extent, which is important to note when comparing the outcome of national projections. But the main issue in this context is that the methodology enables the inclusion of further details in the output and in this context the focus is on the age structures. As will be shown in the next section comparable results can be generated in connection with the Nordregio approach to inter-regional population prognoses.

For all Nordic countries the general trend is quite similar, namely, a continuation of the already existing process of population ageing. Especially in Greenland the age group of 65 and above shows an expected increase from 6.2 % in 2010 to 14.4 % in

There are very good reasons for using tools such as simple projections of previous trends in planning and political processes. The methodology is easily accessible and very quick in generating outputs that may be useful when discussing possible future scenarios. Particularly in connection with scenario building where the outlining of future development may be dependent on multiple processes "proceeding as usual"-projections can be a very useful starting point.

There are, however, also severe limitations connected to the simple forecast methods used in the prognoses outlined above. A major question here is that the prognoses are projections assuming a continuation of the previous general trends, in this case the development path of the previous 20 years. Important details such as natural or politically-induced changes in the underlying parameters are only indirectly reflected in the results to the extent that such parameters have been a part of the previous development. In addition, it is often simply not possible to introduce expectations regarding possible changes in this respect.

2040 which is an increase of 110 %. Iceland can also show an impressive increase from 12 % in 2010 to 21.2 % in 2040 which is an increase of 77 % in total.

In most of the other Nordic countries the trends are quite similar, for Denmark, Finland and Sweden resulting in a level in 2040 around 23-26 % of the population in the age group 65 years and older. Deviating from this trend is Åland where it is expected that 28 % will be in this age group while Norway's expectations is 22.3 % explained by the higher birth rate and generally higher growth rate compared to the other Nordic countries.

Sweden also shows some deviation from the general trend due to a much higher share (18.4 %) of the population in this age group compared to the other countries, and the expected increase of 29.7 % therefore represented a lower rate increase than that seen in the other countries.

The Nordic countries currently show a variety in age distributions which are comparable to both the situation pertaining in Europe more generally and, indeed, that among other OECD countries. The situation in Sweden is comparable to the most economically developed regions in countries such as Germany, Italy and Japan, while the bulk of the Nordic countries is comparable with, for instance, Belgium, the UK, Canada and the Netherlands.

Population projections based on reporting country and age							
Country and age	2010	2015	2020	2025	2030	2035	2040
Denmark							
0-14	1.001.318	971.304	960.707	971.276	1.005.627	1.032.225	1.034.245
15-24	677.463	715.147	699.766	684.051	668.577	660.469	685.232
25-64	2.953.098	2.883.063	2.890.616	2.893.950	2.859.093	2.815.604	2.786.064
65+	902.859	1.041.903	1.137.179	1.224.256	1.320.724	1.408.539	1.458.317
Greenland							
0-14	12.828	12.362	12.374	12.461	12.205	11.910	11.673
15-24	8.830	8.330	7.723	7.441	7.612	7.794	7.734
25-64	30.696	31.264	31.413	30.866	29.747	28.923	29.497
65+	3.835	4.247	4.997	6.115	7.563	8.584	8.206
Finland							
0-14	886.705	908.322	937.331	948.011	942.715	931.229	926.800
15-24	659.828	639.659	605.777	617.997	642.503	655.456	656.930
25-64	2.887.647	2.822.639	2.802.687	2.771.261	2.739.724	2.748.235	2.793.858
65+	943.985	1.138.108	1.290.143	1.415.303	1.525.155	1.591.753	1.607.768
Åland							
0-14	4.624	4.798	5.095	5.271	5.397	5.448	5.490
15-24	3.140	3.135	3.037	3.162	3.323	3.432	3.530
25-64	15.154	15.409	15.725	16.120	16.381	16.658	17.023
65+	5.135	6.205	7.247	8.089	8.913	9.648	10.134
Iceland							
0-14	66.494	67.811	70.274	70.805	70.713	71.397	72.632
15-24	46.793	45.813	44.690	46.577	49.308	49.739	49.432
25-64	166.274	167.083	173.654	177.365	180.213	185.716	191.581
65+	38.069	44.308	52.428	62.043	71.496	78.774	84.572
Norway							
0-14	917.725	942.904	986.510	1.029.312	1.061.667	1.083.758	1.101.685
15-24	627.546	660.204	651.419	656.564	685.763	715.366	742.260
25-64	2.590.255	2.670.109	2.765.108	2.842.797	2.898.428	2.936.717	2.990.235
65+	722.673	831.225	931.362	1.043.209	1.156.410	1.281.617	1.387.406
Sweden							
0-14	1.566.313	1.690.100	1.763.149	1.781.474	1.755.447	1.712.012	1.688.944
15-24	1.251.497	1.153.494	1.071.398	1.152.974	1.215.384	1.237.397	1.241.521
25-64	4.867.466	4.967.762	5.082.617	5.072.241	5.045.432	5.056.163	5.093.503
65+	1.736.878	1.940.883	2.079.740	2.205.193	2.345.102	2.453.528	2.521.524

Table 11: Population projections for the Nordic countries. The numbers are generated by the National Statistical Authorities and include details on age structure. The Faroe Islands is absent due to missing information in the Nordic Statistical Yearbook.

The higher natural reproduction rates in Norway are comparable with those of France, while the lower representation of the older age groups in Iceland and Greenland makes them comparable with, for instance, Ireland as well as some of the Balkan countries such as Serbia, Croatia and Macedonia.

Compared to general population development without age structure details there are several different options available, in terms of the development of the model, when such details are required. The simple approach would be to apply simple forecasts for each of the selected age groups and for each country using that to calculate the expected outcome. It is an easy approach which does not require much more in the way of calculations than the population projections. It may, however, easily result in flawed results because simple projections assume that each of the data series is independent of each other. And this is of

course not the case when we are dealing with age structures where the age groups are interdependent.

Any increase in the age group 0-14 years at one point of time will, for instance, lead to a related increase in the older age groups at a later point of time, so individual forecasts for each of the age groups would probably generate serious problems for the results.

Therefore, the methodology which should be applied would require connections between the age groups, which needs – as a minimum the linkages between age groups, but usually would require relations to birth rates as well as death rates in the specified age groups. What would also be needed would be age group based net migration characteristics, as these differ substantially between age groups.

Such linkages are extremely important when the focus is moved from national to regional characteristics because domestic migration is often more influential on changes in population structures

than the basic parameters such as birth- and death rates. Moreover, with the influences on local labour markets through global interactions, for instance in connection with large scale industrial sites and the

extraction of mineral and energy resources, the role of these global linkages through immigration and emigration is becoming even more important in the analysis.

Regional consequences

In the third example we have turned the focus on the possible regional consequences of differences in regional demographic structures and how these should be analysed and interpreted.

Requesting such an analysis results in a further complication of the models which could be applied. The table above shows the results of a forecast up to 2050 with a focus on three components: Regions, Gender and Age. As emphasised above, dealing with inter-related data requires modelling where all relations are defined and interlinked. This is the case in the forecasting system we are developing at Nordregio, and where some of the results are presented here.

We have chosen to focus primarily on Sweden. Generating a forecast requires not only data on age and gender for each region but it is also necessary to know about birth- and death-rates in different age groups, just as migration data – again subdivided into age and gender – is necessary in order to see how all major demographic components influence regional demographic structures. In addition, data on migration is just as important, again subdivided into age group and gender. A first approximation to the results could be based on simple statistics on net migration from each of the counting units involved in the analysis – in this case data on the NUTS3 level – would be sufficient, but in order to make the model dynamic also in relation to mobility migration data on domestic migration patterns between the counting units would be needed. Where, in addition, the interaction between labour markets within the Nordic countries would be of interest mobility patterns between counting units within the Nordic countries would be needed.

The most critical issue in the modelling is to outline a set of assumptions about the different parameters. To illustrate, by means of one parameter, for instance birth rates: Could birth rates at any point in time in the future be seen as an average of the last 20 year's birth rates for each age group in each region? Would it be applicable to consider future changes in birth rates to be a simple linear regression of trends in changes during the previous 20 years? Are the trends in birth rate changes in the regions similar? Or is it necessary to

operate with different types of trends and thereby different types of models?

Before moving into this kind of analysis it is important to be aware of the level of detail in background data required as well as the problems connected with the interpretation of the results when different assumptions are made for different parameters. This of course raises the question of whether the type of prognosis we are trying to apply is feasible, too complex to interpret, or too difficult to support in terms of the accessibility of data.

As noted previously, the analysis here has its focus on Sweden and the regional structure at the NUTS2 level, so the data presented here relates to this particular *problématique*.

In the appendix the data generated by means of the Nordregio forecasting project is displayed in greater detail with only a short summary of the findings presented here, in this case focusing on the gender structure development.

In the table above the results shown, in relation to the regional gender distributions between the NUTS2 regions, not only confirm current patterns showing marked differences in the regional gender structures where regions offering higher educational opportunities and jobs related to the knowledge and experience economies show a marked surplus of females, while sparsely populated areas dominated by resource exploitation are characterised by a surplus of males. Similarly, regions characterised by ageing structures above the national levels are characterised by female dominance due to the fact that women live longer.

According to the data future policies still need to take account of the consequence of differences in gender approaches to development. What is not revealed through the generated data, however, are the ongoing changes in perceptions among males getting closer to what has been the dominant characteristic of females for decades. Such changes may have an impact on future development both positively and negatively. Positively in the sense that the choice and preferences becomes more similar and the long-term consequences more adjusted across gender. Negatively, in the sense that if male choices become

	Total		Males		Females	
	1990	2050	1990	2050	1990	2050
SE11 Stockholm	1.641.669	2.871.397	796.226	1.419.766	845.443	1.451.631
SE12 Östra Mellansverige	1.458.482	1.776.688	723.486	876.188	734.996	900.500
SE21 Småland med öarna	801.255	813.613	399.354	408.954	401.901	404.659
SE22 Sydsverige	1.219.151	1.678.813	598.092	833.266	621.059	845.547
SE23 Västsverige	1.696.018	2.212.331	840.308	1.113.508	855.710	1.098.823
SE31 Norra Mellansverige	861.471	734.925	428.640	371.129	432.831	363.795
SE32 Mellersta Norrland	396.881	303.221	198.482	150.734	198.399	152.487
SE33 Övre Norrland	515.703	481.563	259.429	244.637	256.274	236.926
TOTAL	8.590.630	10.872.551	4.244.017	5.418.182	4.346.613	5.454.370

	Females/Males		% Males		% Females	
	1990	2050	1990	2050	1990	2050
SE11 Stockholm	106	102	48,50	49,45	51,50	50,55
SE12 Östra Mellansverige	102	103	49,61	49,32	50,39	50,68
SE21 Småland med öarna	101	99	49,84	50,26	50,16	49,74
SE22 Sydsverige	104	101	49,06	49,63	50,94	50,37
SE23 Västsverige	102	99	49,55	50,33	50,45	49,67
SE31 Norra Mellansverige	101	98	49,76	50,50	50,24	49,50
SE32 Mellersta Norrland	100	101	50,01	49,71	49,99	50,29
SE33 Övre Norrland	99	97	50,31	50,80	49,69	49,20
TOTAL	102	101	49,40	49,83	50,60	50,17

Table 12: Population projections for Swedish NUTS2 regions from 1990 to 2050. Source of data the Swedish Statistical Central Agency. Projections based on a Nordregio generated model including regional data on population data including age structure, gender distribution, birth rates and death rates and migration characteristics from 1990 to 2010. Projections require data which eliminates random variations. Consequently, it is necessary to choose where details should be present – in the number of parameters, or in the level of regional detail. In this context the NUTS2 level has been chosen because projections subdivided into many categories (in this case, in age and gender groups) would provide results with a much lower probability rate than, for instance, if the NUTS3 level was chosen.

similar to current females choices, an increased out-migration from areas characterised as “peripheral” will contribute to a further differentiation between the “centres” and the “peripheries” unless further policy actions are taken.

Such perspectives are not currently revealed in the data but using the forecast methodology in testing such hypotheses would be an appropriate way of generating data that was useful for both planners and policymakers.

An example of how this could be done is outlined below where the case of the introduction of a large scale industry in a municipality might affect not only the local labour market, but to a certain extent also the labour markets in other regions. Eventually leading to substantial changes in the demographic structure.

The case is taken from Greenland and the tool used in this context is similar to that which has been used in the example from Sweden above. The

age group division is a bit more detailed, including the age groups 0-9,10-19, 20-29, 30-44, 45-64 and 65 years and above, while the regional structure used has been between the four regional units: centre towns, centre villages, peripheral towns and peripheral villages. In the appendix the list of which towns and villages have been classified accordingly is available.

In addition, the gender parameter has also been included, while the major demographic parameters include the natural reproduction parameters as well as national and international migration parameters. In order to trace details on the latter parameters all internal mobility has been based on mobility patterns between the above-mentioned types of towns and villages during the last 20 years.

The case study involves the following *problematic*: A large scale industry – in the example an aluminum plant in a region – is introduced in 2012. In the construction phase an unknown

Changes in the settlement structure induced by the establishing of an industry providing 600 jobs								
	Center, towns		Center, villages		Periphery, towns		Periphery, villages	
	Females	Males	Females	Males	Females	Males	Females	Males
Below 10 years	22	19	-6	-6	-11	-8	-6	-4
10-19 years	54	109	-6	-15	-38	-70	-4	-15
20-29 years	98	212	-9	-23	-76	-154	-14	-27
30-44 years	27	104	-7	-22	-13	-39	-6	-23
45-60 years	7	55	-6	-12	0	-33	-1	-10

Table 13: Change in settlement structure in Greenland due to the introduction of a large aluminium smelter in one of the major towns. The table shows the number and age structure of the influx (positive number) and outflow (negative numbers) from four settlement types: centre towns, centre villages, periphery towns and periphery villages in connection with the start-up of the plant. Data and calculations from a report on Mobility in Greenland (Rasmussen 2010).

number of persons (but probably around 5 000) will be involved, but the company will provide a substantial part if not all of this. During the establishment period, with a duration of 5 years, a total of 600 permanent jobs will be created, the vast majority based on workers from Greenland. In the planning of the future development the following is assumed:

- 1) The company is established in a city centre area.
- 2) Half of the jobs will be filled by the local labour force while the other half will be filled through labour coming from villages in the centre area or towns and villages in remote areas.
- 3) Two thirds of the jobs created are expected to be taken by men while the remaining third are expected to be filled by women.
- 4) Half of the jobs will be filled by people who are single while the other half will come with one or two other persons in existing family units.
- 5) In terms of the family grouping two out of three families will likely be without children while one in three will be families with two or more children.

In addition to the direct attraction of new employment opportunities a significant side effect would be the accompanying spouses or partners and children. These people will undoubtedly have important consequences for the demographic parameters used. In some cases two people from the same family may be looking for jobs in the new industry, but for many of the accompanying persons their inclusion represents an additional contribution to the local labour market in the town with the new industry.

Using the model under these constraints the results are shown in output in the table below and the graph on the following page:

While the jobs are offered in one of the central towns the lack of both qualifications and available persons leads to an influx of persons from other towns and villages. The lowest numbers are from the villages in the centre region because job opportunities in the centre towns are already fully exploited, leaving the centre-villages either with a deficit of persons in the relevant age groups, because they have already moved, or the villages are in such a strong position jobwise that only a limited number of persons will be tempted by the new opportunities offered.

The situation is rather different when it comes to what are characterised as “periphery towns”. These towns have marked limitations in terms of what kind of jobs are offered, so a substantial number of persons will make use of the new opportunities and chose to move. A the similar situation characterises the villages in the periphery. So from these regions it is also likely that a substantial number of persons would choose to move.

The moving of several hundred persons from towns in the periphery and around a hundred or so persons from the peripheral villages is, in itself, a problem for these places. What is perhaps the most challenging problem, however, is the fact that those choosing the option of moving will be the part of the population who are among the best trained and most skilled persons, leaving both towns and villages with voids in these fields which may be extremely difficult to compensate for because these places may be much less able to attract replacements from other towns and villages.

The potential long-term consequences of the above example have been generated by means of the model with the results displayed in the following graph. The direct effects of the introduction of the

new activity is seen just before and after the introduction date. It is quite clear however that the long-term consequences are much more substantial than the immediate effects. While the introduction of a new group of young well-qualified workers in the centre town has a continuous positive multiplier effect throughout the whole period, resulting in a situation where the creation of 600 new jobs eventually leads to a population increase

of around 1 200 persons, the exact opposite process occurs in terms of towns and villages in the periphery. Namely, the continued outflow and decline of the population in both settings. At the same time, the de-skilling of these populations, due to the attraction of qualified persons away from such places, is something that is deeply embedded in these changes.

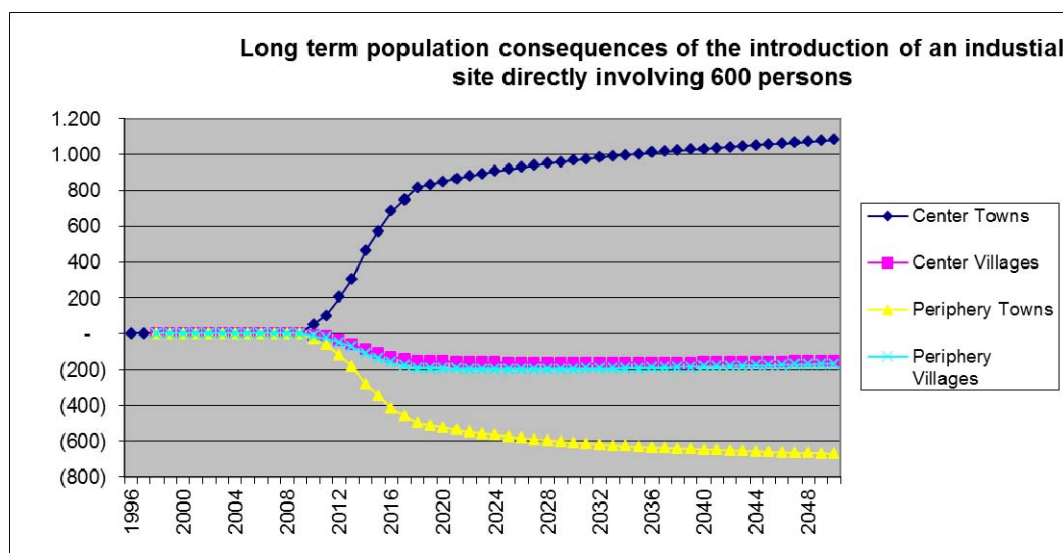


Table 14: Projected long-term population consequences of the introduction of an industrial site in a Greenland centre town. The number of people directly involved includes some 6 000 persons, but because those involved are accompanied by spouses and children the effect of the initiative is rather closer to 1 200 persons. The graph shows how four types of settlements: centre towns, centre villages, periphery towns and periphery villages are expected to be influenced by the new activity.

Simplicity versus complexity

The four examples above essentially illustrate that many options are available to us in terms of generating forecasts on expected future development. They also illustrate, however, that there is a more or less direct relationship between complexity in the modelling of future development and the accessibility of the interpretation in terms of the models. Understanding the results of prognoses or forecasts requires an understanding of the underlying components and their interaction. It does not mean that one should shy away from becoming involved in such endeavours. Nevertheless, we should be aware of what it requires.

In that context it is tempting to rely on the more simplistic approaches presented in connection with the population development projections mentioned in relation to the first case. It is rather

straightforward to see what the pre-requisites are, namely, an idea of what is likely to shape future development. Whether or not one would place emphasis on the general trends (linear regression) or variations (cubic regression) could therefore depend on what the projections aim to accomplish. A clear advantage of this method is that it is easily accessible, available and easy to apply. So as a preliminary or initial tool in testing hypotheses and developing ideas this approach may be seen as appropriate.

In order to respond to more complex questions in relation to demographic development a more detailed analysis is however required. The second case regarding age structure development serves as a good example of what this implies. Firstly, detailed data in relation to the demographic parameters involved in the question raised and, in

addition to this, some basic assumptions and theories on the inter-relationship between the components, needs to be collected. Such approaches are intrinsically more demanding, requiring, for instance, methodologies similar to that used by the national statistical agencies and Nordregio. This is time consuming but it does enable the testing of hypotheses on expectations in relation to the demographic components included in the analyses.

This leads to the third example showing the regional consequences of ongoing changes in the demographic structures in Sweden, where questions such as inter-regional mobility and migration patterns are essential. In connection with Nordregio's development of analyses in relation to demography such models are important and may indeed provide answers – or at least generate discussion inputs - to many of important questions. Current developments remain open not only to a focus on national regional developments, but also

to attempts to include components such as inter-regional mobility in the Nordic countries data and to the consequences for the development of local labour markets.

Another important issue in this context is the idea of developing these approaches into what is often referred to as “micro simulations”. The last example from Greenland is a good illustration of the potential of such an approach in contributing to both our background knowledge and to the required policy measures needed in connection with regional development strategies. The latter are clearly important in relation to the increasing direct interaction between regions and multi-national and global initiatives, for instance, connected to large-scale initiatives in relation to resource extraction. Last – but not least – we should also consider here the possible consequences of an increased focus on renewable resource and green economic initiatives in rural settings.

Complex modelling

As indicated in the previous sections forecasting is a risky business when working with complex issues. Moreover, demographic development includes a number of components which may or may not be predictable.

In the previous examples the major elements encompass a model as illustrated below, including some elements which may be predictable within a short to medium timescale such as birth rates, death rates and to some extent also national mobility, because these components will in the main be the result of national policies.

However, in relation to international mobility the mechanisms are way beyond the national policies, though attempts to prevent the effects of what happens internationally may be implemented through precautionary policies. Similarly the consequences of the development of new technologies, the discovery of new resources, the impact of climate change etc., are beyond national or even international control. In addition, the impact of globalisation may have a marked impact on the processes of changes, and may be able to generate changes within a relatively short space of time.

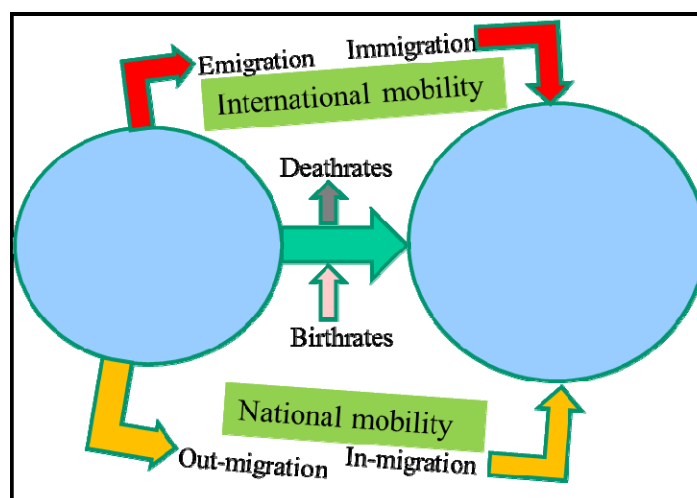


Table 15: Main components in the modelling of demographic changes.

As a consequence the complex modelling of the demographic components aiming at what previously has been characterised as the generating of a “steady state” forecast, i.e. a forecast based on the evolutionary development of the different components, could be characterised as shown in the illustration below.

When looking at a 5-15 year time span one may consider the outcome to be predictable as long

as there are time series supporting the suggested future trends of the components. In a longer perspective such as 20-30 years the modelling may generate plausible results because such a time span indicates a generation.

Major shifts usually take place in connection with generational shifts. So beyond such a time period one may presume an outcome, while also accepting that major changes in the assumptions are likely to occur.

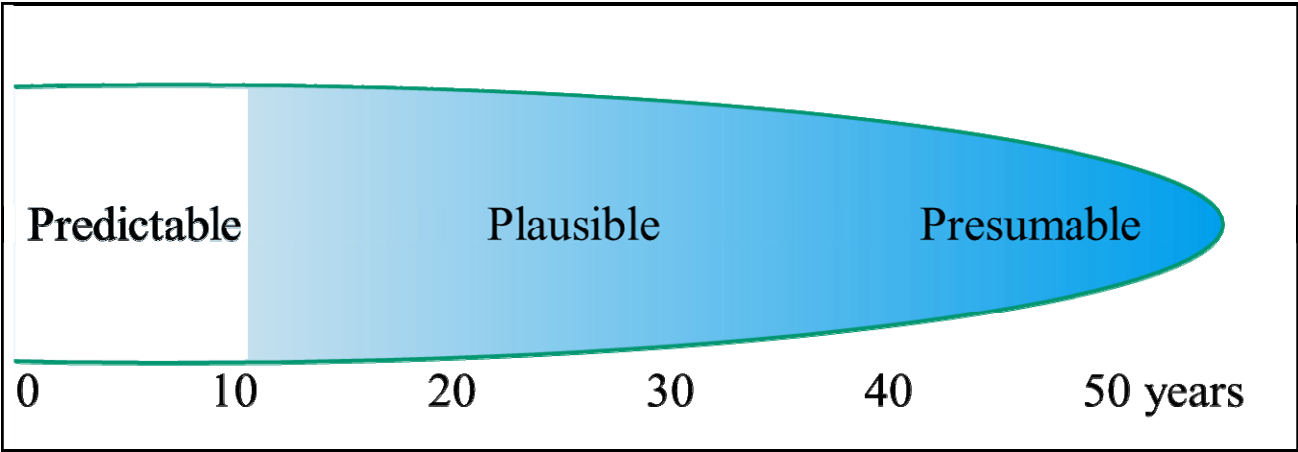


Table 16: *Durability of “Steady state” forecasts.*

The role of turning points

Turning points are events that tend to change demographic processes from a steady state (described by a certain paradigm) into an unprecedented situation (often referred to as a shift in paradigm). The concept was introduced by Hervé Le Bras (2008) in connection with the OECD’s attempt to predict the future needs of Higher Education (OECD: Higher Education to 2030, Vol. 1: Demography).

A major conclusion in the report is that turning points in fact play the most important role in demographic trends and consequently that demographic trends cannot be extrapolated directly

but can only be explored through forward-looking scenarios incorporating political and economic factors which act as drivers in the processes of shifts in demographic paradigms.

Two examples brought forward by the OECD helps to illustrate the level of complexity. The first relates to the question of the predictability of future changes where the changes in fertility from 1955 to 2000 are quite illustrative. The graph below shows the fertility rate for 23 EU countries in 1955-60 on the *x*-axis and 2000-05 on the *y*-axis, each dot representing a country.

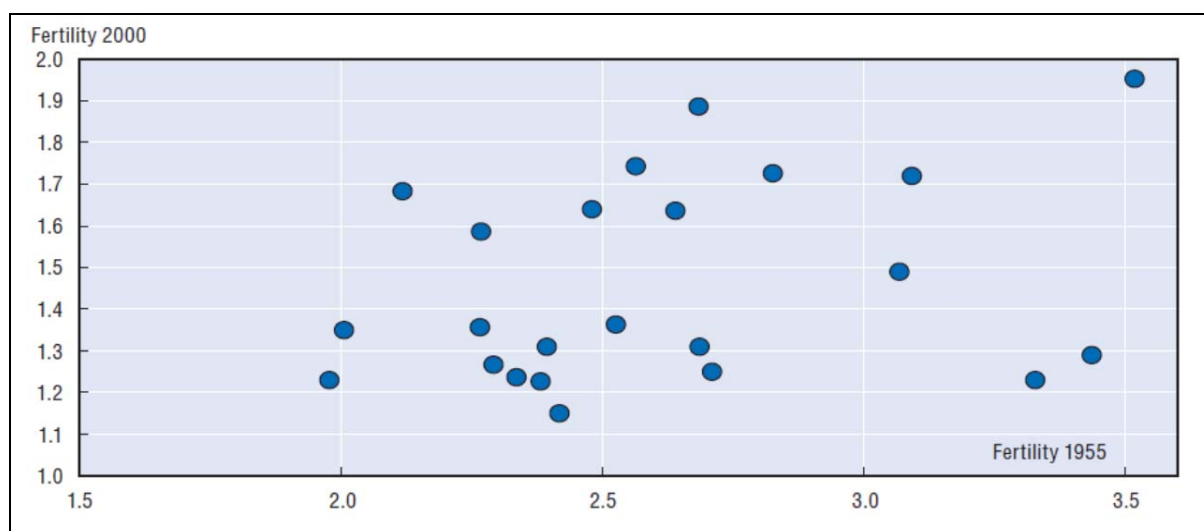


Table 17: Fertility comparison of 23 EU countries. Fertility in 1955-60 and in 2000-05. Each country is shown by a dot. (EU24 minus Cyprus). Source: Hervé/OECD.

It is quite clear that the fertility level has dropped from between 2.0 and 3.5 down to somewhere between 1 and 2. But there is no clear pattern in the changes. If the drop in fertility had followed a general trend the outcome would have been a more or less straight line, with low values in 1955 dropping to lower values in 2000, and higher values in 1955 would have dropped to lower levels, but still maintained their position at the higher end in 2000. In the high end in 1955, however, we have countries which are still at the high end in 2000 as well as countries which have dropped to the low end in 2000. Moreover, some countries which were at the low end in 1955 now appear at the high end of the scale in 2000.

The second example, brought forward by Hervé/OECD, is the change in fertility rates in Norway, Sweden and Denmark between 1950 and 2000 by means of the illustration reproduced in figure 30 below. As emphasised by the author there are many common characteristics in relation to the political, cultural, and economic characteristics of these three countries, and as a consequence the changes in fertility rates have followed more or less similar patterns over this 50 year time period.

The levels differ somewhat as does the exact point of time when trends change. But the patterns run in parallel, with Sweden as the country with the highest level of industrialisation, showing the lowest level during the first 30 years. Denmark is in the middle, between Sweden and Norway as regards industrialisation, while Norway remains predominant in terms of the primary sectors, maintaining also a traditionally higher level of births. The high level of social services in Sweden, especially after 1985 when – as described in the text: “Sweden adopted a number of measures designed to enable parents to stay at home when their children were very young”. This saw the fertility rate immediately soar.

A number of countries, including France, thought that Sweden had found the magic formula for pronatalism, but they were mistaken. A few years later, once the benefit of the measures had been reaped, the fertility rate fell below Denmark’s, largely offsetting the gain in fertility achieved earlier. Then, at the end of the period, both countries returned to the same rate” (Le Bras 2008,31).

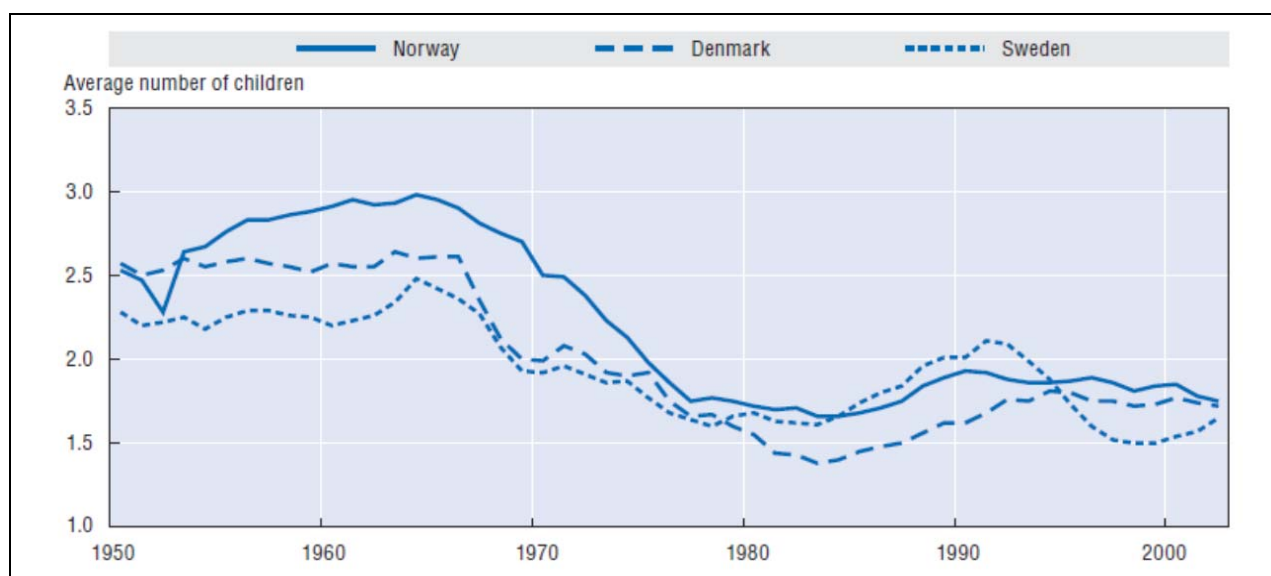


Table 18: Comparing trends in fertility rates in Norway, Sweden and Denmark from 1950 to 2003. Source: Hervé/OECD.

In addition to the above-mentioned examples the report by Hervé for the OECD is quite clear, namely that the possibilities of forecasting demographic trends seem to be fairly limited. Again, to quote the report: “It is impossible to make a demographic forecast independently of an economic and political forecast. A long-term population forecast assumes implicitly that no event will occur. It drifts in an unreal world aptly illustrated by the migration projections conducted by the United Nations” (Le Bras 2008,38).

The decisive point would be to what extent political and economic events are predictable, and as has been emphasised before, such predictions are dependent on a large number of issues such as technological forecasts, predictions on future resource use, changes in climate etc., **and** the

modelling of the inter-relations between these conditions. In a short term perspective – as long as we are talking about “steady state” situations we may be able to come up with plausible projections and apply pro-active measures in meeting the challenges.

In a long term perspective however a focus on pro-active measures as a secure way of meeting the future has its limitations as the nature of turning points is to be unpredictable the evaluation of long term consequences requires other means and measures. This includes tools such as the development of scenarios where different paths are tested and foresight development where the ability of communities to be reactive and to respond to changes through the exchange of experiences would be more important.

References

- Brox, Ottar (1966). What skjer i Nord-Norge. En studie i Norsk utkantpolitikk. Oslo 1966. Pax.
- Brox, Ottar (1984). Nord-Norge: Fra allmenning til koloni. Oslo 1984. Universitetsforlaget.
- Carlson, Dean, Rasmus Ole Rasmussen, Prescott Ensign, Lee Huskey and Andrew Taylor (eds) (2011). Demography at the Edge. Remote Human Populations in Developed Nations. Farnham 2011. Ashgate.
- Dahlström, Margareta and Sigrid Hedin (eds) (2010). Regional trajectories to the knowledge economy - Nordic-European comparisons (REKENE). Oslo 2010. Nordic Innovation Centre.
- Dahlström, Margareta, Sigrid Hedin and Lise Smed Olsen with contributions from Sara Östberg, Christian Dymén and Anu Henriksson (2010). Knowledge dynamics in moving media in Skåne - Cross-sectoral innovations in game development and film tourism. Nordregio Report 2010:1, Stockholm 2011. Nordregio.
- Dustmann, Christian and Albrecht Glitz (2011). Migration and Education. Discussion Paper No. 2011-11. Norface Migration. www.norface-migration.org [Visited 19 July 2011].
- Gløersen, Erik, Alexandre Dubois, Andrew Copus and Carsten Schürmann (2006). Northern Peripheral, Sparsely Populated Regions in the European Union and in Norway. Nordregio Report 2006:2. Stockholm 2006. Nordregio.
- Gløersen, Erik, Alexandre Dubois, Johanna Roto, Rasmus Ole Rasmussen and Jose Sterling (2009). Development perspectives for the NSPA: Opportunities and Challenges. Nordregio Electronic Working Paper 2009:3. Stockholm 2009. Nordregio.
- Harbo, Lisbeth Greve, Rasmus Ole Rasmussen and Freia Lund Sørensen (201x). [Forthcoming] Selvstyrets interesse i den kommunale planlægning [working title]. Nordregio. Forthcoming.
- Hedin, Sigrid (ed) (2009). Higher education institutions as drivers of regional development in the Nordic countries. Nordregio Working Paper 2009:3. Stockholm 2009. Nordregio.
- Hedström, Moa and Helene Littke (2011). Perspectives on rural development in the Nordic countries – Policies, governance, development initiatives. Based on discussions and presentations at seminars held by the Nordic working group 1b: Future rural areas. Nordregio Electronic Working Paper 2011:3. Stockholm 2011. Nordregio.
- Hörnström, Lisa (2010). Redistributive Regionalism. Narratives on regionalisation in the Nordic periphery. Umeå 2010. Umeå Universitet.
- Lindquist, Maria (ed.) (2010). Regional Development in the Nordic Countries 2010. Nordregio Report 2010:2. Stockholm 2010. Nordregio.
- OECD (2001). The New Economy: Beyond the Hype. Final report on the OECD growth project. OECD 2001. <http://www.oecd.org/dataoecd/2/26/2380634.pdf> [Visited 1 August 2011].
- OECD (2006). The New Rural Paradigm: Policies and Governance. OECD 2006. http://www.oecd.org/document/7/0,3343,en_2649_33735_37015431_1_1_1_1,00.html [Visited 1 August 2011]
- OECD (2007). Demography and Population. Demographic Indicators. OECD population pyramids in 2000 and 2050. 1st March 2007. http://www.oecd.org/topicstatsportal/0,3398,en_2825_494553_1_1_1_1,00.html#494560 [Visited 15 July 2011].

OECD (2009). Education at a Glance 2010. OECD Indicators. OECD 2010. <http://www.sourceoecd.org/9789264055988> [Visited 1 August 2011].

Rasmussen, Rasmus Ole, Johanna Roto m.fl. (2010). Mobilitet i Grønland – en sammenfattende analyse. Nordregio 2010. http://www.smv.gl/DK/mobilitet/rapporter/samlet_mobilitet_v04_feb2010.pdf. [Visited 5 August 2011].

Rasmussen, Rasmus Ole et al. (2011). Megatrends. TemaNord 2011:527. Nordic Council of Ministers, 2011.

Rauhut, Daniel and Ingi Rúnar Eðvarðsson (2009). The Potential Labour Supply in the Nordic Countries. Nordregio Report 2009:3. Stockholm 2009. Nordregio.

Rauhut, Daniel and Petri Kahila (2008). The Regional Welfare Burden in the Nordic countries. Nordregio Working Paper 2008:6. Stockholm 2008. Nordregio.

Rauhut, Daniel, Rasmus Ole Rasmussen, Johanna Roto, Per Francke and Sara Östberg (2008). The Demographic Challenge to the Nordic Countries. Nordregio Working Paper 2008:1. Stockholm 2008. Nordregio.

Thematic maps illustrating demographic statistics for the Nordic countries 1990-2011

Appendix 1

**Demography in the Nordic countries
– a synthesis report**

Johanna Roto



NORDREGIO
Nordic Centre for Spatial Development

Contents

List of tables and figures	4
Preface	5
Demographic status for 2011	6
Settlement structure	6
Age structure	10
Dependency ratio	17
Gender	22
Demographic development for 1990-2011	25
Total population change	25
Natural population change	31
Migration	35
Socio-economic characteristics for 2010	40
Level of education	40
Labour market	43
References	46

List of tables and figures

Figure 1: Population density in Nordic country municipalities and regions, in 2011	7
Figure 2: The relative size of Nordic municipalities in relation to total population, in 2011 .	8
Figure 3: Degree of urbanisation and population density.....	9
Figure 4: Share of population aged 0-14 years.....	11
Figure 5: Share of population aged 15-24 years	12
Figure 6: Share of population aged 25-54 years	12
Figure 7: Share of population aged 55-64 years	14
Figure 8: Share of population aged 65-79 years	15
Figure 9: Share of population aged 80 years and over.....	16
Figure 10: Total dependency ratio.....	18
Figure 11: Change in total dependency ratio.....	19
Figure 12: Young age dependency ratio	20
Figure 13: Old age dependency ratio	21
Figure 14: Total number of females per 100 male	23
Figure 15: Total number of females per 100 male in age group 15-64.....	24
Figure 16: Total population change, 1990-2011	27
Figure 17: Total population change, 2006-2011	27
Figure 18: Total population change, 2010-2011	29
Figure 19: Total population change in the European and Arctic regions, 2000-2010.....	30
Figure 20: Natural population change, 2006-2010	32
Figure 21: Crude birth rate, 2009-2010 average	32
Figure 22: Crude death rate, 2009-2010 average.....	34
Figure 23: Migration rate, 2006-2010	36
Figure 24: Domestic migration rate, 2006-2010.....	37
Figure 25: International migration rate, 2006-2010.....	38
Figure 26: Migration flow to and from Nordic municipalities and regions in 2010	39
Figure 27: Tertiary degree education	41
Figure 28: Gender difference in tertiary educated persons	42
Figure 29: Employment rate.....	44
Figure 30: Unemployment rate	45

Preface

This appendix presents a snapshot of the demographic status of the Nordic countries in 2011 while also highlighting the main trends occurring in the various types of Nordic regions over the last twenty years. This appendix is constructed primarily on the background material produced in the context of Nordregio's own database which is based on the latest statistics from the various national statistical institutions and from those of international organisations such as Eurostat and the OECD.

The appendix is divided into three thematic parts. The first part presents the current demographic status in 2011 with a particular focus on settlement structure, age structure and gender. The second part focuses on recent demographic trends, namely, the main demographic developments since 2000, including, natural population change and migration. The third and final part of this appendix document focuses on the socio-economic characteristics of the Nordic population.

Demographic status for 2011

Settlement structure

The population of the Nordic countries is 25.7 million people living in an ice-free land area of approximately 1 580 000 km². Based on these figures, the average Nordic population density is 16.3 inhabitants per square kilometre. Moreover, considering that (1) a significant proportion of the land area, such as mountainous areas, is inhospitable to human inhabitation and (2) that the population has been both rising in numbers while (3) becoming ever more concentrated to the larger urban areas located mainly in coastal areas and (4) that there remain significant differences between the northern and southern parts of Norden, this average number does not really provide a meaningful measurement of the Nordic settlement pattern, especially when about 65 % of people live on 10 % of the land.

The European Commission, in its *Green Paper on Territorial Cohesion*, has identified 'sparsely populated NUTS3 regions' in the European Union. The criterion for this definition is an average population density of less than 12.5 inhabitants per km² in a NUTS3 region. Based on this delineation, approximately 1/3 of Nordic NUTS3 regions are sparsely populated. At the municipal level the share is, moreover, even higher with 46 % of Nordic municipalities classified as sparsely populated. In addition, significant differences also exist between the Nordic countries. For instance, at the municipal level there are no sparsely populated areas in Denmark, while 65 % of Sweden 75 % of Finland, 81 % of Norway and 99 % of Iceland can however be classified as sparse. In contrast, the OECD defines municipalities as 'urban' when the average municipal population density is above 150.0 inhabitants per km² – this level equates to 11.2 % of Nordic municipalities.

In addition, large differences also exist between the municipalities in respect of their size. The 1242 municipalities (Faroe Islands on regional

level) of Norden have a population span from 52 to 847 000 inhabitants and a size span from 2 to 19 371 km² (excluding Greenland). The highest population density figures in Norden can be found in the capital regions. Altogether 30 municipalities in the Nordic capital regions and Stavanger municipality have a population density above 1 000 inhabitants per km². Frederiksberg municipality in the middle of Copenhagen has the highest density of 11 264 inhabitants per km². In contrast 87 municipalities, mostly in the northernmost part of Norden, have a population density below 1 inhabitant per km².

In total, 84 % of the Nordic population lives in build-up areas with more than 200 inhabitants per km² which constitutes the statistical definition of a settlement. Several of the most densely-populated municipalities share a relatively small land area and a high urbanisation level but this is not always the case. Taking the statistical definition of a settlement as the starting point, a significant difference clearly exists between the southern and northern parts of Norden. In Denmark and in the southern parts of Finland, Norway and Sweden there are plenty of densely populated small municipalities with low degrees of urbanisation. While in the more sparsely populated areas, where the land area of the municipalities is generally larger, the densities are often higher for the central municipality itself. For instance, Kiruna, Rovaniemi and some other population concentrations in the northern parts of Norden, have a greater population density when just the inner city is measured, and not the surrounding hinterlands as well, leading to high degrees of urbanisation being recorded. This pattern of low population densities but high degrees of urbanisation is even more visible in a regional context.

Figure 1: Population density in the Nordic municipalities and regions, in 2011

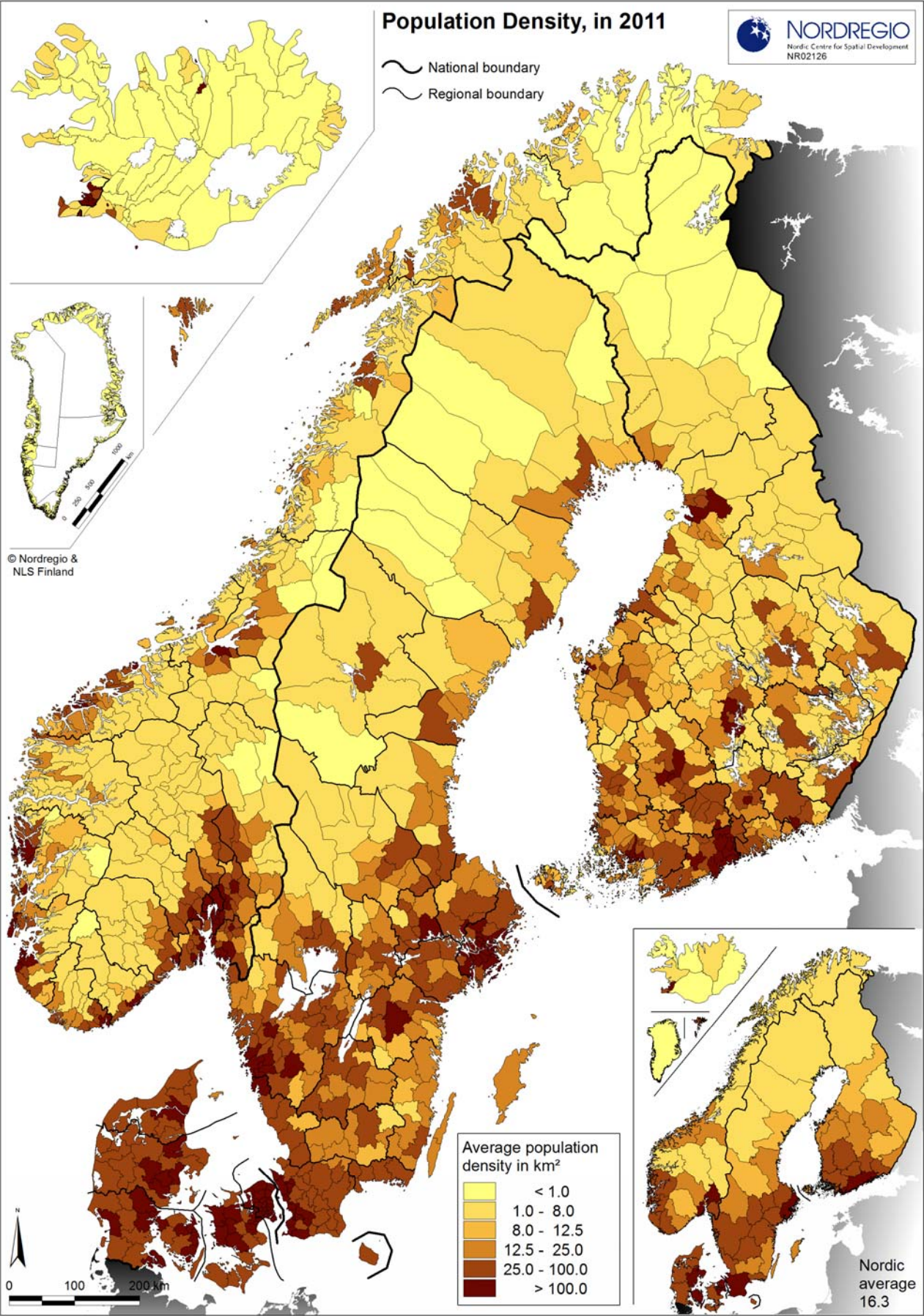


Figure 2: *The relative size of the Nordic municipalities in relation to total population, in 2011*

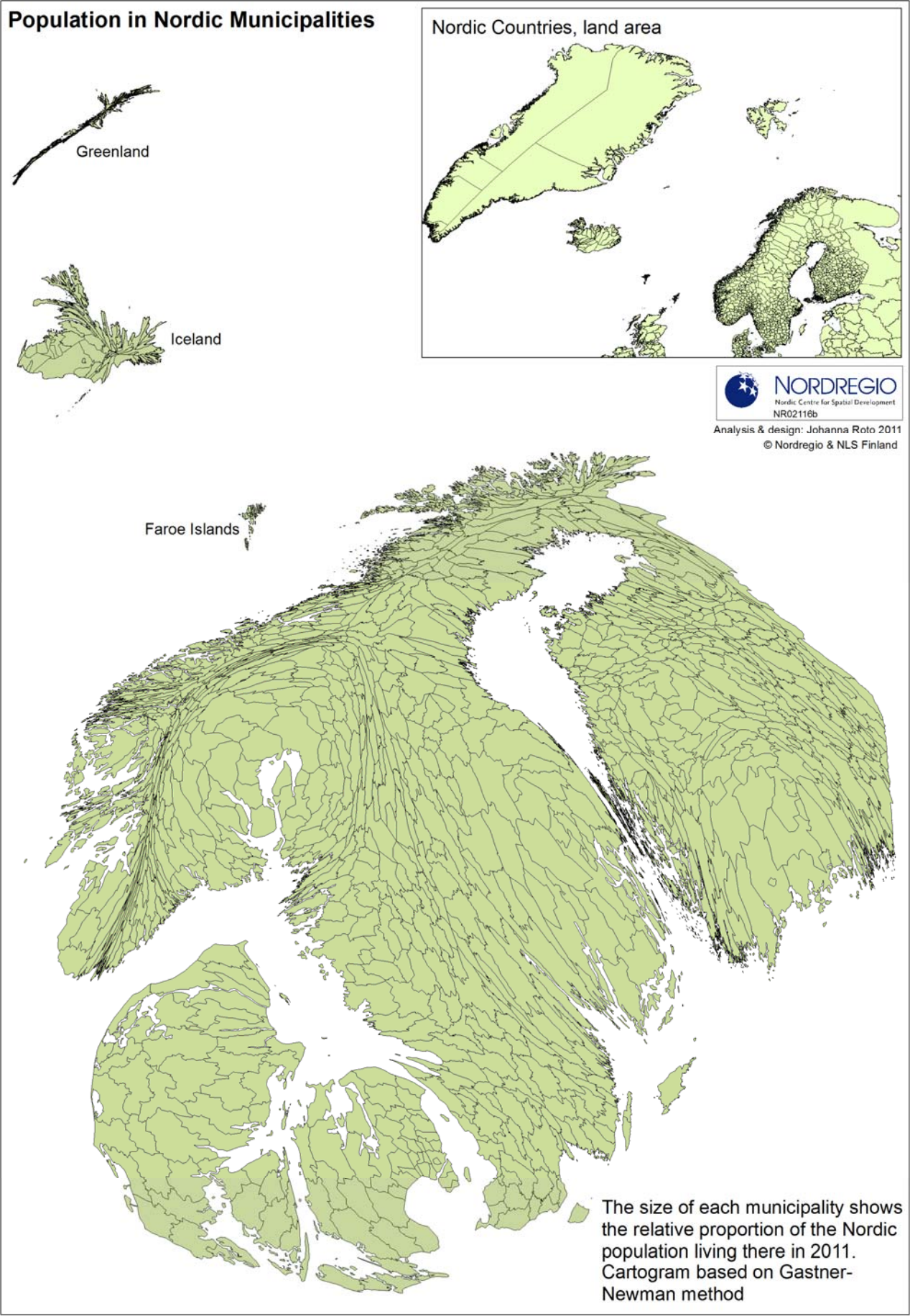
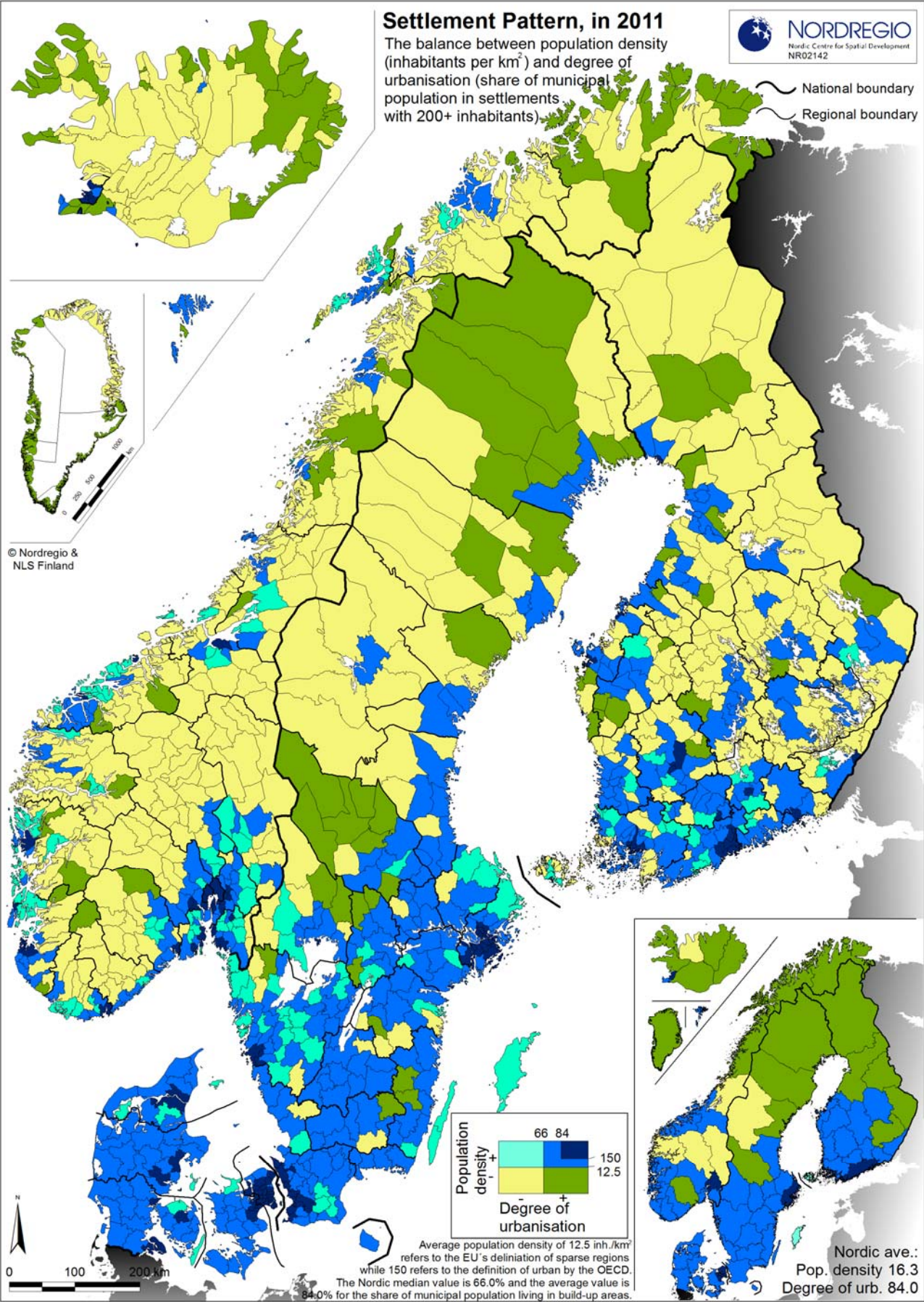


Figure 3: Degree of urbanisation and population density



Age structure

Demographic trends have had a strong impact on Nordic societies and on the potential performance of their regions in an EU context. Low fertility levels, combined with increased life expectancy, have resulted in the demographic ageing of the European population.

A common classification regarding age structure is the grouping into three major classes based on dependency, such that 0-14 indicates young age dependency, while 65+ indicates old age dependency, while 15-64 indicates the working age population. It should however be noted that the 15-24 age group is now primarily involved in education and training rather than being in the general working population and thus this age group should be identified rather more as a significant future contributor to the productive age group and to knowledge economy. As such, the age structure used here is even more nuanced. In this light the 55-64 age group is also worth highlighting in order to help identify those regions where the coming retirement wave will hit hardest with the group of elderly people, aged 65 and over divided into two; namely, into active retired persons of 65-79 years and those aged 80+ which is, in general, more dependent on health care and on other public services.

When reviewing the population structure by age in the Nordic countries, the nature of development is rather similar across each country. Nevertheless, differences remain between settlement types and countries. A common trend is that the population of urban areas is younger, while in rural and sparsely populated areas the population is older. This development does not concern only ageing population but also depopulation in these areas, and is particularly visible in rural and peripheral areas in Finland and Sweden. In the West Nordic region, the population is much younger than in other parts of Norden.

The ageing of the population in terms of fast growing groups in the retirement ages will impact the Nordic countries quite significantly in the coming years. Compared to the European (EU27)

average, the 55-64 age group is significantly larger in Norden, and particularly in Northern and Eastern Finland. In contrast, the share of children aged 0-14 years is higher in Norden than in the EU, which means that relatively larger age groups are not only leaving but also coming into the labour markets. The largest shares of children can be found around the largest cities, in the West Nordic regions, and in coastal municipalities of Norwegian Vestlandet and Finnish Pohjois-Pohjanmaa. In these regions the relatively high share of children is related to the overall age structure - a relatively young population, among other things influenced by a high influx of people - and by tradition, both religious and non-religious. In addition, parts of the West Nordic region can still be seen to reflect stages II or III of the demographical transition model. Municipalities with a low number of children are particularly prevalent in the northern part of Sweden, but also in parts of the interior of Finland, and a few municipalities in the interior of Norway and the smaller Danish islands.

The 15-24 age group is, on the regional level, relatively equally distributed although the in general the younger age structure in the West Nordic region makes this age span larger there. At the municipal level, the regional centres with training and education possibilities and especially those with universities, across Norden are clearly highlighted. The lowest share of these young adults can be found in eastern Finland. The largest share of population in the main productive age group, 25-54 years, can be found in and around the large metropolitan areas and regional centres whereas the lowest shares can be found in rural inland municipalities in Finland and Sweden.

The pattern of old age persons (65-79 and 80+ years) is to a certain degree a reverse picture of that outlined above. Urban areas are generally characterised by a relatively low percentage of persons in these age groups, while rural areas are generally characterised by the relatively high proportion of old age persons, especially in eastern Finland and northernmost- and mid- Sweden.

Figure 4: Share of population aged 0-14 years

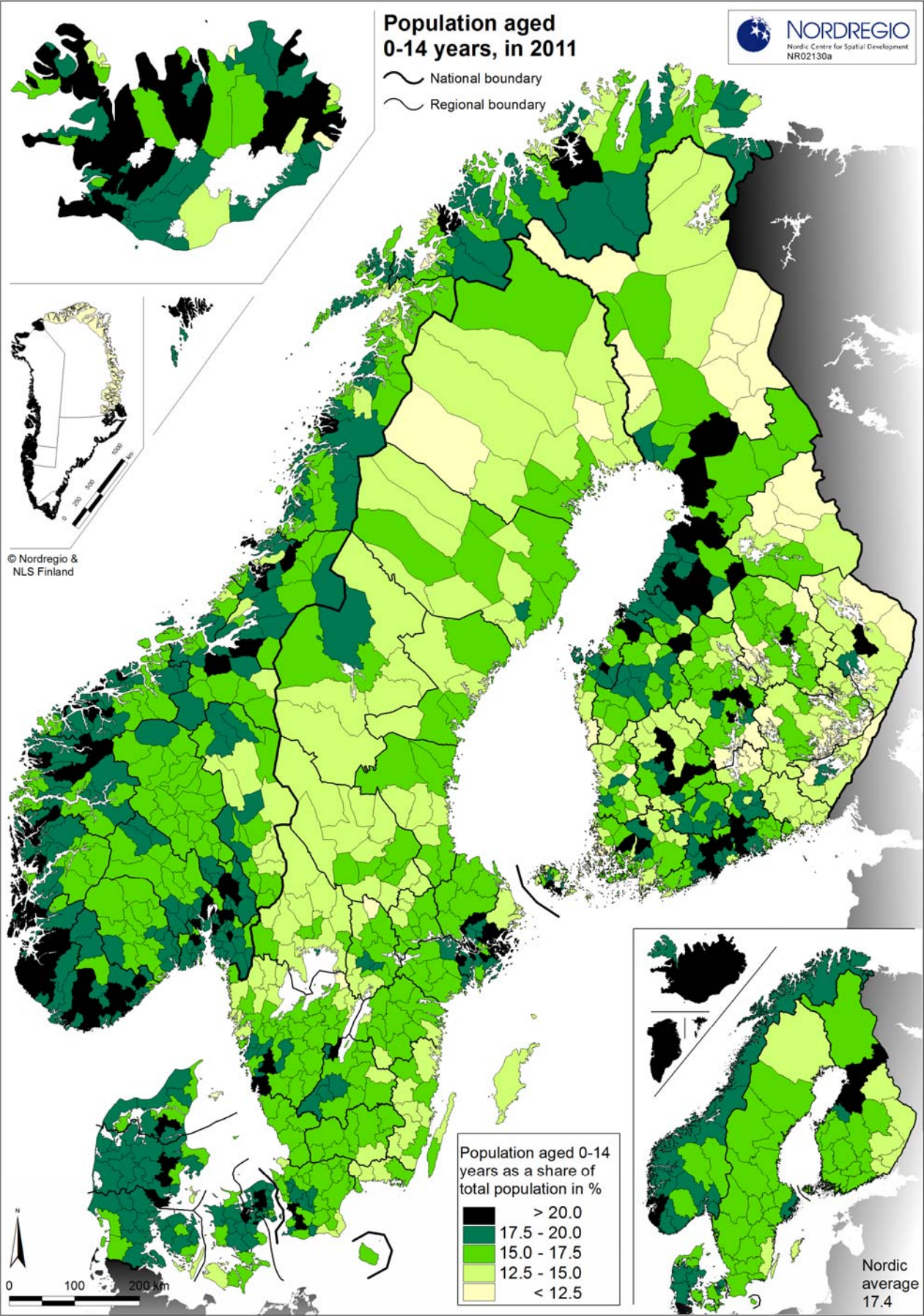


Figure 5: Share of population aged 15-24 years

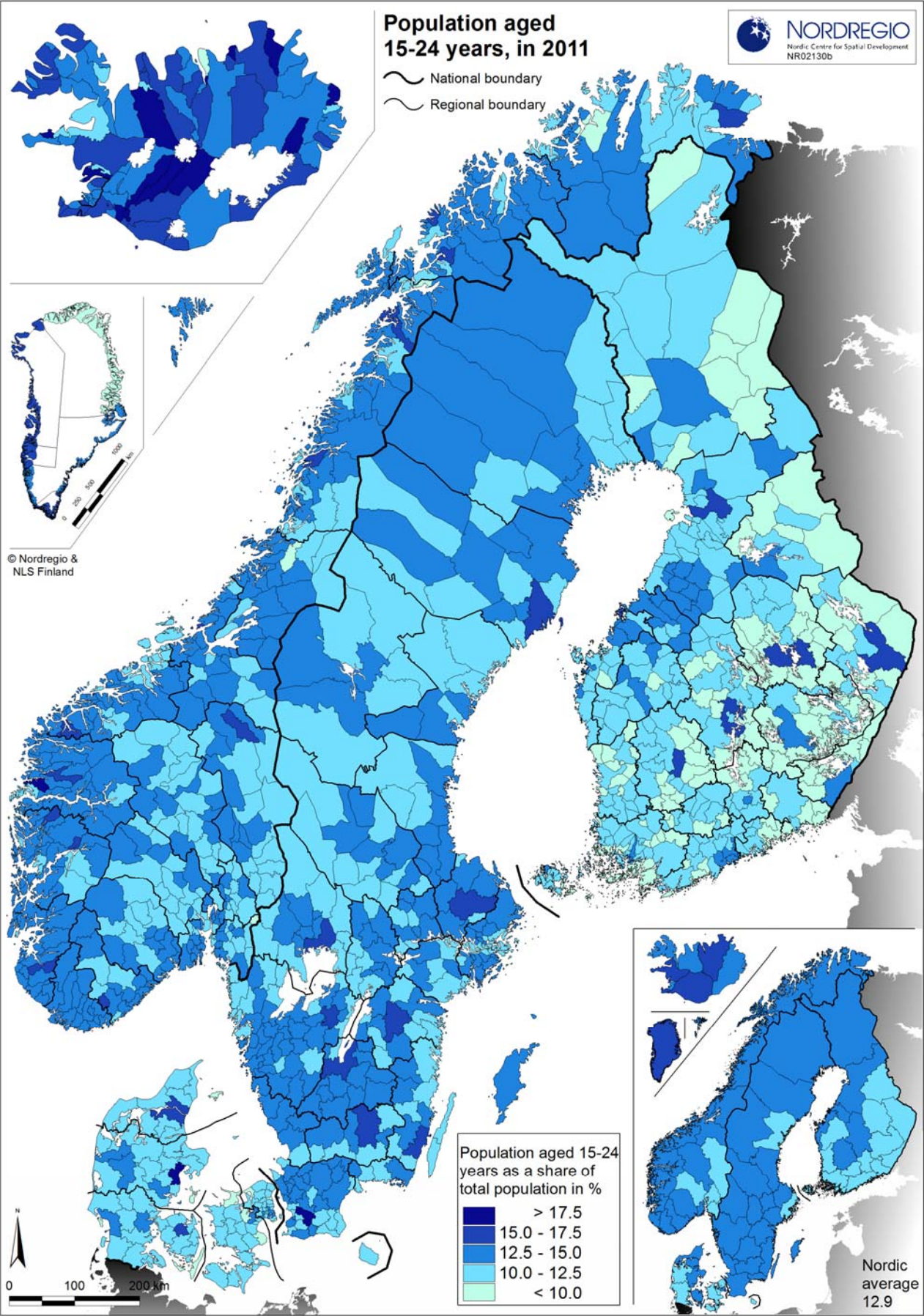


Figure 6: Share of population aged 25-54 years

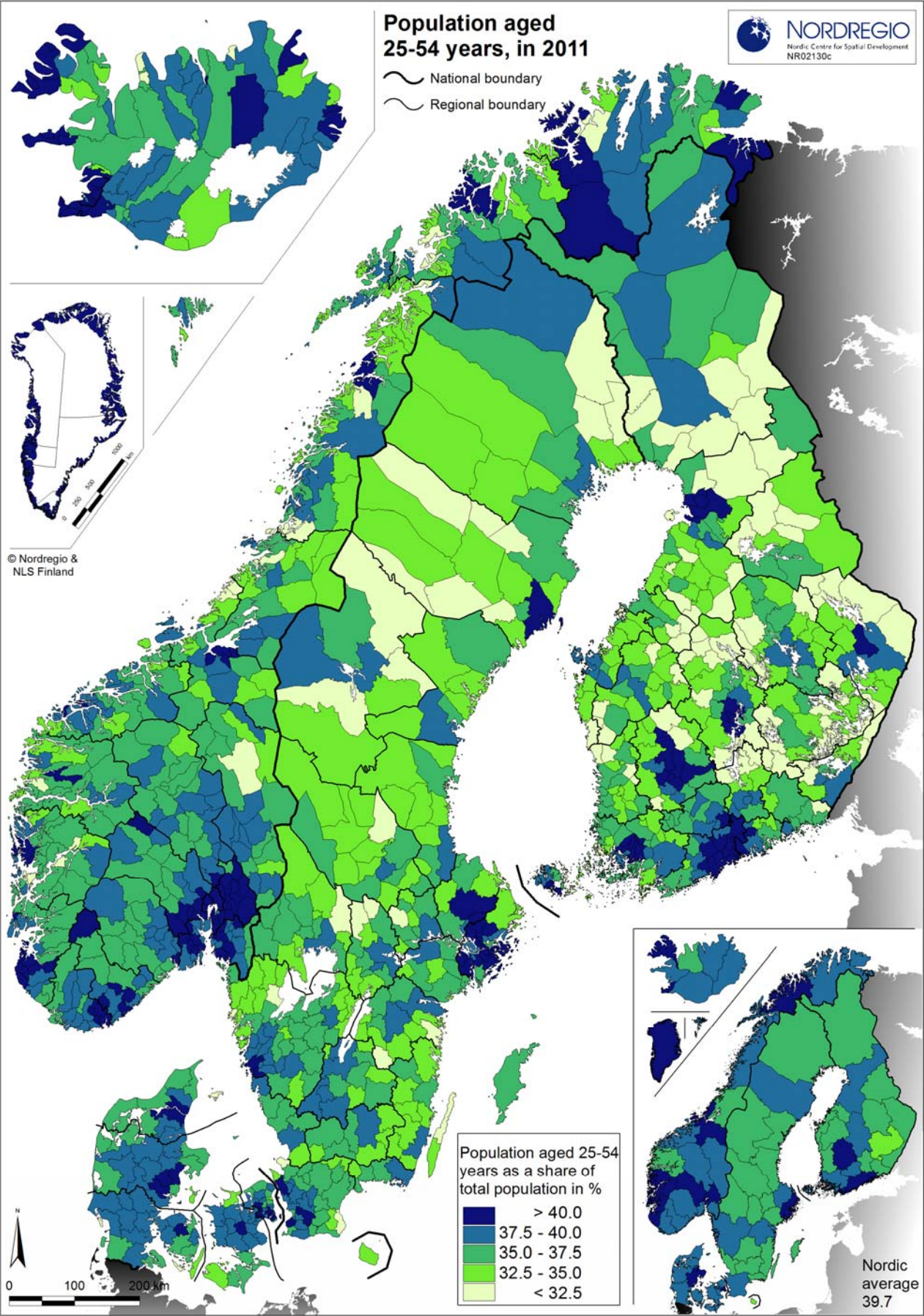


Figure 7: Share of population aged 55-64 years

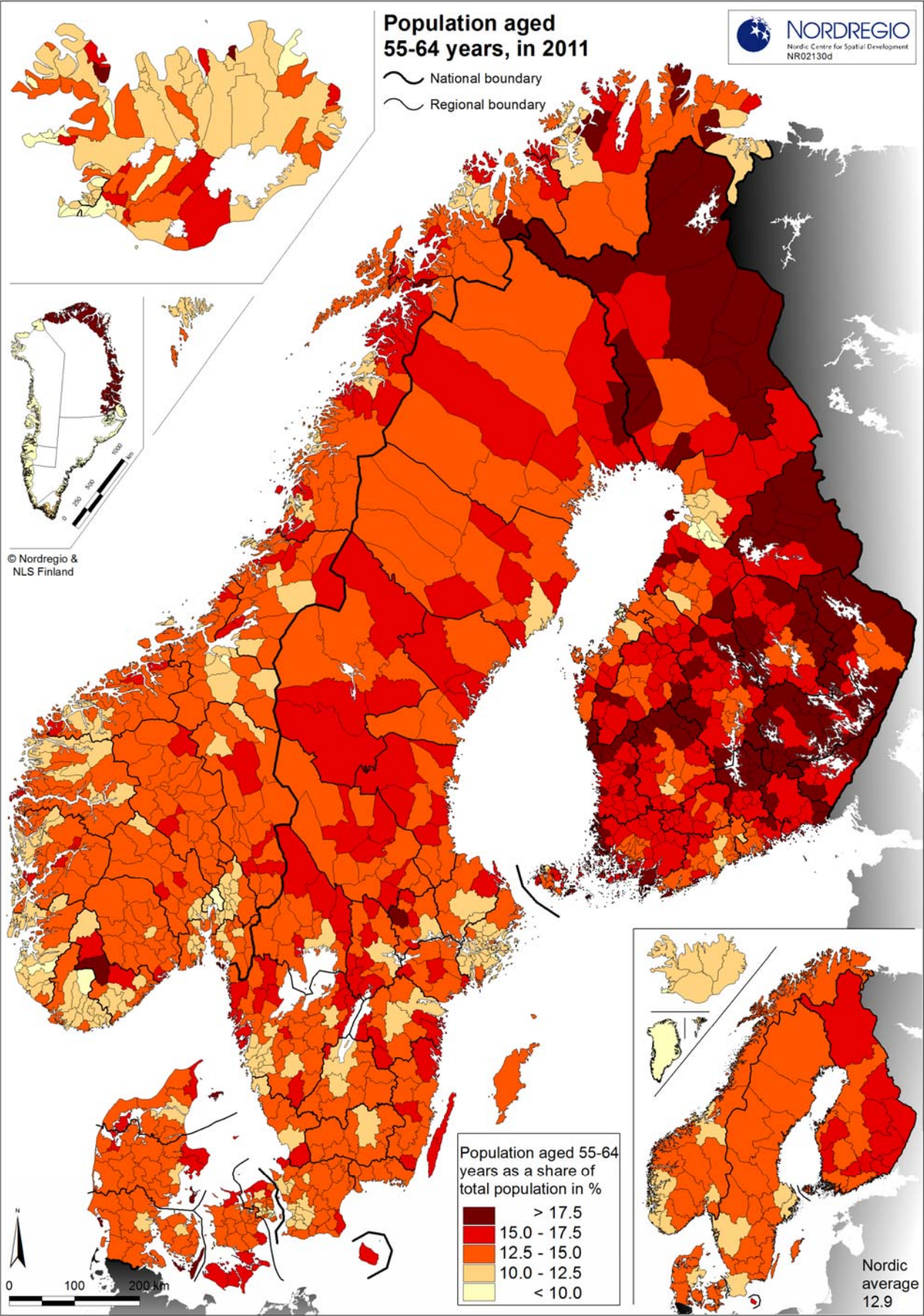


Figure 8: Share of population aged 65-79 years

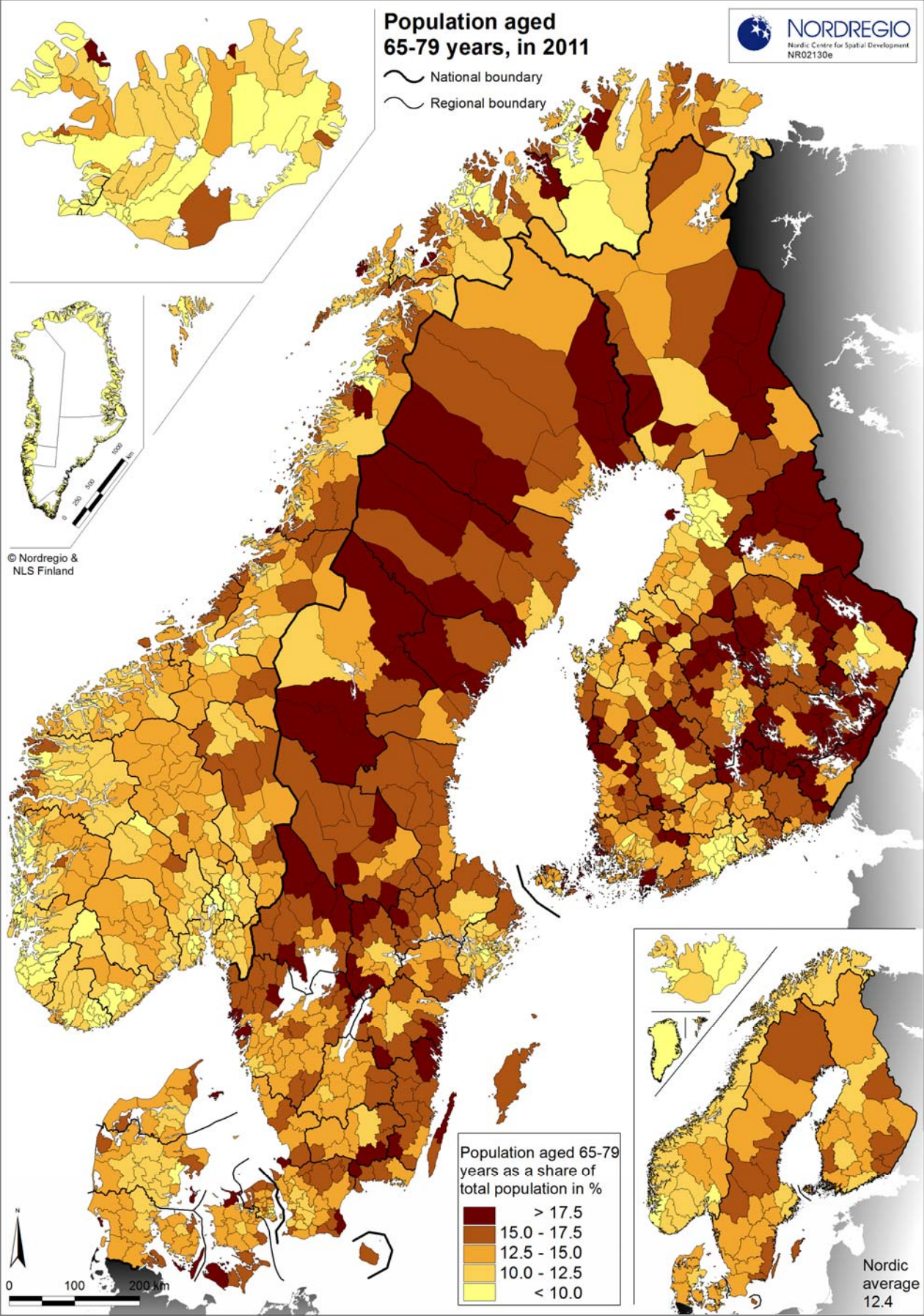
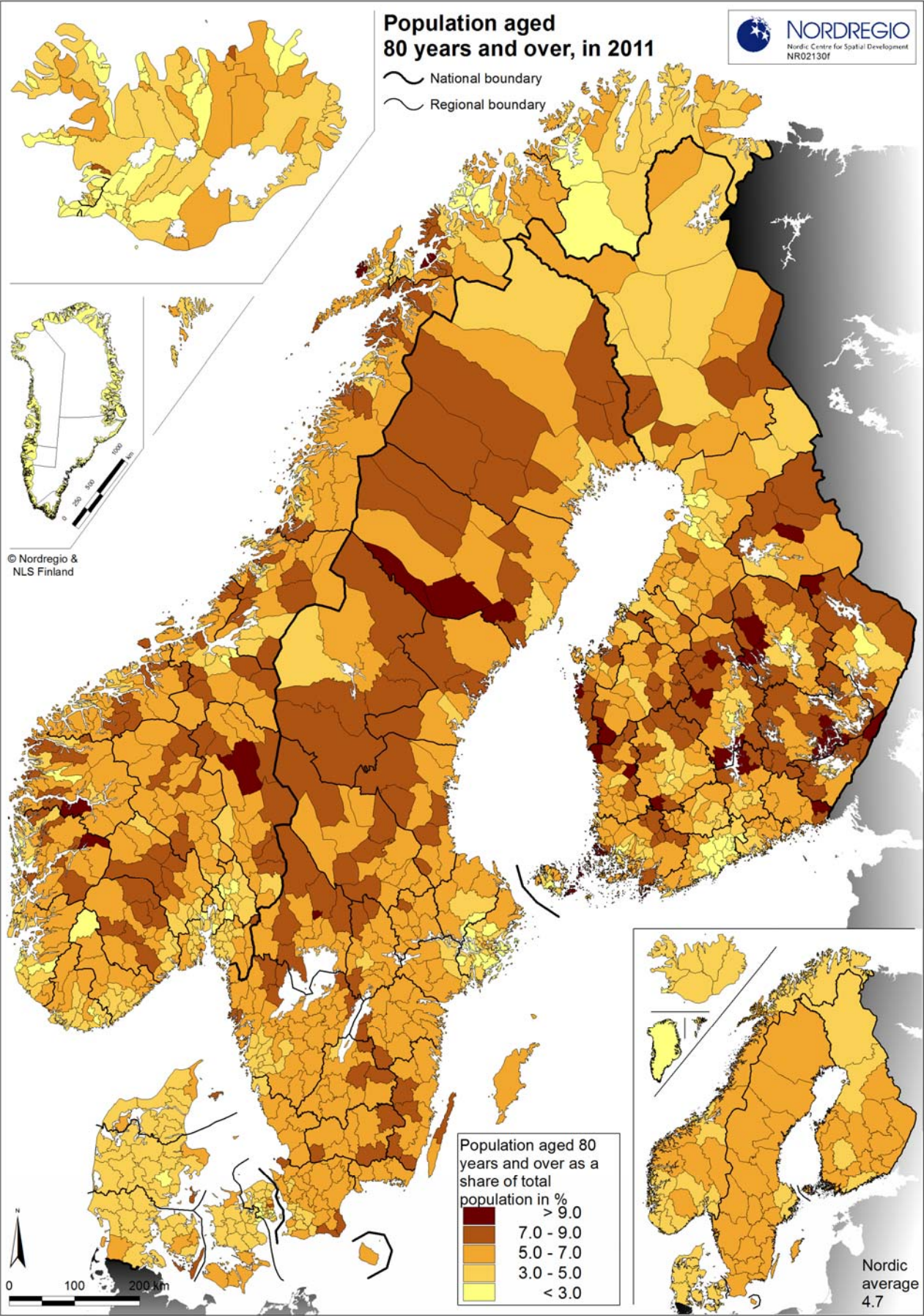


Figure 9: Share of population aged 80 years and over



Dependency ratio

Age-dependency ratios are a measure of the age structure of the population. They relate the number of “dependent” individuals – youths and the elderly – to the number of those individuals who are capable of providing such support. The demographic dependency rate refers generally to persons aged 0-14 and to those 65 years and over, compared to the population aged 15-64. As noted previously, the 15-24 age group is challenging in this context, but because the economic dependency ratio (non-employed population versus employed population) is also included, we will remain with this commonly agreed delineation. Two other dependency indicators are also presented here: the youth-dependency ratio (for individuals aged less than 15) and the old-age-dependency ratio (for persons aged 65 and more), both calculated relative to the number of individuals aged 15 to 64.

The total dependency ratio varied in 2011 between 34 in Copenhagen and 91 in Luhanka (Keski-Suomi), with an average value across the Nordic Countries of 53. In general, the highest dependency rates can be found in some municipalities in Finnish Keski-Suomi and in Swedish Torne Valley and inland municipalities near the Norwegian border. The lowest rates can be found in capital regions, West Norden and South-East Norway.

There is, however, a significant difference if the high or low dependency rate is a result of many children or of a high share of elderly people. A rising dependency ratio is a concern in many Nordic regions facing an ageing population and thus the need to provide services and pension which can, in turn, become a real burden. With respect to the elderly, in 2011 there were, on average, 26 persons aged 65 and over for every 100 persons aged 15 to 64, a level that is two persons higher than ten years ago. Differences between regions are large – between 10 and 15 in Greenland and Suðurnes and over 35 in Kalmar, Bornholm and Etelä-Savo. On the municipal level the span is even larger and in

addition to municipalities in the above-mentioned regions, some municipalities in Pohjois-Pohjanmaa and in the metropolitan regions show very low old-age dependency ratios whereas the highest municipal values can be found in Keski-Suomi region (Luhanka 71).

Conversely, the youth-dependency ratio had reached a level of 26 across the Nordic countries in 2011 – which is a reduction of around 3 from its 2001 level – ranging in regional level between 22 in Etelä-Savo and Etelä-Karjala to 34 in the Faroe Islands and Suðurnes. In general the young age dependency rate is highest in Western part of Norden and Western Norway while the rate is lowest in regions with a high population decrease (Eastern Finland). The lowest municipal ratios can be found in Northern and Eastern Finland (Pelkosenniemi 13) and in the inland municipalities of Norrbotten while the highest can be found in coastal Pohjois-Pohjanmaa (Liminka 61) and across Iceland.

At the Nordic level the young age dependency ratio is 0.3 units higher than the old age ratio, but the differences between countries are, once again, highly significant. In Norway and West Norden the young age dependency rate is higher than the old age dependency rate in all other regions except Hedmark, Oppland and Telemark. In Finland only the capital area, Keski- and Pohjois-Pohjanmaa, and Stockholm and Uppsala regions in Sweden have a higher young age dependency rate. In Denmark both region types exist.

The greatest imbalances between young - and old age dependency rates can be found across West Norden and in Rogaland. Almost all of these regions have a young age dependency rate over 10 units higher than the old age one. In Greenland the difference is particularly striking at 32/10. In contrast, similar differences can also be found at the other end of the scale, Etelä-Savo, Kalmar and Bornholm having the highest difference as regards the old age ratio

Figure 10: Total dependency ratio

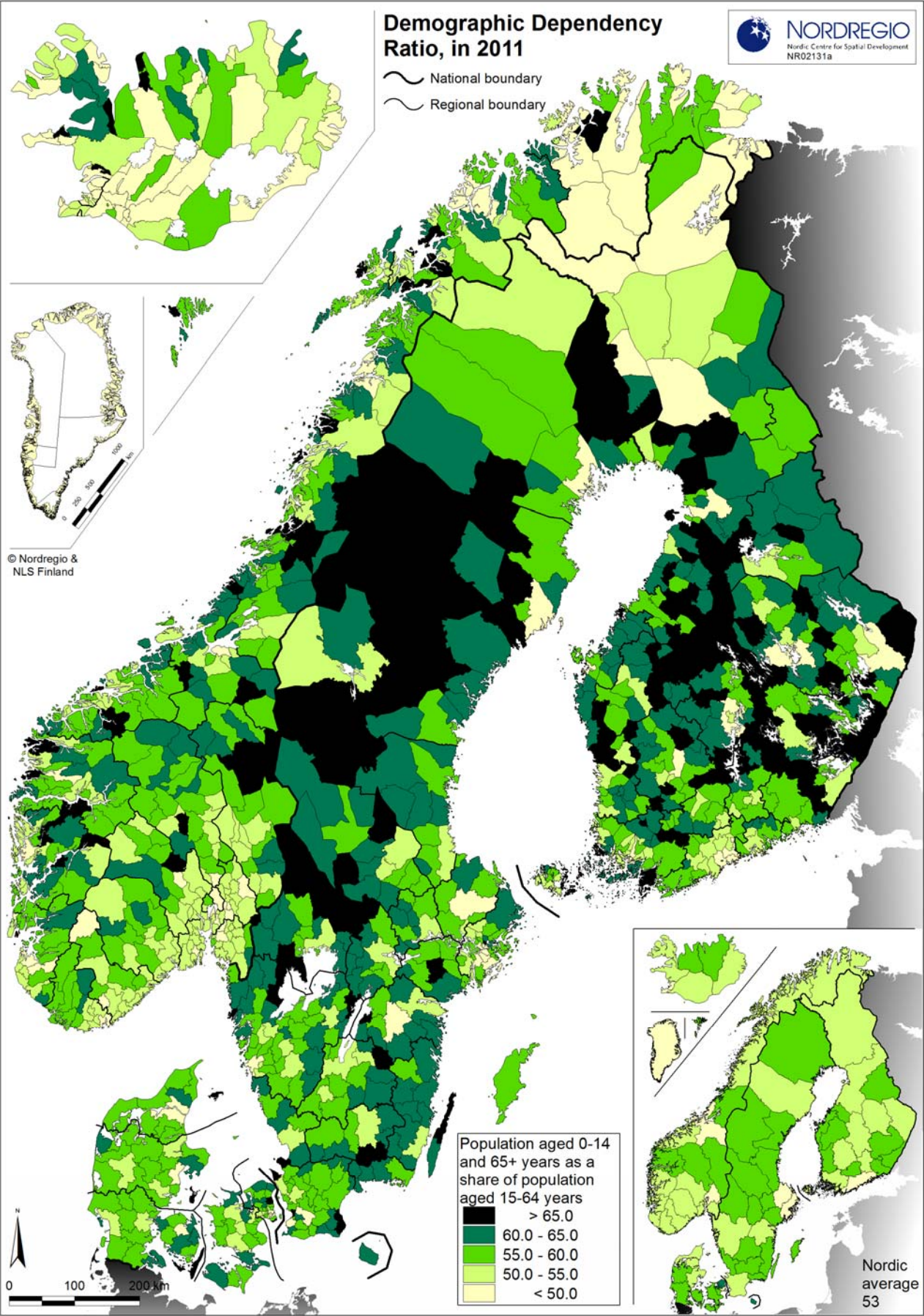


Figure 11: Change in the total dependency ratio

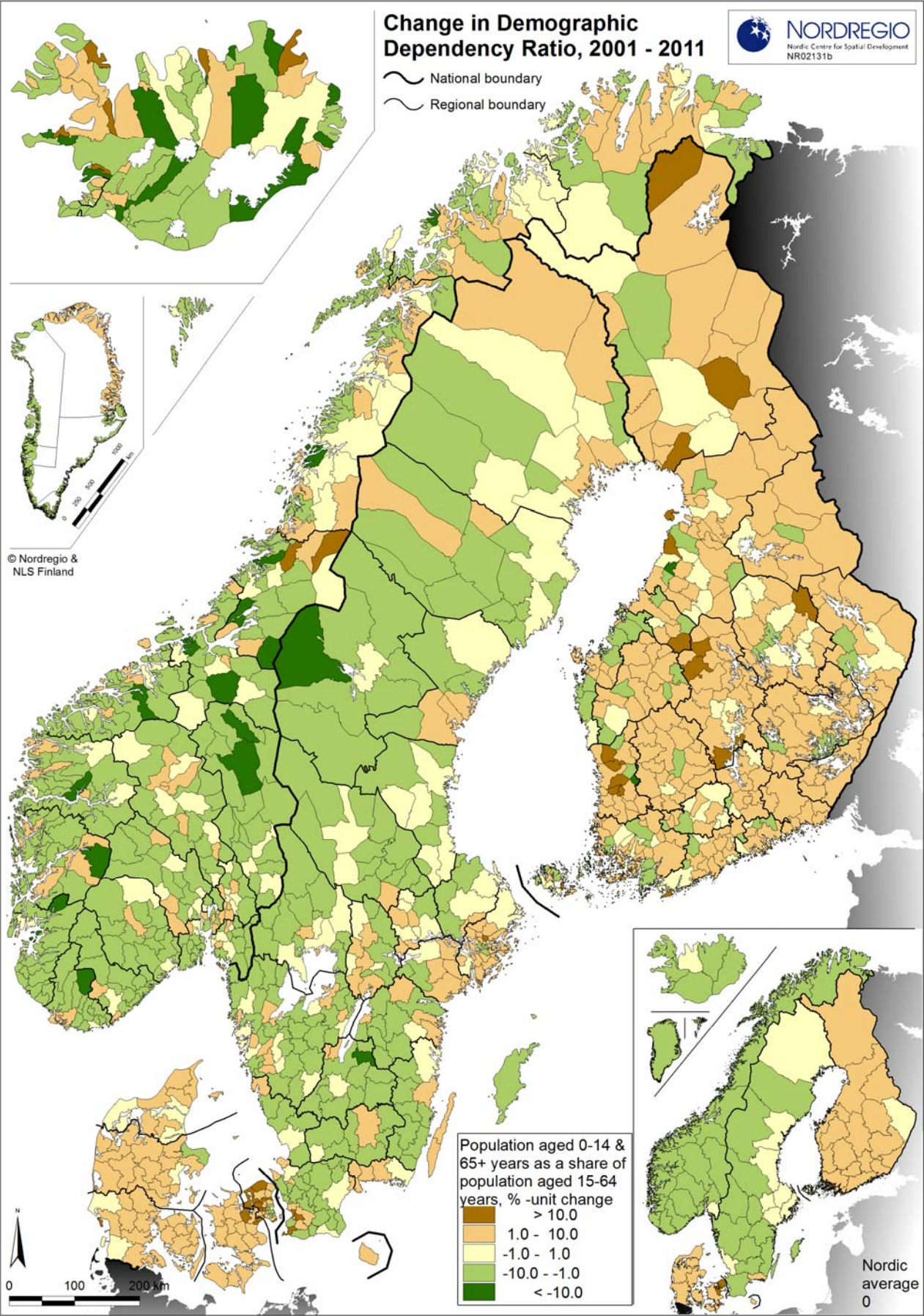


Figure 12: Young age dependency ratio

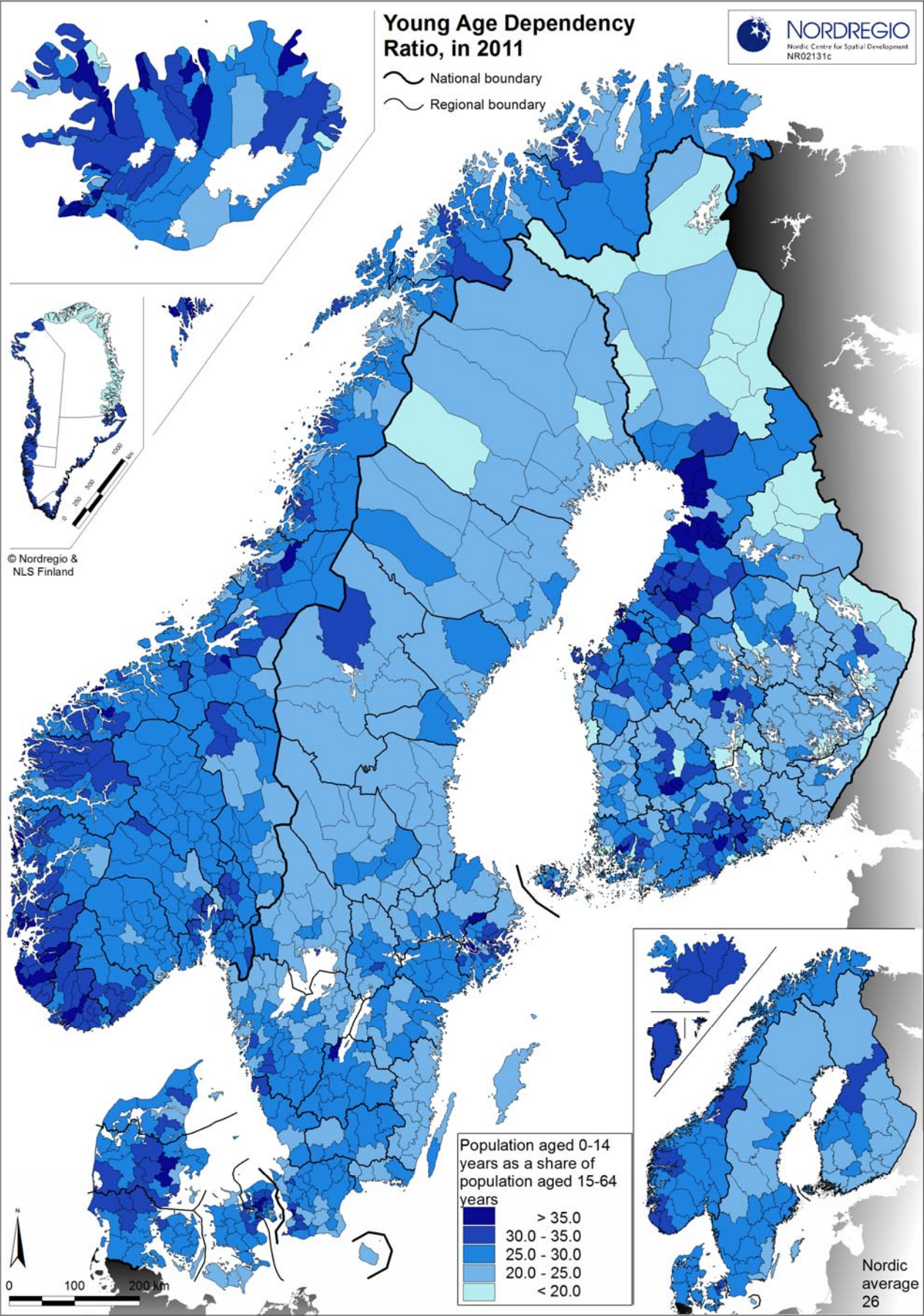
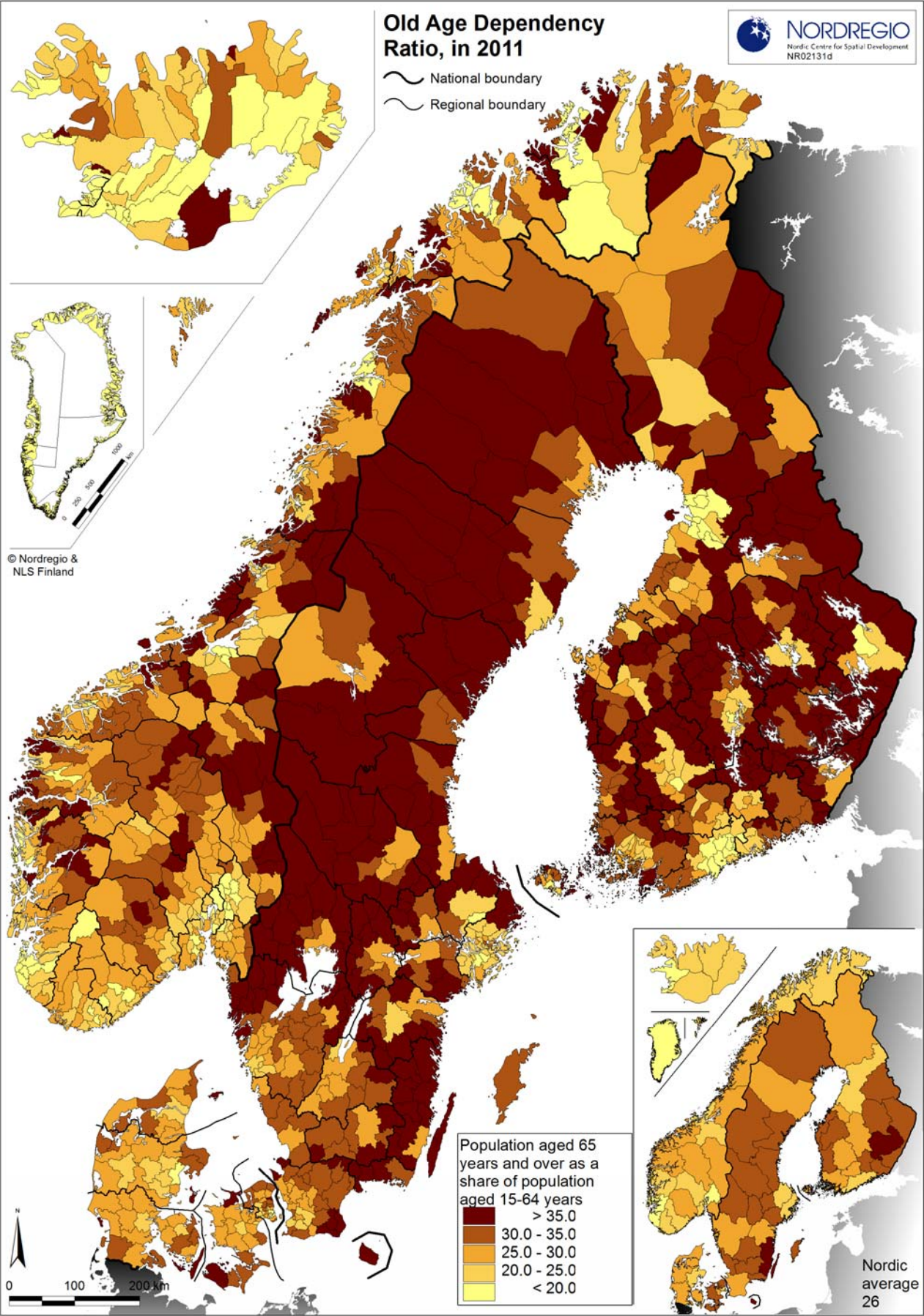


Figure 13: Old age dependency ratio



Gender

The gender balance in the Nordic countries is almost equal with, on average, 101 females per 100 males. Considerable regional variations both between cities and sparsely populated areas and between eastern and western parts of Norden however persist. Generally speaking, the city regions - with the capitals at the apex - have the highest share of female population. The Nordic capital core cities of Helsinki and Copenhagen regions are the most female dense regions. The main reasons for women to move to cities or, in general, to 'the south' relate to the availability of educational opportunities and to the unavailability of advanced jobs in northern and rural regions. The expanded capital regions, together with the Nordic *metropolises* and regional centres, have in general a rather balanced gender distribution. In small and medium-sized towns and some more rural regions, and especially in the West Nordic region, a clear male predominance however is discernable. The most clearly male-dense regions are generally in some Greenlandic and Icelandic municipalities, but striking differences can also be found in some rural municipalities in the North Calotte area and in Kainuu region.

The current 'overrepresentation' of the female population at the Nordic or national level is related to life expectancies. Nordic females on average tend to live between 3 (Iceland) and 6 (Finland) years longer than Nordic males. Therefore, it makes sense to look at gender differences *within* the labour force aged population at times when people decide independently where they want to live and when differences in terms of life expectancy do not yet affect the figures. In

terms of the population aged 15-64 years, the Nordic overrepresentation of males is clearly visible with 97 females per 100 males on average and the imbalance between urban and rural and also between north and south is even more pronounced. The out-migration and lack of working-age women is especially striking in Greenland, Austurland (Iceland) and the Faroe Islands where there are less than 90 females per 100 males, and also in many regions in eastern- and central-Finland where the overall gender balance favours females, but in the working age population the balance is over 8 %-units lower with a clear male predominance.

Nordic development trends thus increasingly portray the 'masculinisation' of the population. On the Nordic level, 95 girls are born per 100 boys; immigration is dominated by males while male life expectancy has also increased in recent years. These three factors in combination with changes in lifestyles with less physically onerous jobs, better health care, a decline in unhealthy behaviours and no major military conflicts have favoured an increase in the male population. These changes in trends have led to a situation where, for the first time in known history, there are more males than females in Norway (since January 1st 2011) and in Sweden it is estimated that a similar change in the gender balance will occur during 2014. In Norway the main reason for this change is international migration. Since 2005 changes in international migration patterns have contributed, together with the other above-mentioned facts, to the male surplus by about 20 000 persons in 2011.

Figure 14: Total number of females per 100 males

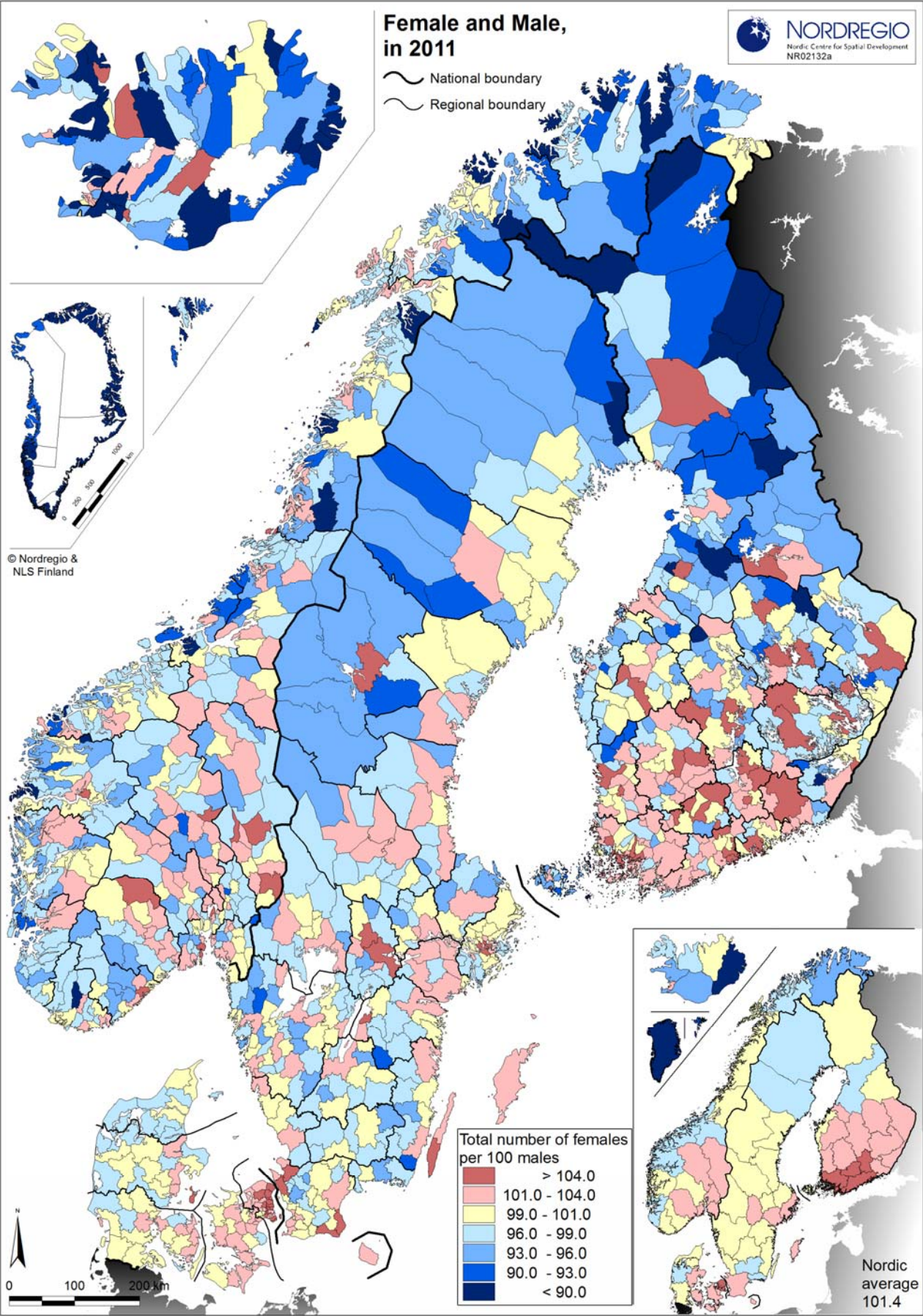
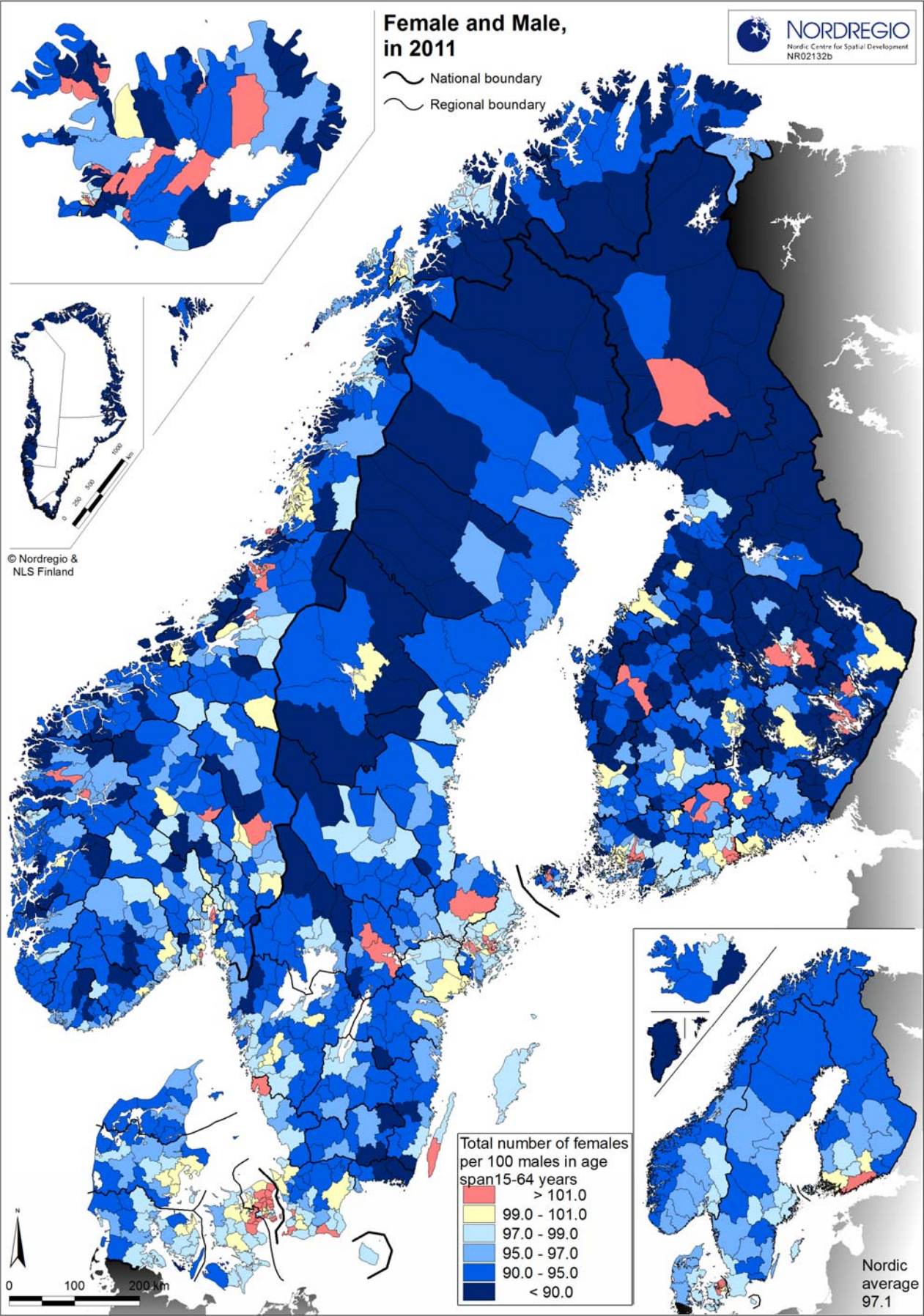


Figure 15: Total number of females per 100 males in age group 15-64



Demographic development for 1990-2011

Total population change

The total population change is a combination of births, deaths and migration to and from the region. During the last twenty years the Nordic population has increased by almost 2.6 million inhabitants or by 10 %. Annually this growth means approximately 0.48 % *per annum*. This was more than the average in the European Union, which saw 0.32 % annual growth. At the national level, Denmark, Finland and Sweden had a total population increased around the EU average, the latter in spite of an increasing growth rate in recent years. Norway had a higher annual population increase, more than twice the EU average. From a wider European perspective, Iceland had the most spectacular development with a modest population increase in the 1990s, over two percent *per annum* in 2005-2008 and finally a population decrease in 2009 as a result of the economic crisis. After the population decrease in response to the economic crises of the mid-1990s the population change in the Faroe Islands has been modest, showing at best a very slight increase. In Greenland the population has been relatively stable for the last 20 years.

At the regional and sub-regional levels the Nordic population is quite heavily polarised in spatial terms, both from north to south and especially towards larger urban settlements and regional centres. In all of the Nordic countries the capital regions and the second tier city regions were the best performers in relation to population increase, while the small regions without any large cities experienced the largest population decrease. At the Nordic regional level, the Reykjavik (IS; +41 %) and Oslo (NO; +31 %) regions increased most, while the regions of Vestfirðir (IS; -27 %) and Kainuu (FI; -15 %) decreased most. At the municipal level almost all university cities and their labour markets are among the fastest growing Nordic municipalities, whereas the most sparsely populated areas are losing their population. Some extremes can also be found – the Icelandic municipalities of Álftanes and Mosfellsbær, both located in the capital region, increased their population by over 100 % whereas the

municipalities of Mänttä-Vilppula (FI) and Árneshreppur (IS) both had a population decrease of over 50 %.

During the period 2006-2011, four out of five Nordic regions saw a faster population increase than in the period 1990-2005. This is particularly the case in Oslo, Stavanger and Stockholm regions and in other big city regions as well as those regions (partly) located in capital labour markets, such as Suðurnes, Buskerud and Malmö (in relation to Copenhagen). At the same time, the most peripheral regions in Eastern and Northern Finland and Bornholm are performing even worse. In both time periods it is notable that regions experiencing a population increase outside the capital and metropolitan regions are growing primarily 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 i.e. in Oulu and Pohjois-Pohjanmaa, Umeå and Västerbotten, and in Tromsø and Troms. At the municipal level approximately half of all Nordic municipalities experienced a decline in population both during the last twenty years and during the last five years. The main shift during these periods is in the size of the commuting catchment areas around the larger cities which have generally become significantly larger over time.

In the wake of the current economic crises, the latest population change figures for the Nordic countries show some change in these trends. On the Nordic level, total population increased by 0.74 % or by almost 200 000 inhabitants, in 2010. However, the effects in respect of the different Nordic countries were rather diverse.

In Denmark the population has become increasingly concentrated to city regions and to larger labour markets with the option of commuting. During the last ten years the whole of Zealand has become part of Copenhagen's labour market, though the Copenhagen city area itself has seen stable or even negative population growth up

to 2008. Since 2008 however the Copenhagen city region has been the fastest growing region in Denmark. Otherwise the highest growth has been in Vejle-Århus-Grenå region in Eastern Jutland. Previously, all Danish regions – excluding Bornholm – had a positive population development trend. However, in 2009 significant changes in this pattern occurred when both western part of Jutland and Vest- og Sydsjælland region saw population decreases rather than increases.

In Finland, the polarisation between *metropolises* and regional centres with a university on the one hand, and other labour markets and municipalities on the other, is more striking than in other Nordic Countries. Outside the main *metropolises* and regional centres, only a few municipalities have seen a positive population development, those mostly located along the main transport corridors in Southern Finland and some tourism-oriented municipalities in other regions.

Over the last 20 years the total population increase in Iceland was supported by both high birth rates and in-migration. Since all regions and 90 % of Icelandic municipalities saw a natural population increase, migration was an even more important component for regional change here than in the other Nordic countries. The main population increase –and concentration – occurred mostly around the expanded capital region. However, the financial crisis – beginning in the middle of 2008 - resulted in major changes in population development, as Iceland for the first time since 1889 experienced a decrease in population. Even if the natural population change remained positive at a level of approximately 1 %, a negative net migration of as much as 5 000 people in 2009 resulted in an overall population decrease in all the regions. In 2010 the total population was however already again on the rise, the main growth occurring in the capital region, Akureyri and in few rural municipalities.

Since 2000 the Norwegian population has continued to concentrate to major coastal cities, particularly to the greater Oslo and Stavanger

regions, while large land areas in Northern Norway and the inland areas of Oppland, Buskerud and Telemark have lost population. Nevertheless, compared to other countries, the Norwegian population change is more balanced with some small coastal municipalities outside the regional centres having managed not only to maintain but to increase their populations. From 2009 the Norwegian population change on the NUTS3 level was, for the first time in over 20 years, positive in all regions.

In Sweden the population continues its concentration to regional centres and especially to the Stockholm and Malmö-Lund regions. Some minor labour markets on the traffic corridors between Gothenburg – Malmö and Gothenburg-Stockholm are also increasing. On the other hand, small labour markets, particularly in Northern Sweden, are losing population. The role of tourism in some municipalities in Northern Sweden and in Dalarna is however becoming more and more visible, resulting in positive immigration. Overall, only three Swedish regions had a negative population development in 2010.

When looking at the Nordic regions in a broader European context, a wide spectrum of development trends can be found. Almost all the Nordic capital regions were among the fastest growing European regions. The population increase between 2000 and 2010 was higher than 1 % *per annum* in 130 European regions – including the capital regions of Helsinki, Oslo, Reykjavík and Stockholm. In addition, Rogaland (Stavanger) also belongs to this group of the top 12 % of European regions. At the same time the Finnish region of Kainuu is currently undergoing a significant population decrease in a European perspective equalled only by some Bulgarian and Eastern German regions which have an annual population change less than -1 % over the last ten years.

Figure 16: Total population change, 1990-2011

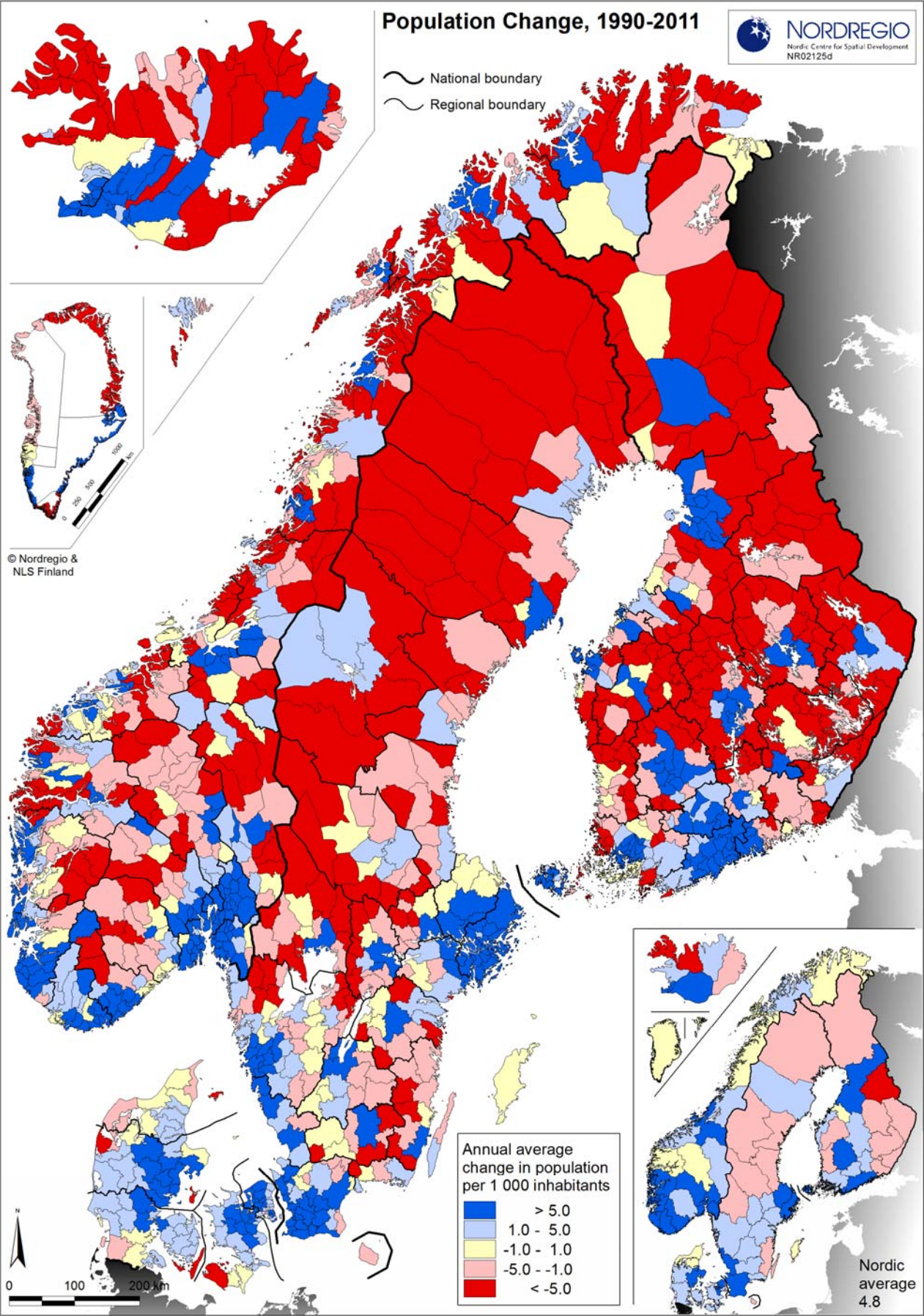


Figure 17: Total population change, 2006-2011

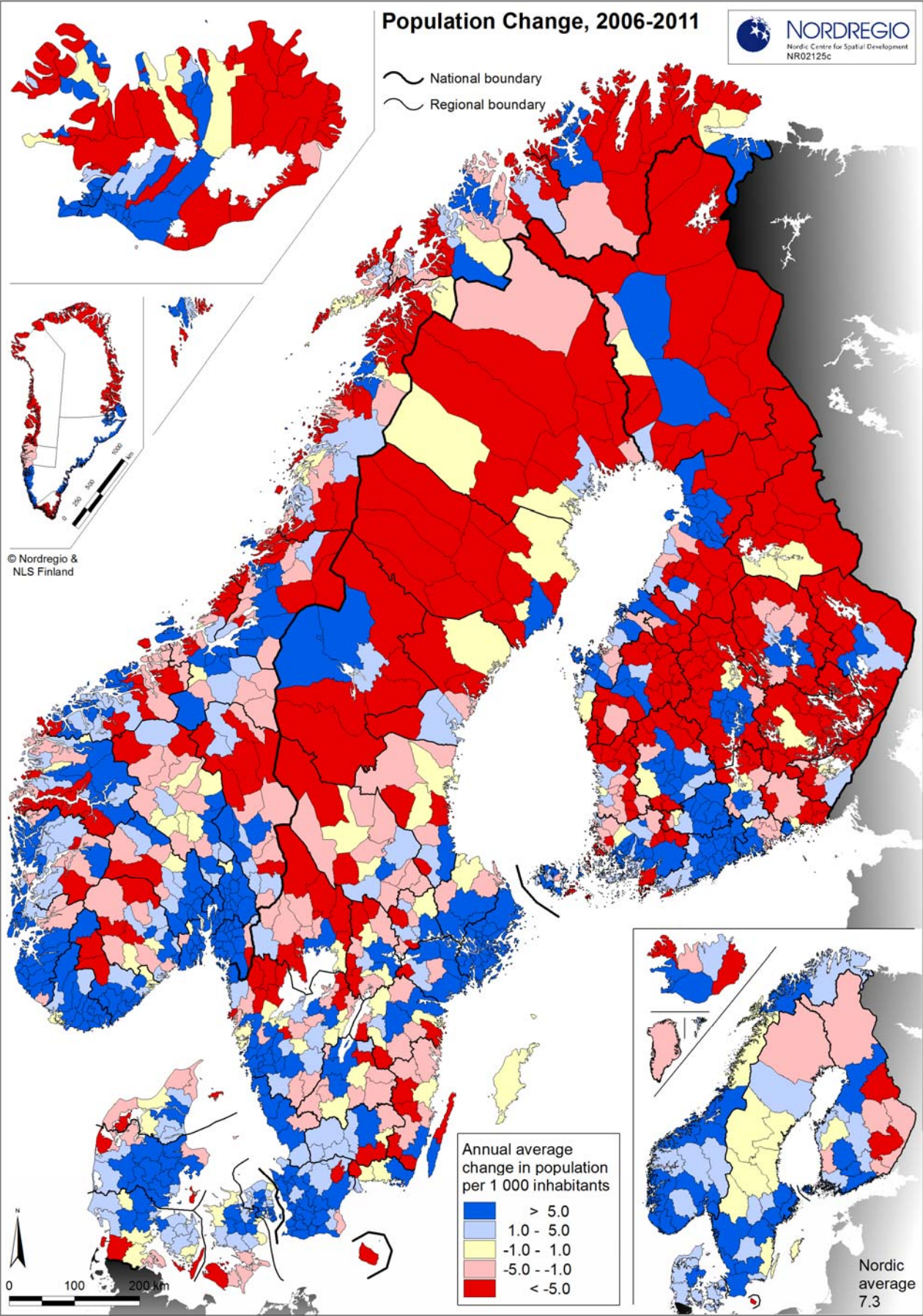


Figure 18: Total population change, 2010-2011

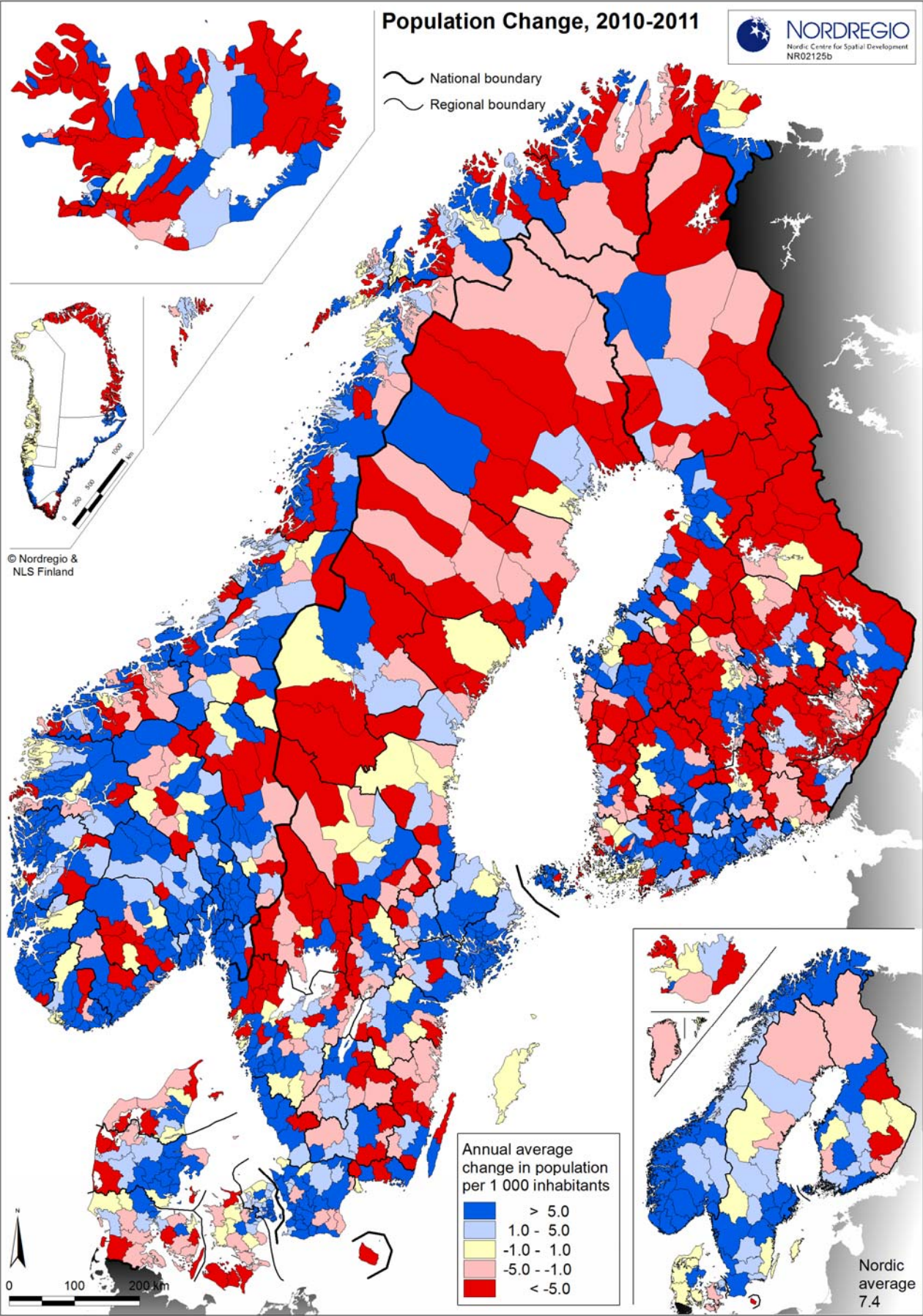
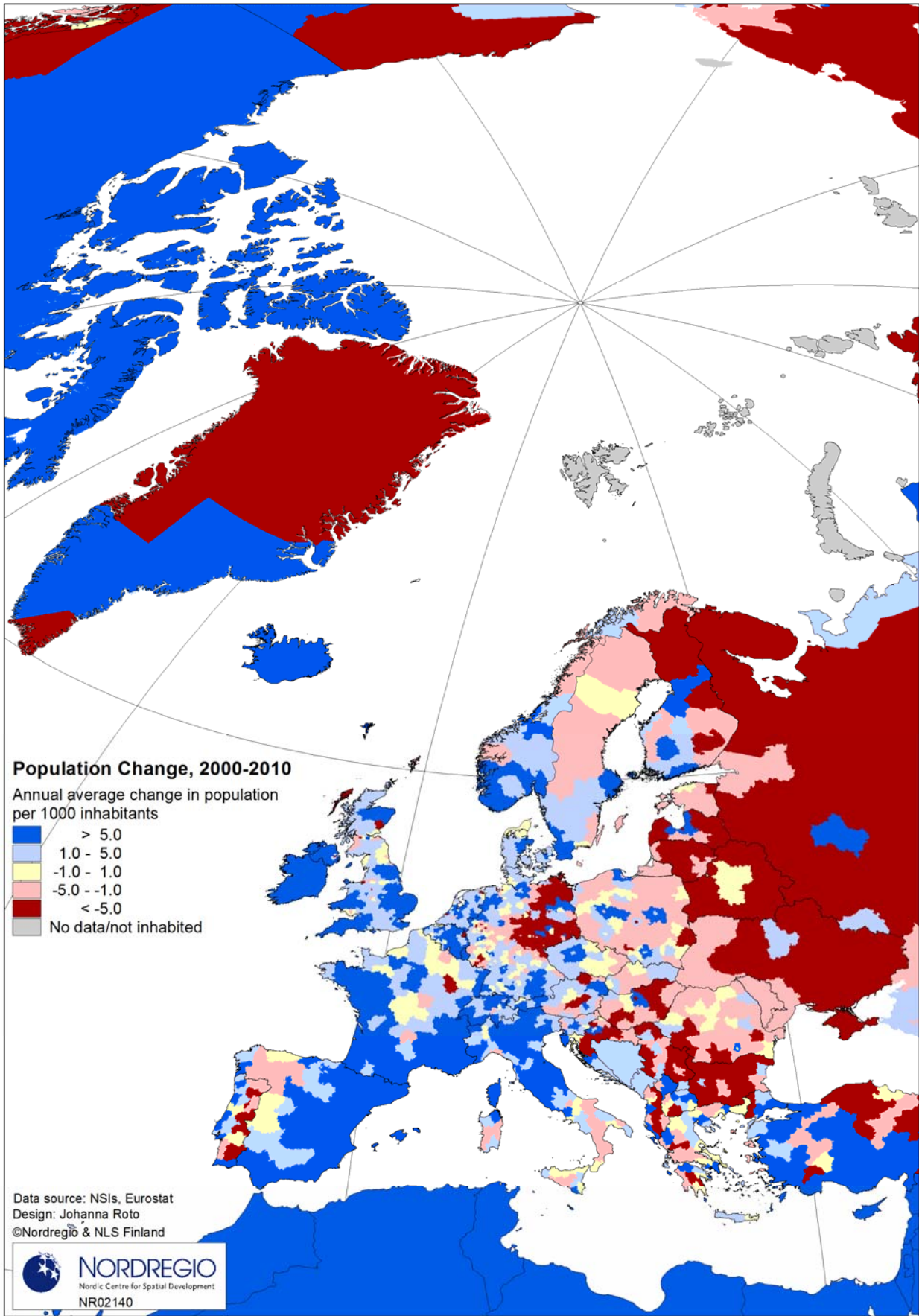


Figure 19: Total population change in the European and Arctic regions, 2000-2010



Natural population change

The natural population change is a combination of births and deaths. Up to the end of the 1980s, natural population increase was by far the major component of population increase in Europe in general. Since then, decreasing fertility rates, increasing life expectancy and the increasing importance of international migration have changed this picture quite radically. Over the last 20 years migration has become the major component of population growth.

In a European context, the Nordic countries in general have high natural increase rates, becoming very high in the West-Nordic region (Western Norway, Iceland, Faroe Islands and Greenland). The only countries with at least as high change rates are France, Ireland and the United Kingdom. Otherwise all of the Nordic capital regions, especially Stockholm, experience high natural population increase, at least in a national context. Excluding Sweden, there is a clear Nordic trend where high natural increase compensates, in some regions, for negative net migration, keeping the total population increasing, as in, for example, many regions in the northernmost parts of the Nordic countries and in Western Jutland. The highest natural increase rates between 2006 and 2010 were found around the municipality of Oulu in Finland and in South-West Iceland while the highest natural decrease was found in some small municipalities outside larger labour markets, especially in Eastern Finland.

The natural population change shows the balance between births and the deaths in a region. In general, a high birth rate basically indicates that a relatively high proportion of the population is in the most fertile age groups. This can be the result of the general age structure in a region, which is generally the case in several small municipalities in the rural areas and periphery. Another important factor here is a population increase in the fertile age groups. This is characteristic of several growth centres in the Nordic countries, such as the Capital regions and larger cities, but also university cities and other cities with good educational opportunities, for instance the Tromsø or Umeå regions. In addition, some areas have high birth rates for cultural or religious traditions, while in other places such rates are simply due to other types of traditions. In some areas high birth rates are a combination of all of these factors, as in Finnish Ostrobothnia and in South-Western Norway.

High death rates are primarily connected to the general ageing of the population and are therefore closely connected to stagnating municipalities with old age structures and high out-migration. The highest level of mortality rates are to be found in small municipalities in central areas of Norway and Sweden and in Finland especially in the border regions with Russia. In Denmark the highest rates can be found in small island municipalities.

Figure 20: Natural population change, 2006-2010

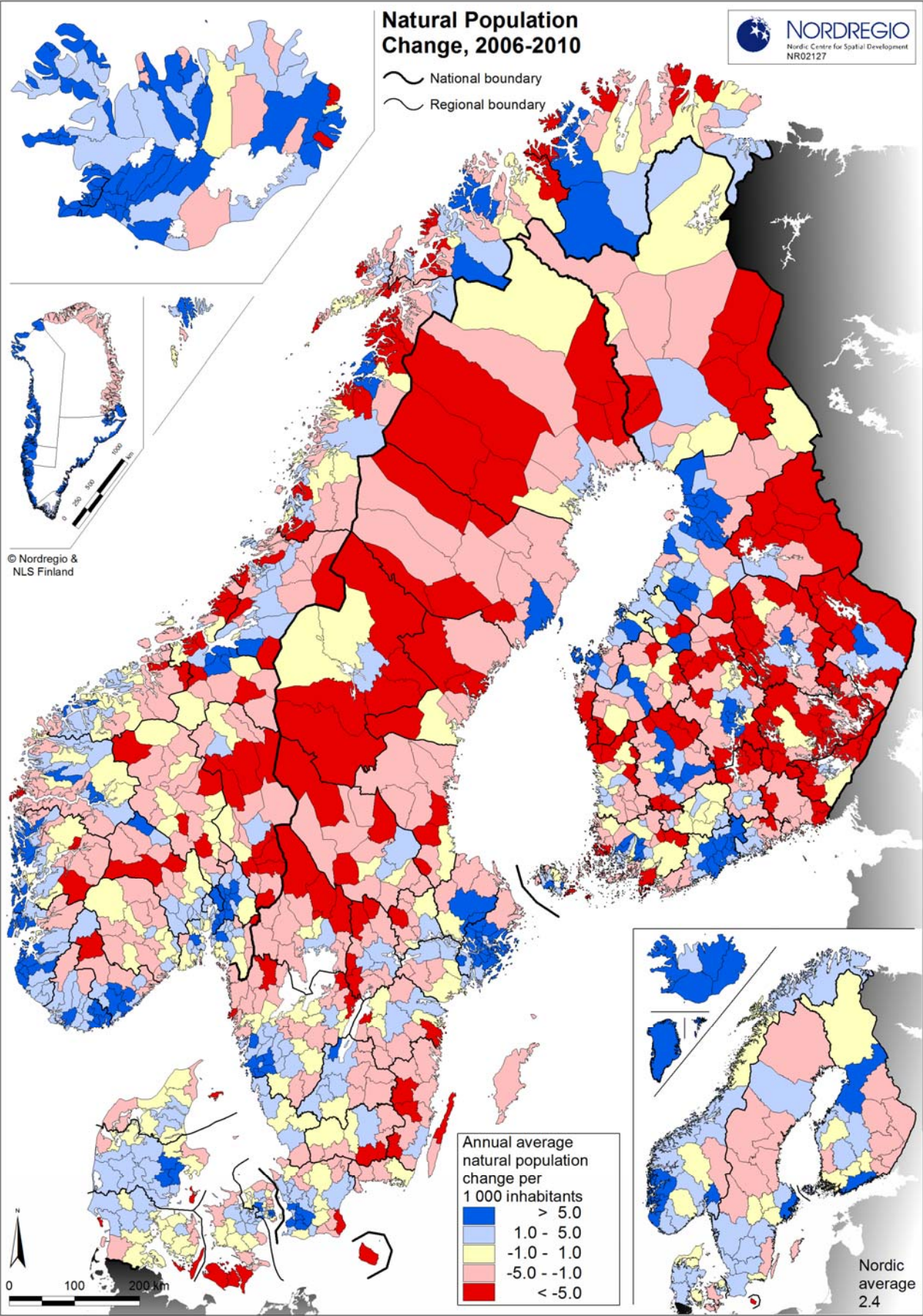


Figure 21: Crude birth rate, 2009-2010 average

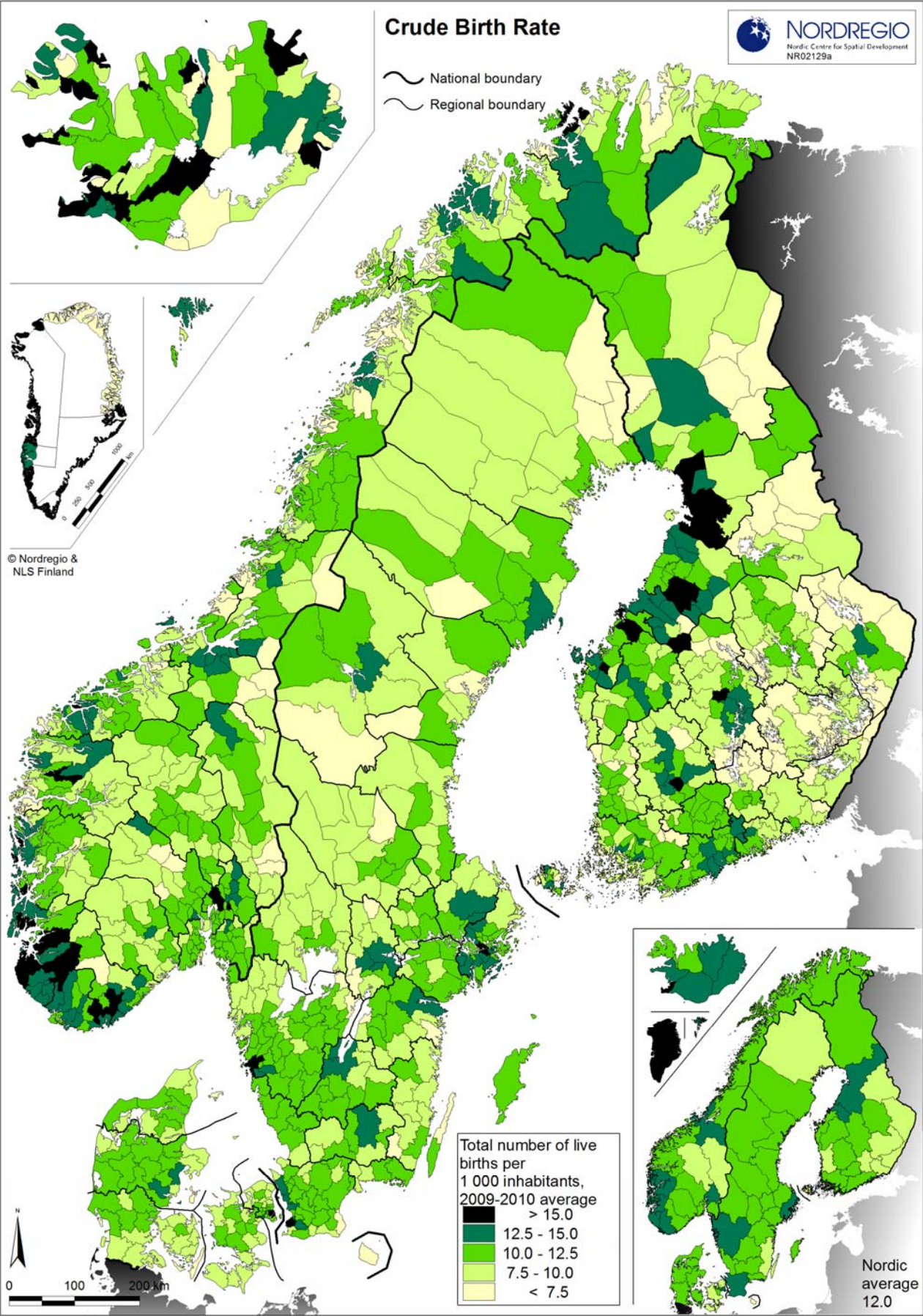
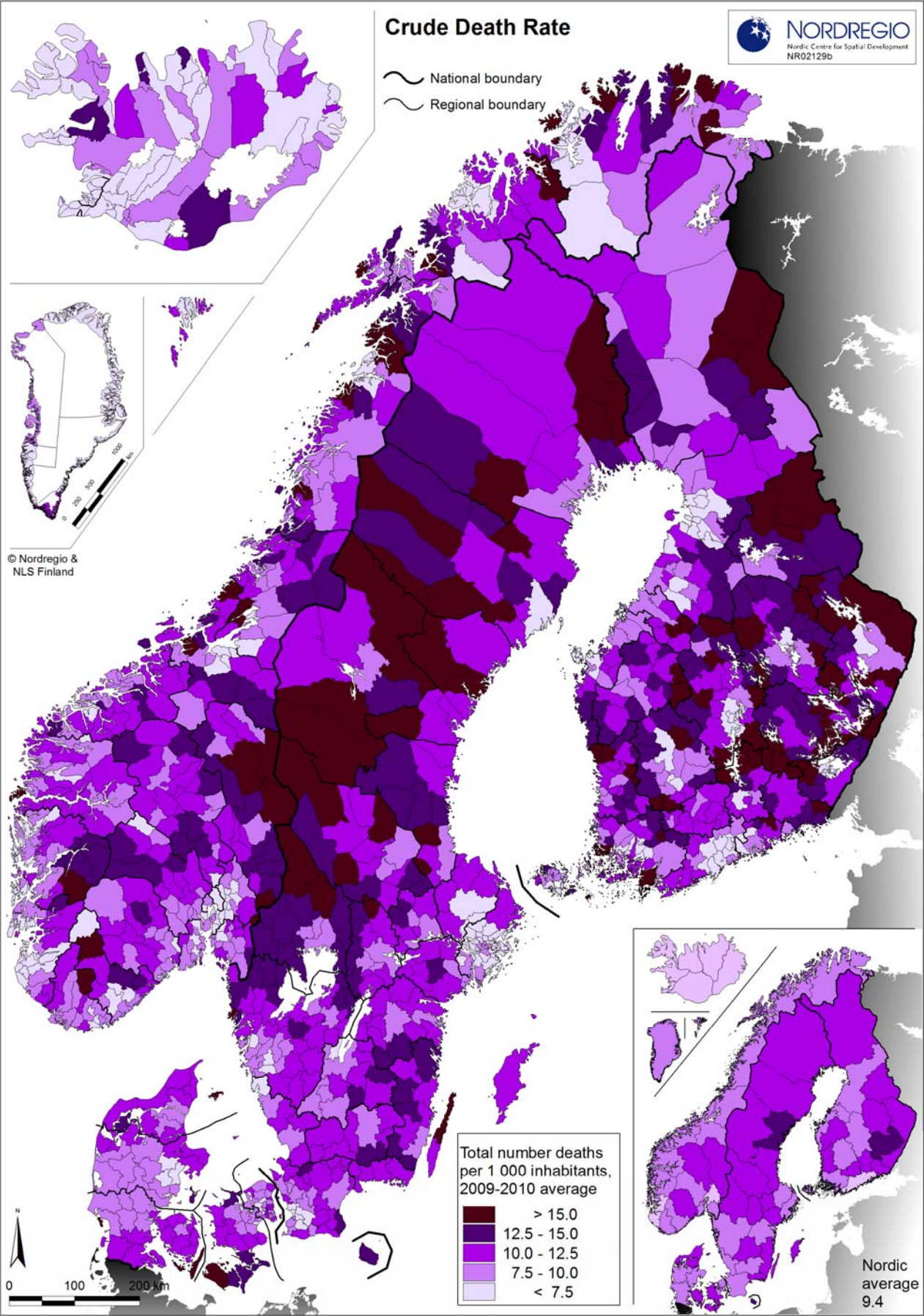


Figure 22: Crude death rate, 2009-2010 average



Migration

The third component of total population change, net migration, is the difference between in- and out-migration. It is the component that shows the clearest picture of population concentration to larger city regions, regional centres and their commuter catchment areas in the period 2006-2010. Although 59 % of Nordic municipalities experienced a net migration surplus, the different characteristics of the migration pattern between the countries should be stressed. On the one hand the marked differences between urban and rural areas is the key driver across all countries, but due to differences in the size of the municipalities concerned and the more diverse structure of differences between urbanised and rural municipalities in Norway and Finland – compared to Denmark and Sweden – the comparison between the countries is often rather problematic. Besides the obvious development of urban centres, a north-south divide seems to characterise both Sweden and Finland while there is a clear east-west divide in the case of Denmark. In Norway the growth regions are geographically more scattered to urban centres and coastal communities. Outside these main trends, some smaller communities with either a significant tourism industry or various fishing and aquaculture activities have also managed to keep the net migration positive.

In the period 2006-2010 the Nordic regions of Suðurnes, Oslo, Akershus, Rogaland, Stockholm and Buskerud had a net migration rate over 1.0 % annually. At the municipal level there were 20 municipalities with net migration rates over 2.0 %, mostly located in the local labour market areas of the major city regions. The population decreased mostly due to out-migration in Austurland region (-2.8 %) where the building activities of an aluminium smelter were finalised during this time period as well as in some municipalities in Vestfirðir region.

When looking at migration in terms of its main components, domestic and international migration, two different maps of the Nordic Countries can be drawn. A little over one third of Nordic municipalities saw a positive domestic net migration whereas most municipalities had a positive international net migration balance. A little under one third of Nordic municipalities, moreover, saw positive net migration in terms of both components.

Domestic net migration highlights the positive development in the Nordic capitals and larger city regions, although the role of secondary *metropoles* and expanded capital labour markets becomes even more visible when looking at those Nordic commuter catchment areas gaining most from domestic migration. The expanded Reykjavik area, Tampere and the expanded Oslo regions, as well as some municipalities in Öresund region, were the regions with the highest domestic in-migration rates. Some small and rather isolated municipalities in the northernmost parts of Finland, Norway and Sweden, as well as those in the Icelandic countryside, experienced significant out-migration to other municipalities within the same country.

Over 96% of Nordic municipalities gained from international migration in the period 2006-2010, with the main exceptions being the Faroe Islands, Greenland and some of the smaller Icelandic municipalities. Major differences in intensity nevertheless remain evident. In Norway and Sweden both the overall level and share of international migration were higher than in Denmark and considerably higher than in Finland. In many municipalities and regions the negative domestic migration is compensated by extensive international migration.

Net migratory trends give a picture of regions that are either gaining or losing population. This picture however needs to be nuanced with actual flows as 11.3 % of the Nordic population changed their place of residence moving across a municipal boundary in 2010 whereas the average rate for net migration was 0.5 %. As persons of the same age group are not moving in and out of each municipality and region, the policies impacting the migratory trends do not need so much to focus on the absolute change but rather on how to influence the constant flows in and out.

Total mobility was highest on the one hand in the capital and larger university city regions and on the other hand in small rural municipalities with relatively high seasonal differences in relation to economic activities like tourism and various forms of primary production. On the regional level compared to total population the people in West Norden, the Nordic capitals and in Åland were most mobile while the small island regions of Bornholm and Gotland were the most stable in population terms.

Figure 23: Migration rate, 2006-2010

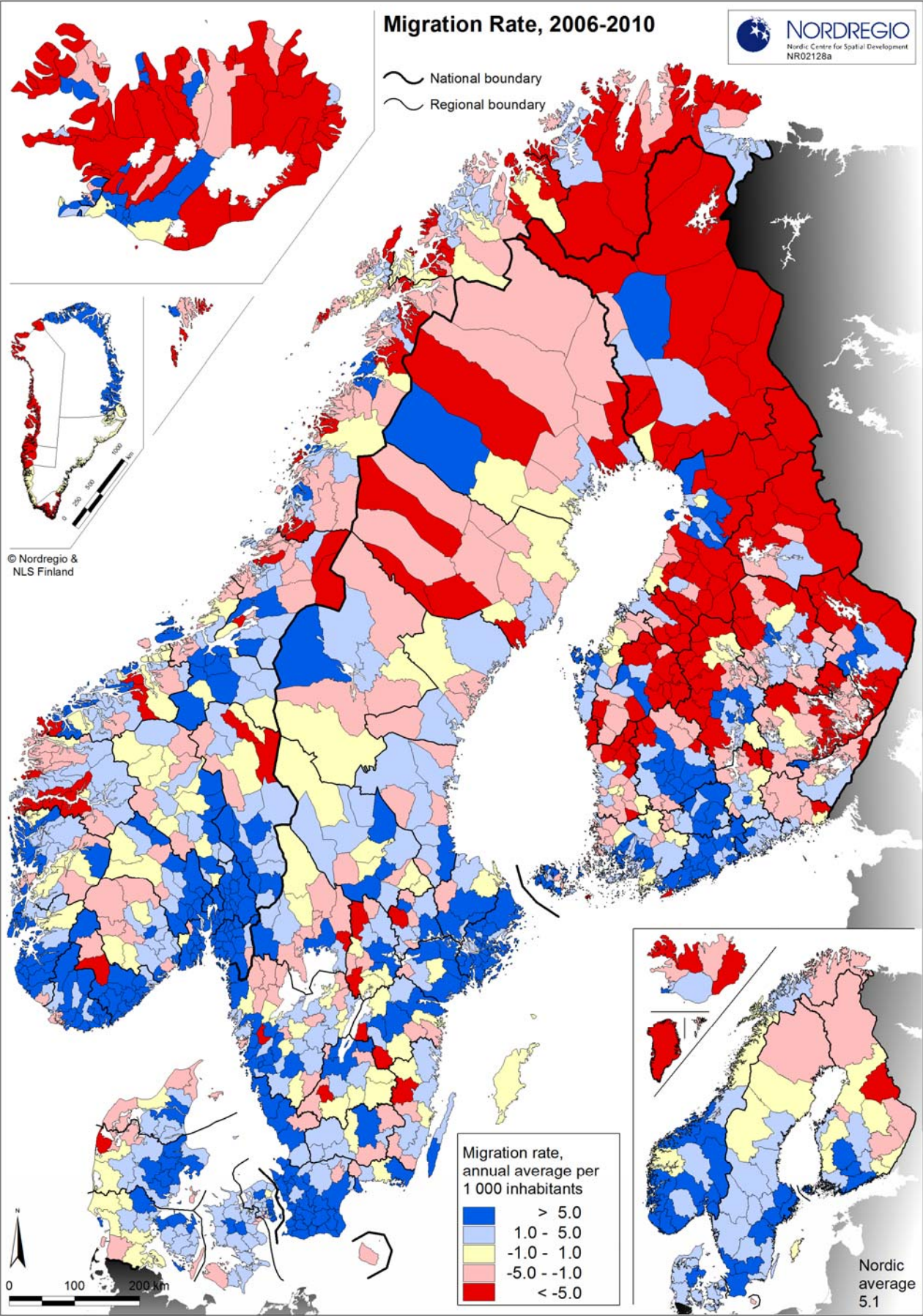


Figure 24: Domestic migration rate, 2006-2010

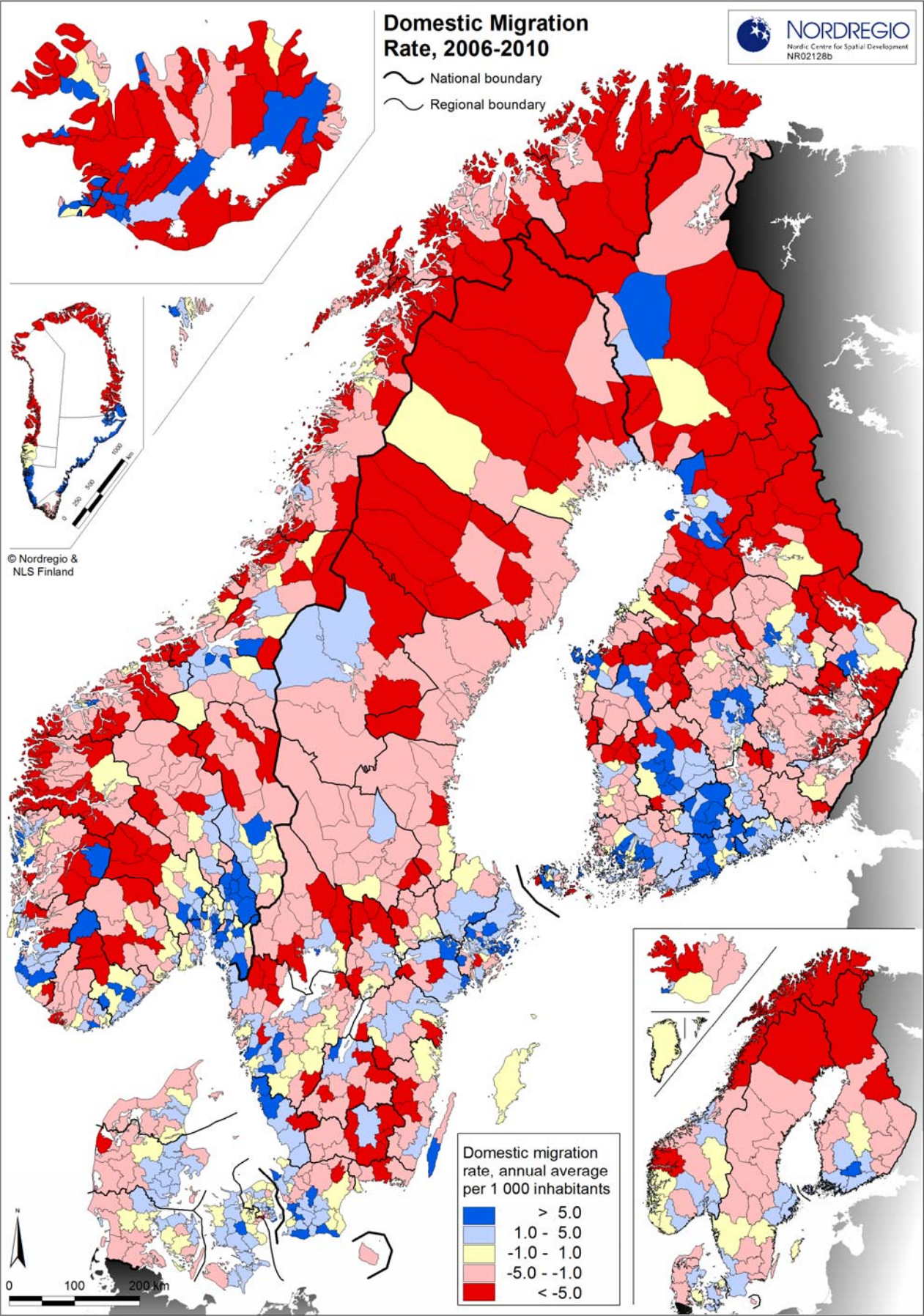


Figure 25: International migration rate, 2006-2010

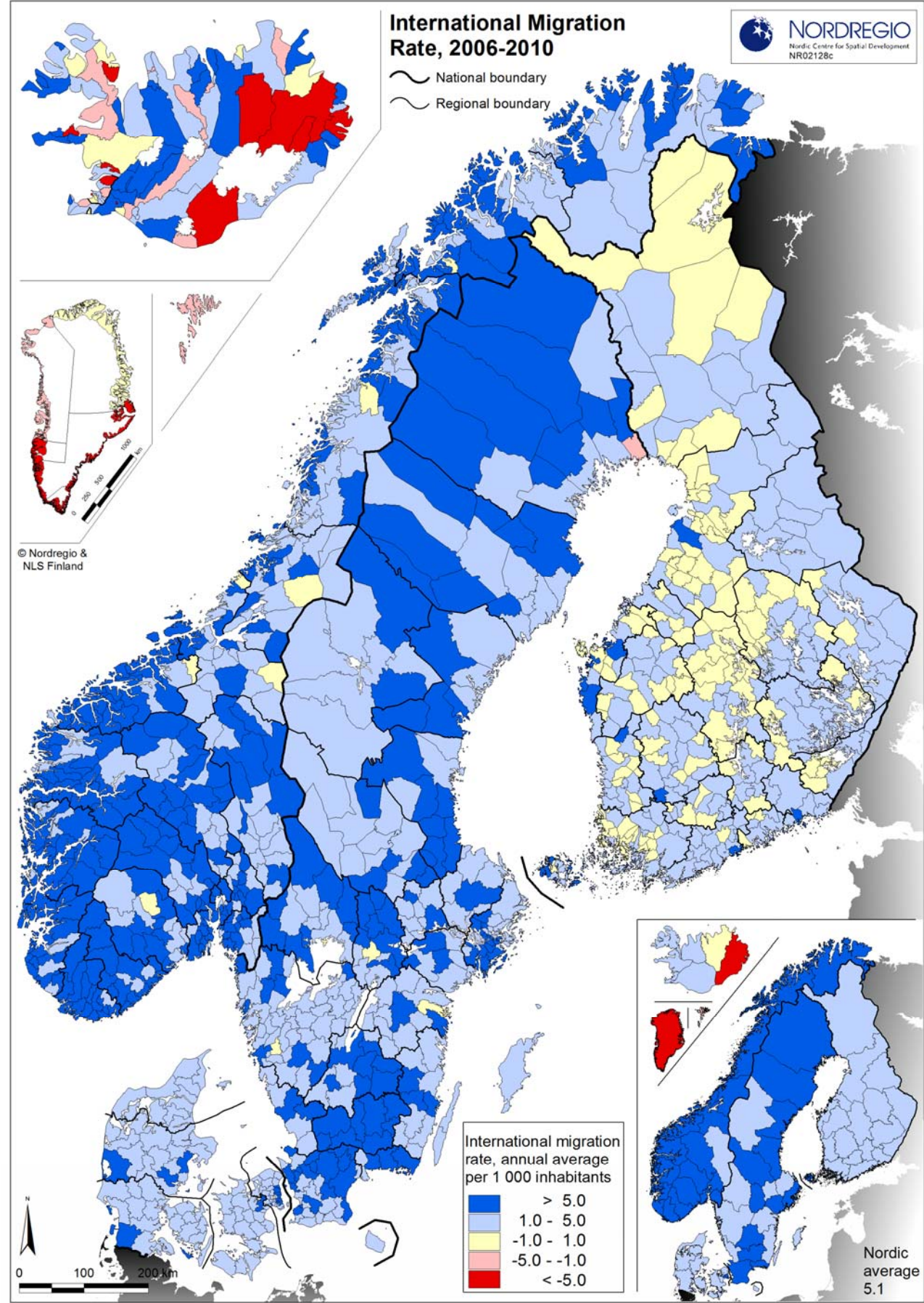
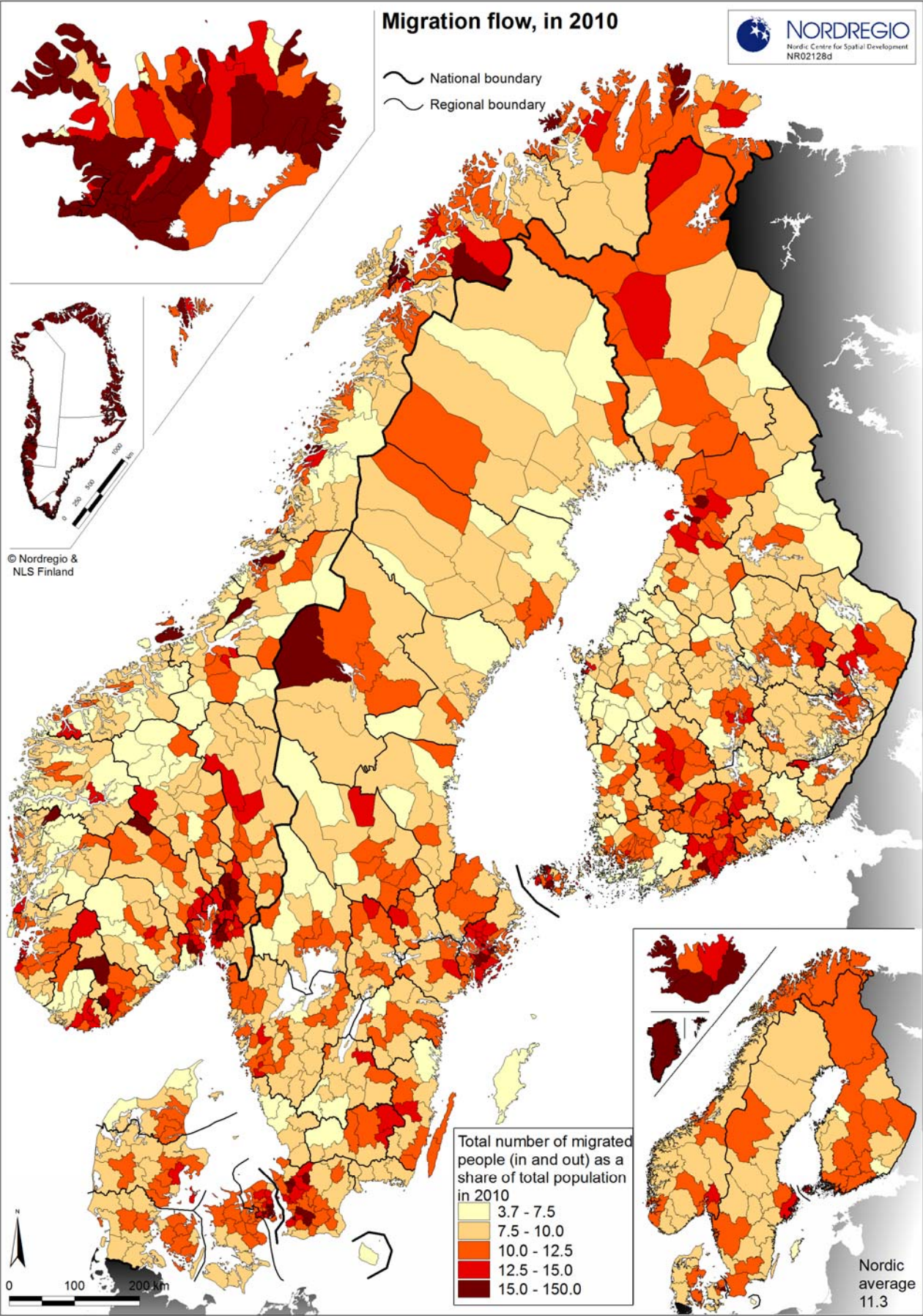


Figure 26: Migration flow to and from the municipalities and regions in 2010



Socio-economic characteristics for 2010

Level of education

One of the most important assets for Nordic labour markets is their highly skilled labour force. All of the Nordic countries have a higher share of tertiary educated persons than the EU average (22 %), referring to persons with semi-long (bachelor's level) and long (master's and PhD-level) higher education. On the regional level, the regions with highest levels of population with a tertiary education in Europe can be found in the Nordic countries. Skilled workers tend to be more productive, less exposed to unemployment; more satisfied with their professional lives and retire at a higher age. The level of education and the quality of the entire educational system are crucial elements in the construction of a skilled labour force.

On average, 32 % of the Nordic population aged 25 years or more has a tertiary level education. At the Nordic regional level the highest percentages are associated with densely populated areas and/or major cities. The capital regions of Oslo, Uusimaa (Helsinki) and Copenhagen (both "by" and "omegn") have rates of over 40 %. The lowest rates can be found in sparsely populated small regions with limited educational opportunities.

At the municipal level, regional centres with universities and other higher education institutions can also be highlighted.

There is a clear female dominance here in relation to higher education. The main reason for the Faroe Islands and Greenland not being in the same situation is the limited nature of their domestic higher educational opportunities and that many women, when they complete 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. In terms of the average Nordic level there are 129 highly educated females per 100 males while in 34 small sparsely populated municipalities the relation was in the order of more than 200 per 100.

Very few municipalities, approximately 1 %, exist with a majority of males with a higher education. In most cases where this does occur it has to do with the existence of specialised 'male' activities, for instance in relation to the military, heavy industry, resource extraction, or the existence of a technical university dominating the community.

Figure 27: Tertiary degree education

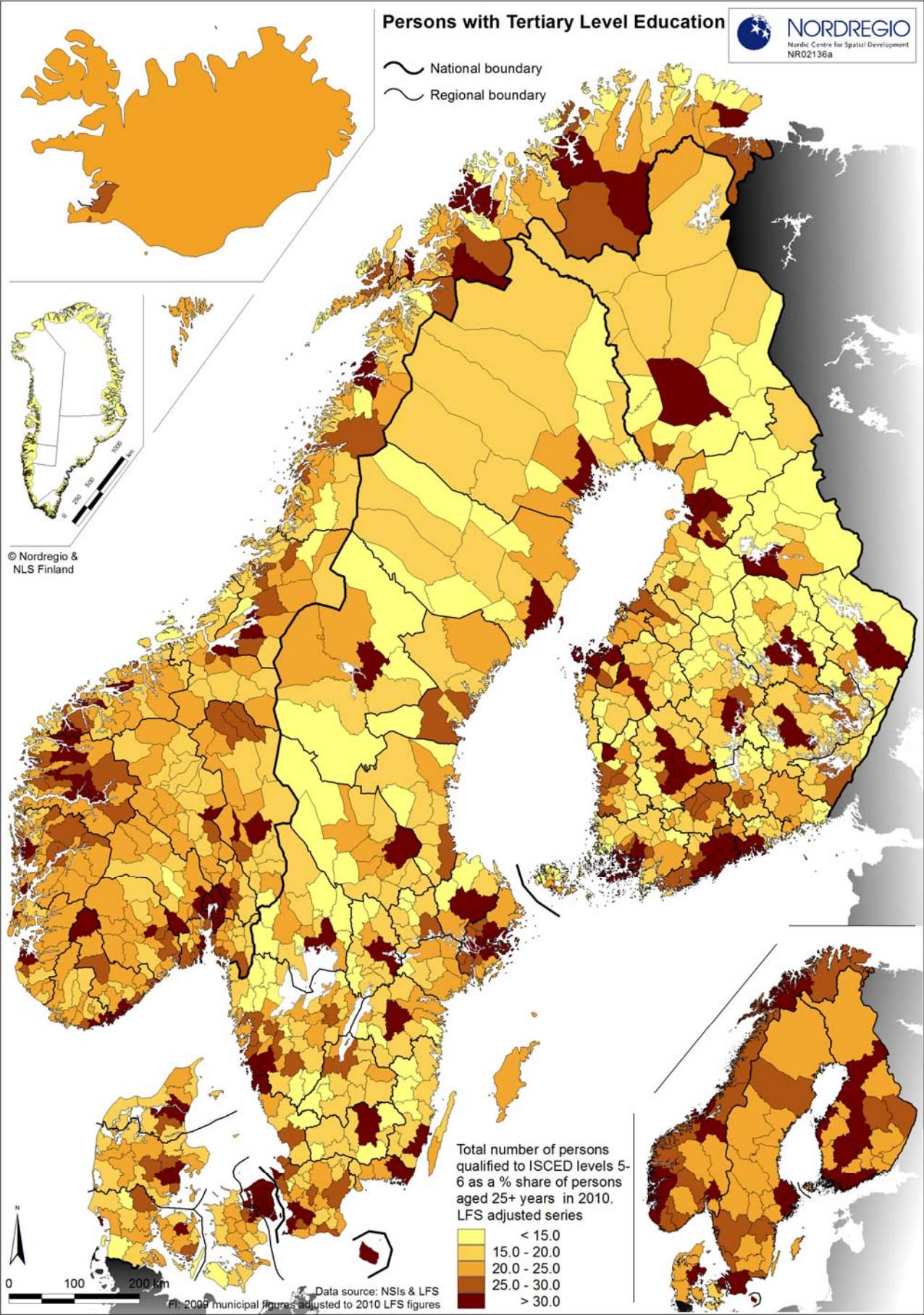
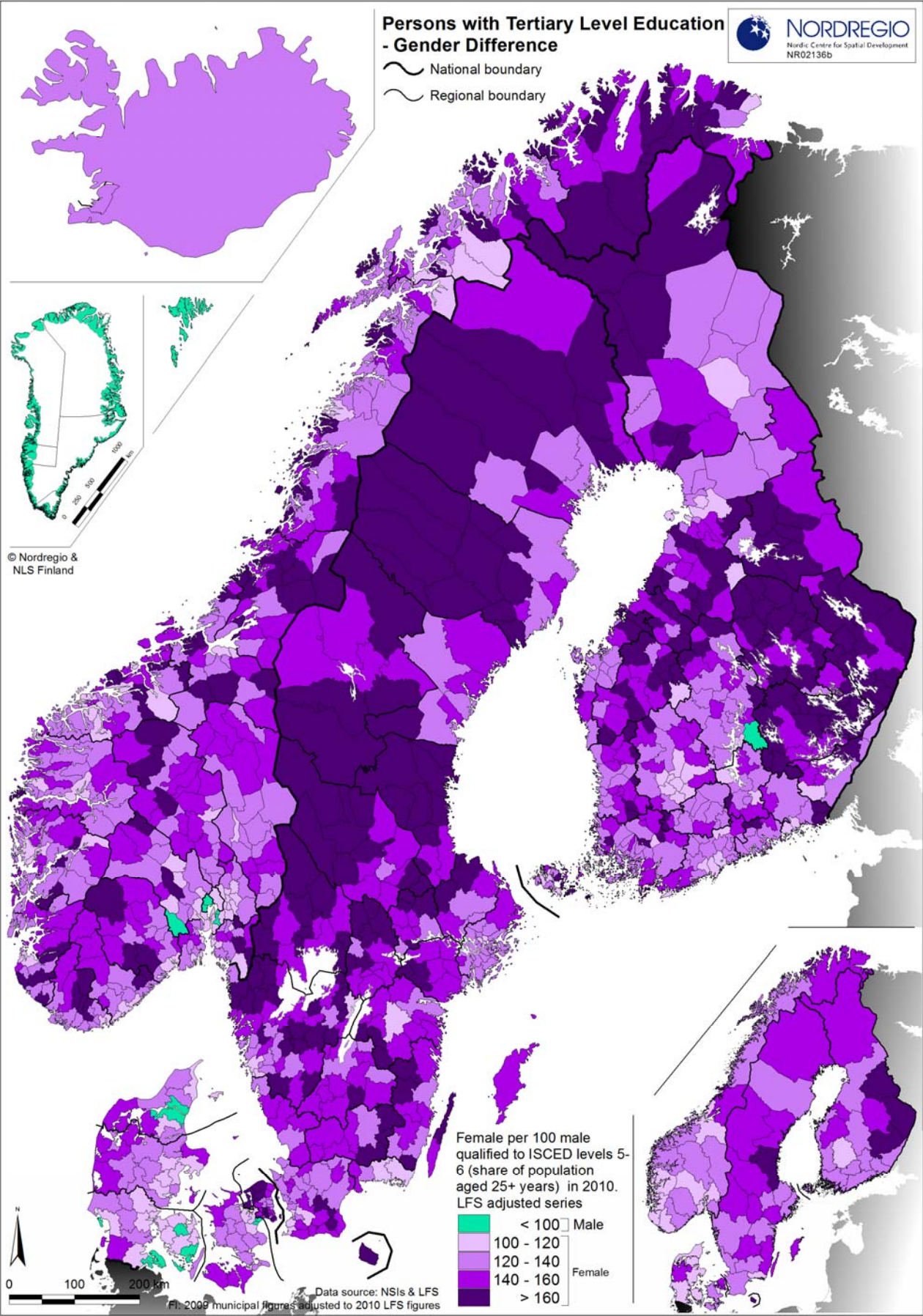


Figure 28: Gender difference in tertiary educated persons



Labour market

The labour force survey adjusted unemployment rate represents unemployed persons as a percentage of the labour force based on the International Labour Organisation (ILO) definition. The labour force is the total number of people employed and unemployed. The data is presented here in its seasonally adjusted form. Unemployment levels are strongly influenced by the economic situation, but a low unemployment rate also indicates an efficient regional labour market, where labour supply and the demand are relatively balanced. The regional challenge is thus to attain a level of unemployment that secures a dynamic labour market without creating significant social or economic problems. Often an unemployment rate of 2 % is considered necessary in order to be able to respond to structural changes thus keeping labour markets energised.

At the European level, national unemployment rates were at record lows before the financial crisis hit in 2007-2008 with European unemployment reaching a minimum of around 7 %. However, the economic crises resulted in a rapid increase in the European unemployment rate which also resulted in an increase in unemployment rates in all of the Nordic Countries. In 2010, the annual average unemployment rate for the EU27 was 9.6 %. Since the crisis all Nordic national rates have been remained below the EU27 average. Nevertheless, significant changes occurred between and within countries as a consequence of the crisis.

Among the Nordic countries, Iceland has suffered the most dramatic change in unemployment since 2008. Before the crisis, the country had the lowest unemployment rate in Europe, less than 2 %. However, in crisis hit Iceland however the unemployment rate reached an unprecedented 9 %, even though Iceland was experiencing rapid outmigration at the same time. Sweden and Finland had the highest annual unemployment rates in winter 2009-2010, at worst 9.1 % and 8.8 % respectively. Structural unemployment was however a problem in both countries during the preceding periods of economic growth. In Denmark the unemployment rate almost

doubled from its very low level of 2008 (3.3 %) to a level of 6 % in 2009, and is today almost at the same level as that in Finland and Sweden. Norway has experienced only a modest increase in unemployment during this period and retained the lowest unemployment rate (3.5 %) in Europe, in 2010. In the Faroe Islands and Greenland the unemployment rate has been rather stable, but is heavily related to migration.

Regional differences are however much larger than national ones. In the broader Nordic perspective the highest unemployment figures can be found in Finland in those areas along the Russian border (i.e. Salla, around 20 %) and on both the Finnish and Swedish sides of the Torne Dalen (around 15 % in the worst parts of the region). The lowest unemployment rates can be found in Western Norway where a number of municipalities have rates around 1 %.

The Lisbon European Council (2000) set the long-term target for national employment to at least 70 % by 2010. This goal was updated in 2010 in the Europe 2020 strategy, which sites that 75 % of the population aged 20-64 should be employed. The total employment rate in the EU27 aged 15-64 was at its highest level of 65.9 % in 2008, but decreased thereafter to 64.6 % in 2009 and further to 64.2 % in 2010. The global financial crisis thus had a significant impact on EU employment rates. Today, the original target of 70% has been achieved in only 8 states, including Iceland, Norway, Denmark and Sweden, with employment rates between 72-78 %. The employment rate in Finland dropped from 71 % in 2008 to 68 % in 2009. Thus the Nordic area is performing well with regard to employment rates in a broader European perspective. The same pattern and countries follow the 75 % target. At the regional and local levels the highest employment rates can be found in capital and major city areas and in some areas that traditionally have a large share of manufacturing while the lowest rates occur in sparsely populated municipalities mostly in Eastern and Northern Finland.

Figure 29: Employment rate

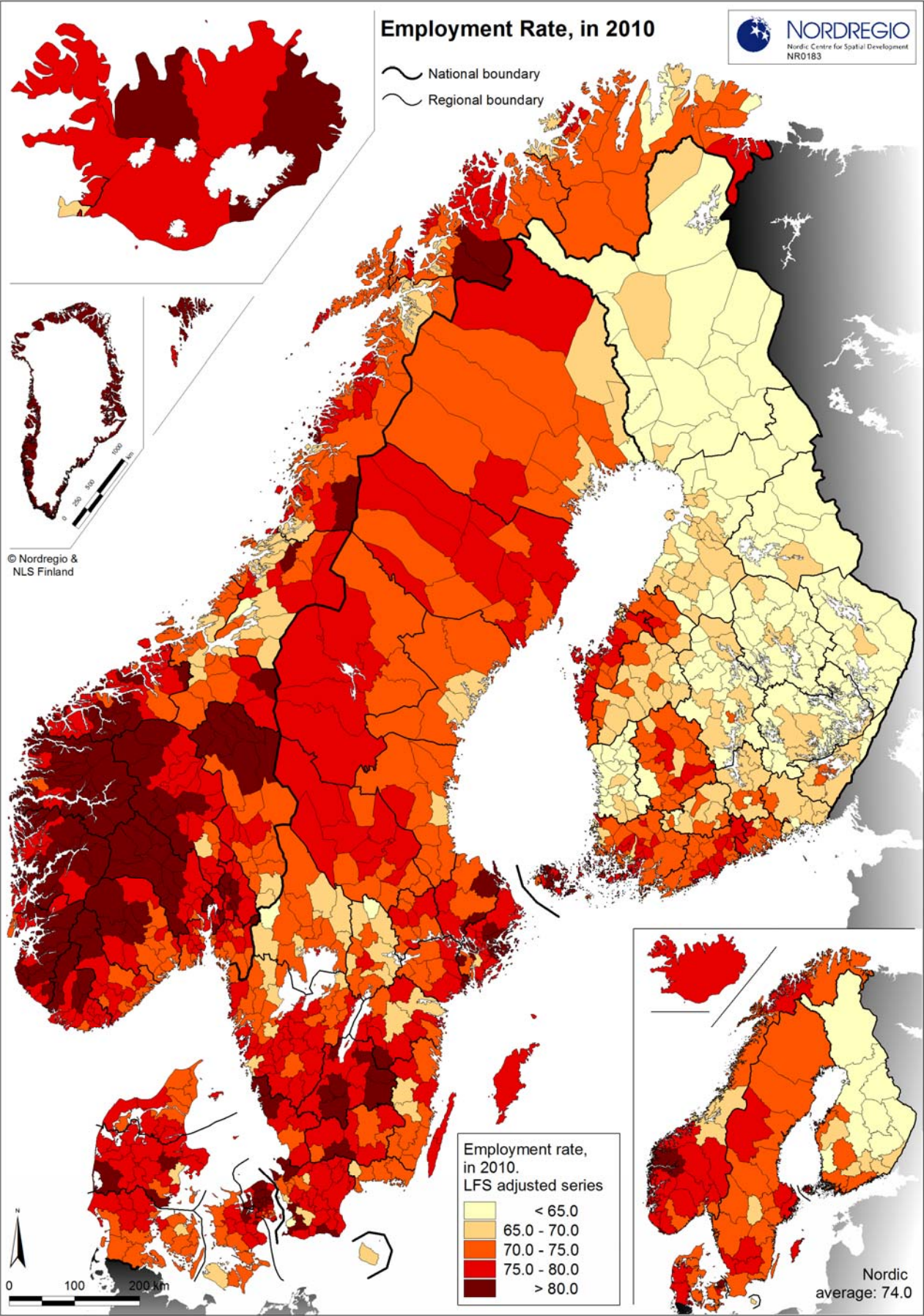
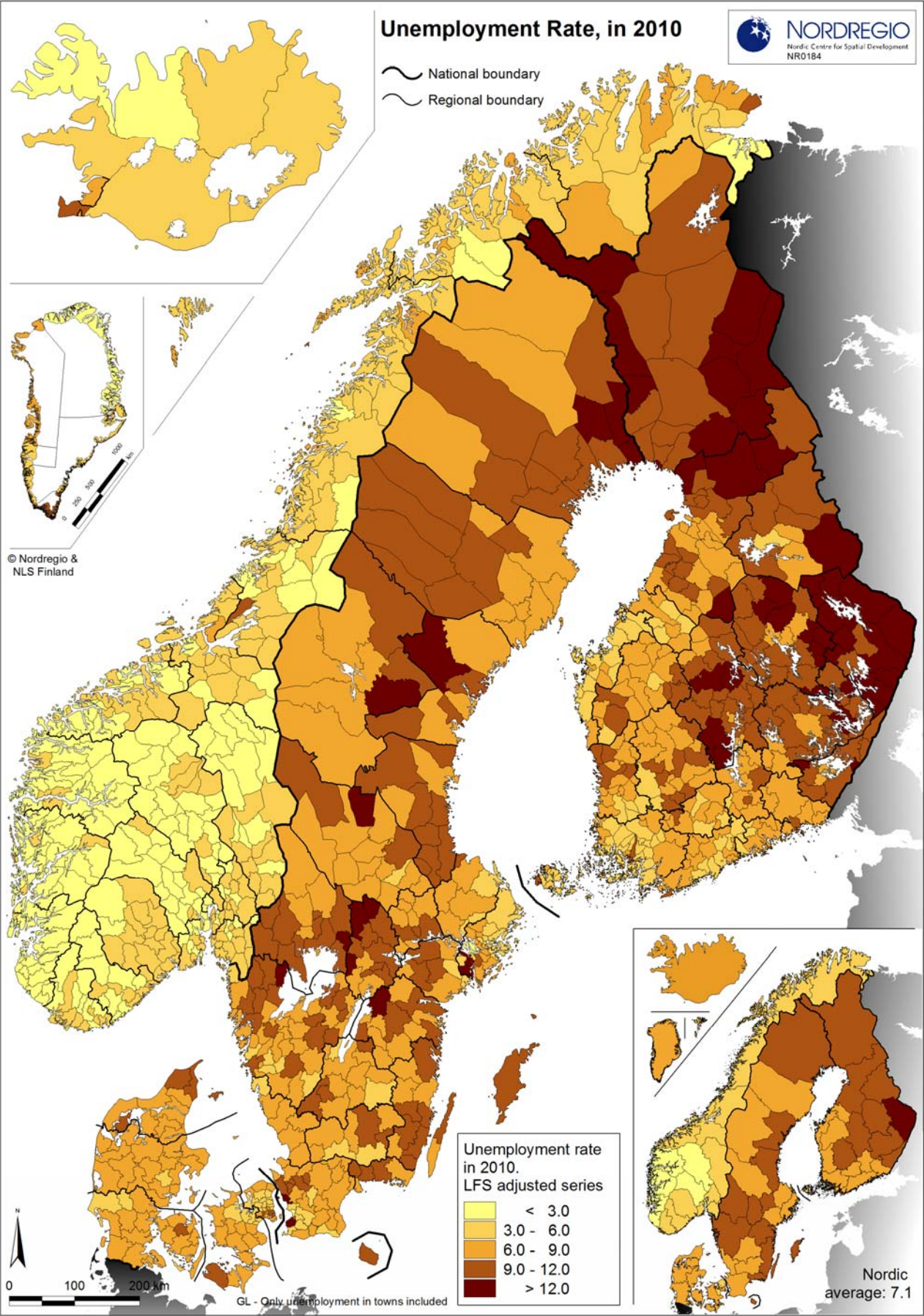


Figure 30: Unemployment rate



References

Data sources used in maps

NSIs - National statistical institutes:

Danmarks Statistik (Statistics Denmark).
<http://www.dst.dk/>

Hagstova Føroya (Statistics Faroe Islands).
http://www.hagstova.fo/portal/page/portal/HAGSTOVAN/Hagstova_Foroya

Hagstofa Íslands (Statistics Iceland).
<http://www.hagstofa.is/>

Kalaallit Nunaanni Naatsorsueqqissaartarfik (Statistics Greenland).
<http://www.stat.gl/Home/tabid/36/language/da-DK/language/en-US/Default.aspx>

Statistiska centralbyrån (Statistics Sweden).
<http://www.scb.se/>

Statistisk sentralbyrå (Statistics Norway).
<http://www.ssb.no/>

Tilastokeskus (Statistics Finland).
http://pxweb2.stat.fi/database/StatFin/databasetree_fi.asp

Eurostat.
<http://epp.eurostat.ec.europa.eu/portal/page/portal/eurostat/home>

Russian Federation – Federal state statistics service.
<http://www.gks.ru/wps/wcm/connect/rosstat/rosstatsite/main/>

State of Alaska, Department of Labor and Workforce Development, Research & Analysis Section.
<http://almis.labor.state.ak.us/>

Statistics Canada.
<http://www.statcan.gc.ca/>

Predictions, Prognoses, Forecasts and Projections

Appendix 2

Demography in the Nordic countries – a synthesis report

Rasmus Ole Rasmussen



NORDREGIO
Nordic Centre for Spatial Development

Contents

List of tables and figures	4
Preface	5
Total Population	6
Age Structure	12
Regional consequences	18
Regional consequences of socio-economic interventions	22
Complex modelling	25
The role of 'turning points'	27

List of tables and figures

Figures

Figure 1: Population forecast for Denmark 1990-2050 based on stepwise linear regression.	7
Figure 2: Population forecast for Norway 1990-2050 based on stepwise linear regression.	7
Figure 3: Population forecast for Finland 1990-2050 based on stepwise linear regression.	7
Figure 4: Population forecast for Iceland 1990-2050 based on stepwise linear regression.	8
Figure 5: Population forecast for Sweden 1990-2050 based on stepwise linear regression.	8
Figure 6: Population forecast for the Faroe Islands 1990-2050	8
Figure 7: Population forecast for Greenland 1990-2050 based on stepwise linear regression.	9
Figure 8: Population forecast for Denmark 1990-2050 based on cubic regression.	9
Figure 9: Population forecast for Finland 1990-2050 based on cubic regression.	9
Figure 10: Population forecast for Iceland 1990-2050 based on cubic regression.	10
Figure 11: Population forecast for Norway 1990-2050 based on cubic regression.	10
Figure 12: Population forecast for Sweden 1990-2050 based on cubic regression.	10
Figure 13: Population forecast for the Faroe Islands 1990-2050 based on cubic regression.	11
Figure 14: Population forecast for Greenland 1990-2050 based on cubic regression.	11
Figure 15: Projected age distribution in the total population in the Nordic countries 2010-2040. .	13
Figure 16: Projected age structure in the period 2010-2050, in Sweden.	13
Figure 17: Projected age structure in the period 2010-2050, in Norway.	13
Figure 18: Projected age structure in the period 2010-2050, in Iceland.	14
Figure 19: Projected age structure in the period 2010-2050, in Åland.	14
Figure 20: Projected age structure in the period 2010-2050, in Denmark.	14
Figure 21: Projected age structure in the period 2010-2050, in Finland.	15
Figure 22: Projected age structure in the period 2010-2050, in Greenland.	15
Figure 23: Projected working age population as a % of the total population in the period 2010-2040.	16
Figure 24: The share of the working-age populations is expected to decrease by 2050.	17
Figure 25: General long-term forecast without introduction of event.	23
Figure 26: Projected long term population consequences of the introduction of an industrial site in a Greenland Centre Town.	24
Figure 27: Main components in the modelling of demographic change.	25
Figure 28: Durability of 'Steady state' forecasts.	26
Figure 29: Fertility comparison of the fertility of 23 EU countries. Fertility in the period 1955-60 and in 2000-05.	27
Figure 30: Comparing trends in fertility rates in Norway, Sweden and Denmark from 1950 to 2003.	28

Tables

Table 1-3: SE11 Stockholm, SE12 Östra Mellansverige, SE211 Småland med öarna	19
Table 4-6: SE222 Sydsverige, SE23 Västsverige, SE31 Norra Mellansverige	20
Table 7-9: SE32 Mellemsta Norrland, SE33 Övre Norrland and Total.	21

Preface

This appendix presents the background materials used in connection with the discussion on 'prognoses as a tool in the analysis of demographic change'. So in relation to the general topic mentioned in the title, i.e. Predictions, Prognoses, Forecasts and Projections, please refer to the main volume for a discussion of their role in connection with demographic change.

The purpose of the appendix is to provide the background information used in generating the tables and graphs presented in the

main text. The appendix is divided into sections representing the three sub-sections of the chapter on 'prognoses' in the main report. In order to maintain the connection the titles of the sub-sections have been maintained here. The only exception to this general rule is the title of the last section, "Regional Consequences", which has been subdivided in two: "Regional Consequences" and "Regional Consequences of Interventions" because of the differences in the topics.

Total Population

The graphs in this section show a simple forecast from 2010 up to 2050 based on population data from the Nordic countries for the period 1990 to 2010. Each of the graphs has been generated by means of a stepwise auto-regression of the data which was available from the Nordic Statistics Yearbook in 2010. Missing from the table are the Åland Islands as these statistics were not included in the Yearbook.

The first seven graphs are based on a linear stepwise auto-regression meaning that the data from a certain time period is projected by means of a simple linear regression of data bit by bit. The simplest approach would have been to generate just a simple linear regression for the time series data available, but the problem would have been that such a generalisation might have obscured important variations in the data. By using a stepwise linear regression random variations are smoothed, taking away such accidental variations, while more substantial variations are maintained and reflected in the forecast.

The next 7 graphs use the same set of data, but now by using a cubic regression where the result is a 3rd degree polynomial curve fitted – again stepwise – to the variations in the 20 year data, and then used as basis for the calculation of the forecast. The advantage of this approach is obvious when looking at the quality of ‘fit’ in terms of the graph and the original data. Forecast variations however become quite substantial, depending on the specific variations occurring during the last part of the time period and thus the results are potentially less reliable in relation to longer forecasts.

In both types of forecasts the black line continuing the original data from 1990 to 2010 shows the projection. Along the projection line are two red lines indicating the span between which there is a 95 % probability the result will be in this field if the preconditions are met. As the gap between the lines increases with the projection time it is clear that the chance of having the results close to the projection line becomes more limited. For graphs 8 to 14 the span increases significantly so even though the graph fits quite well with the original data, the chance that the projected development will be a reality is quite limited.

As specifically indicated on the set of graphs for Denmark, Finland, Norway and Sweden there are differences in the projected expected growth

rates while the variations in past development are reflected in the potential variation in the future. The curves are nevertheless quite similar, both in relation to the linear and the cubic projections, even the latter show some more variation, just as the projections tend to point toward a much more marked growth as time goes on.

The smaller countries, Iceland, the Faroe Islands and Greenland, show much more variation in the forecast, both in relation to the linear and to the cubic development. With smaller populations even quite small deviations from a regular path will manifest as substantial changes, some of which may be argued to be reflecting reality, but most just repeating it, while in the case of cubic forecasts, they may be manifest as enhancements of past variations that may not relate to foreseeable future events. To prevent such, more or less, random variations the smoothing of the original data may be one way of contributing to a reduction here.

An interesting development specifically in relation to the Faroe Islands and Greenland is that the linear projections in both cases indicate a marked future population growth while use of the cubic projection sees the development path move in divergent directions, with the Faroe Islands showing increased population while Greenland registers a marked decrease. The reasons for these variations have to do with the impact of the data for the last 5 years. The Faroese population experienced a returning migration after the major economic crisis of the previous decade which appears to be decisive for the 3rd degree polynomial result, while the continuous out-migration from Greenland leading to a balanced population during the last 5 years has the opposite effect on the calculations.

In both cases the expectation is that the near future will lead to neither an increase nor decrease in the total population. Projections for the different countries therefore indicate some of the problems related to this type of projection. As long as the size of population is relatively large, and development paths are without significant deviations the projections tend to be reasonably accurate, but when dealing with smaller populations and events which have altered the population structure in the past, often quite quickly and significantly, it is very important to be aware of how such factors can potentially influence the results and thus that specific attention should be paid to them.

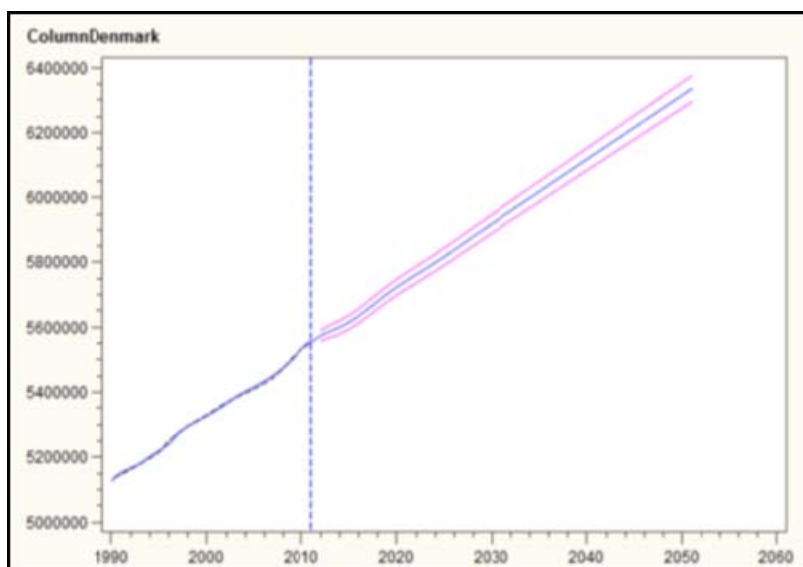


Figure 1: Population forecast for Denmark 1990-2050 based on stepwise linear regression. Data from Nordic Statistical Yearbook. Results generated by Nordregio.

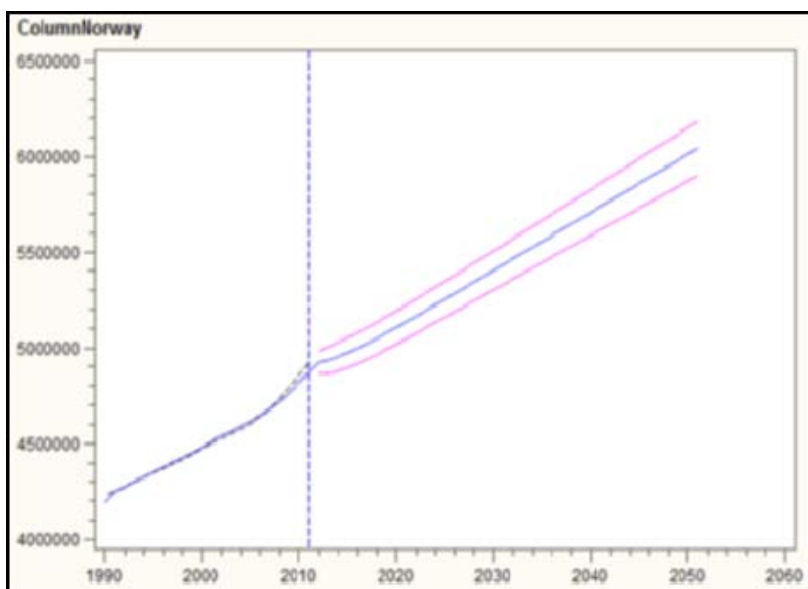


Figure 2: Population forecast for Norway 1990-2050 based on stepwise linear regression. Data from Nordic Statistical Yearbook. Results generated by Nordregio.

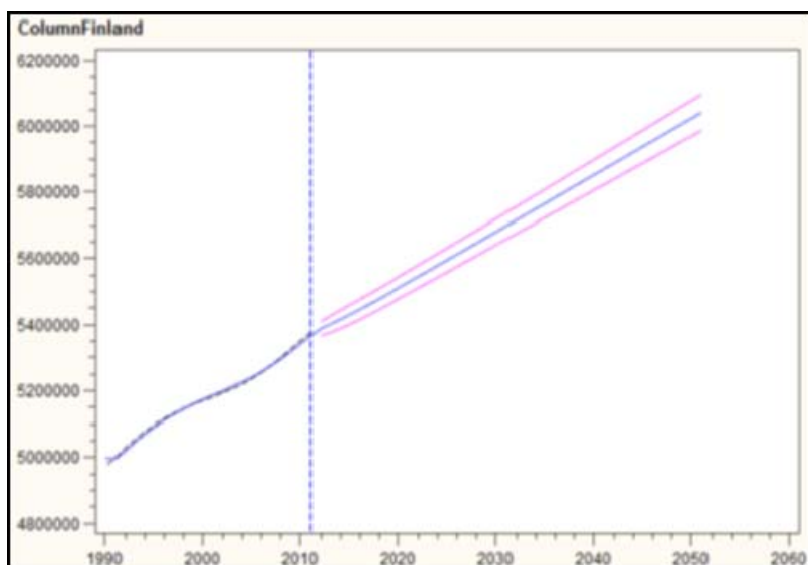


Figure 3: Population forecast for Finland 1990-2050 based on stepwise linear regression. Data from Nordic Statistical Yearbook. Results generated by Nordregio.

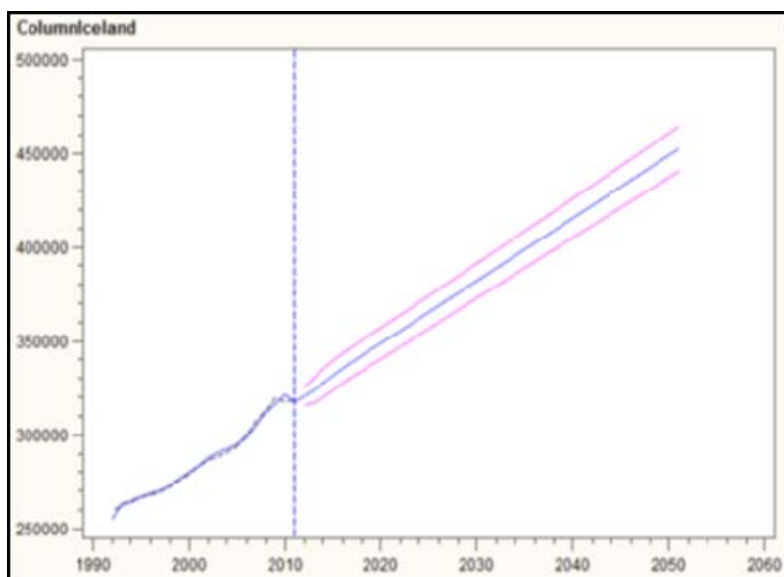


Figure 4: Population forecast for Iceland 1990-2050 based on stepwise linear regression. Data from Nordic Statistical Yearbook. Results generated by Nordregio.

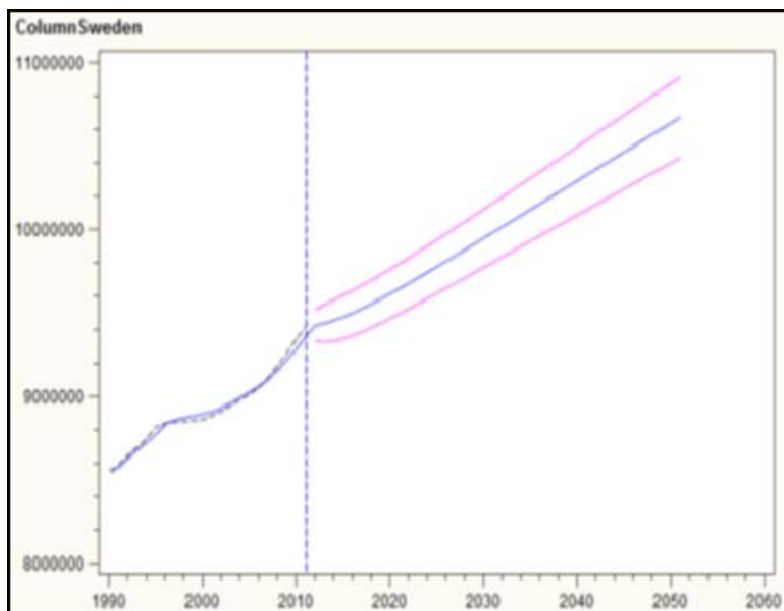


Figure 5: Population forecast for Sweden 1990-2050 based on stepwise linear regression. Data from Nordic Statistical Yearbook. Results generated by Nordregio.

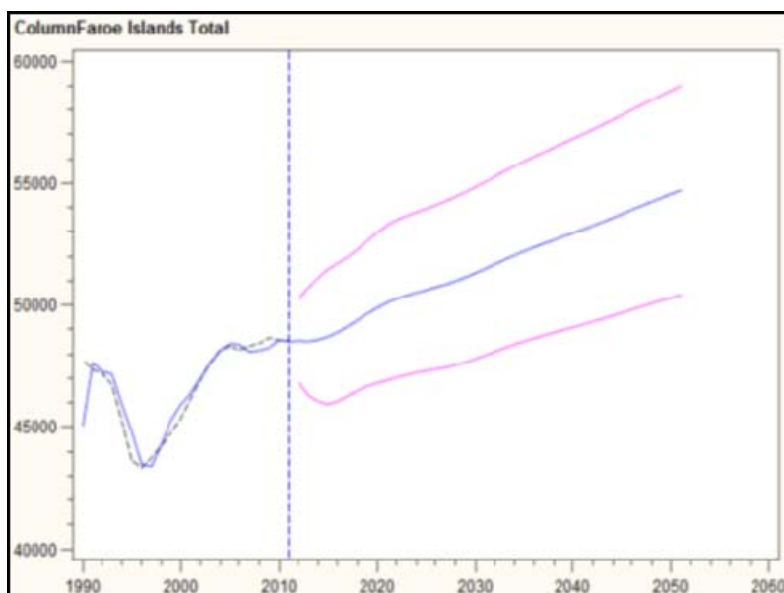


Figure 6: Population forecast for the Faroe Islands 1990-2050 based on stepwise linear regression. Data from Nordic Statistical Yearbook. Results generated by Nordregio.

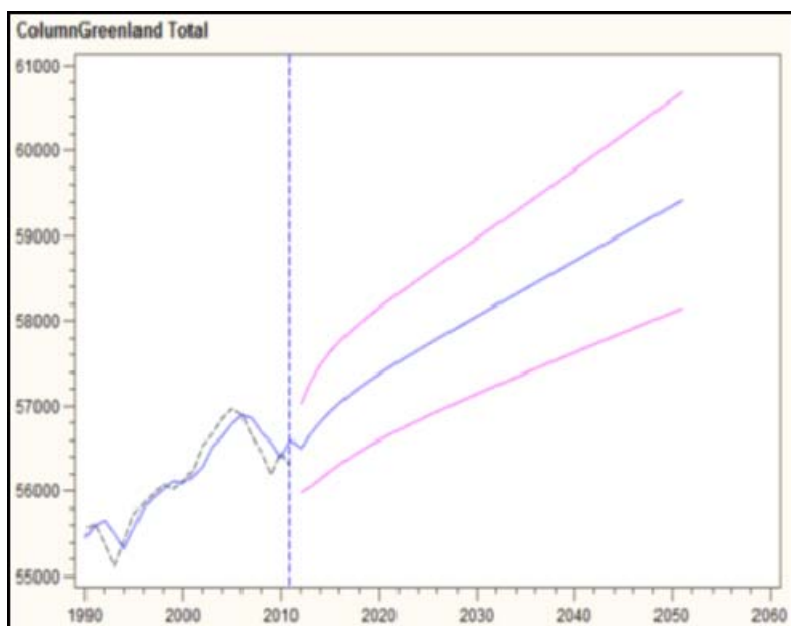


Figure 7: Population forecast for Greenland 1990-2050 based on stepwise linear regression. Data from Nordic Statistical Yearbook. Results generated by Nordregio.

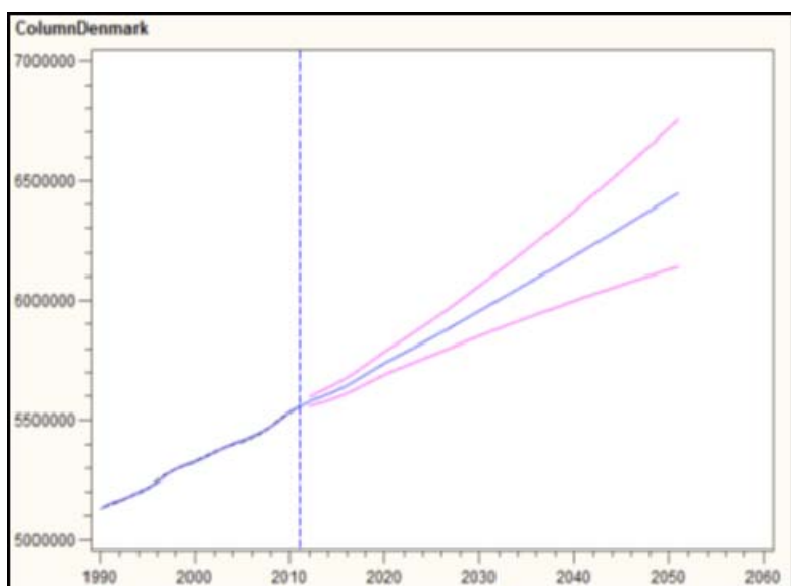


Figure 8: Population forecast for Denmark 1990-2050 based on cubic regression. Data from Nordic Statistical Yearbook. Results generated by Nordregio.

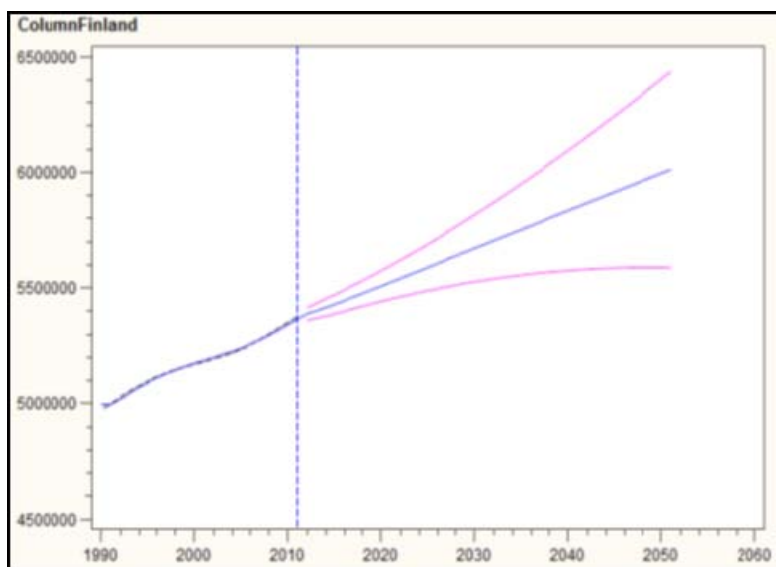


Figure 9: Population forecast for Finland 1990-2050 based on cubic regression. Data from Nordic Statistical Yearbook. Results generated by Nordregio.

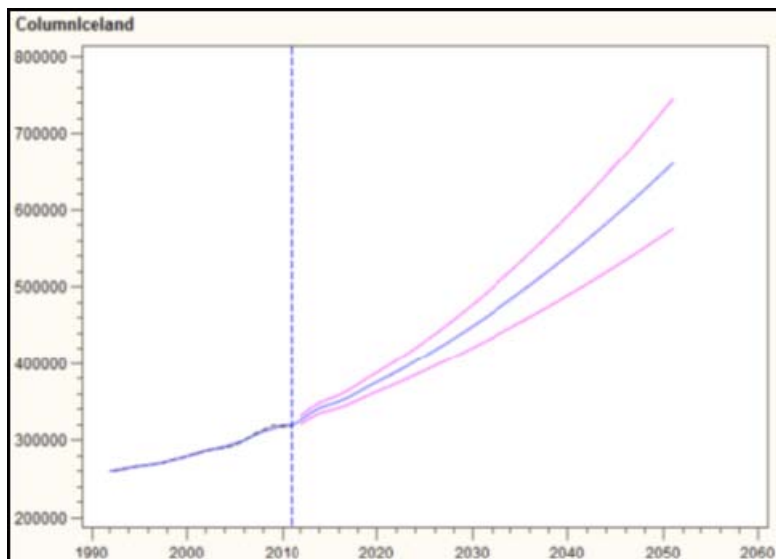


Figure 10: Population forecast for Iceland 1990-2050 based on cubic regression. Data from Nordic Statistical Yearbook. Results generated by Nordregio.

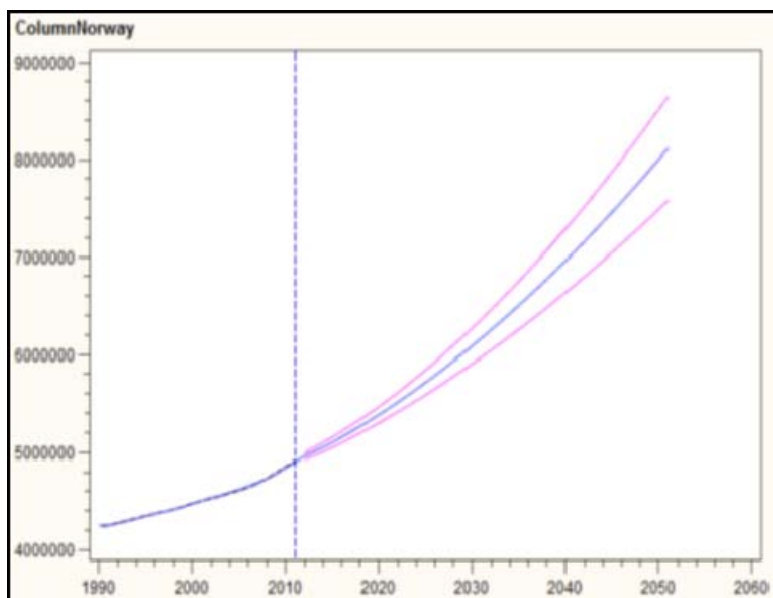


Figure 11: Population forecast for Norway 1990-2050 based on cubic regression. Data from Nordic Statistical Yearbook. Results generated by Nordregio.

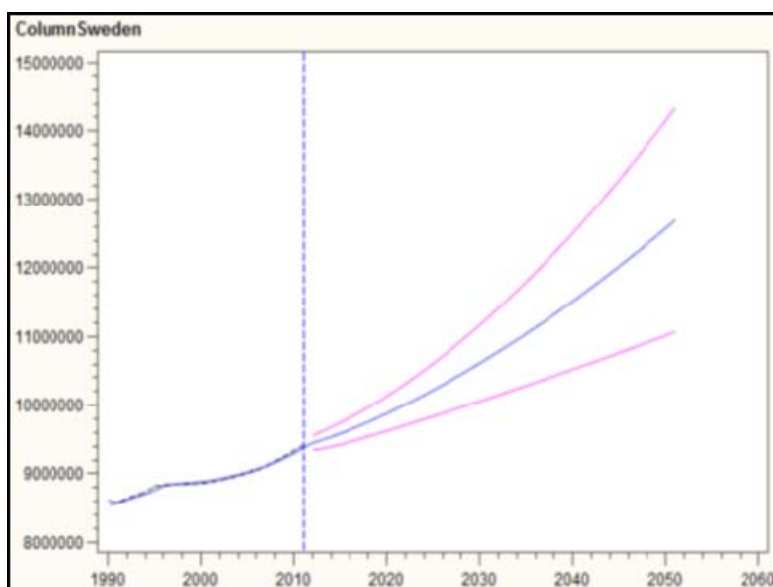


Figure 12: Population forecast for Sweden 1990-2050 based on cubic regression. Data from Nordic Statistical Yearbook. Results generated by Nordregio.

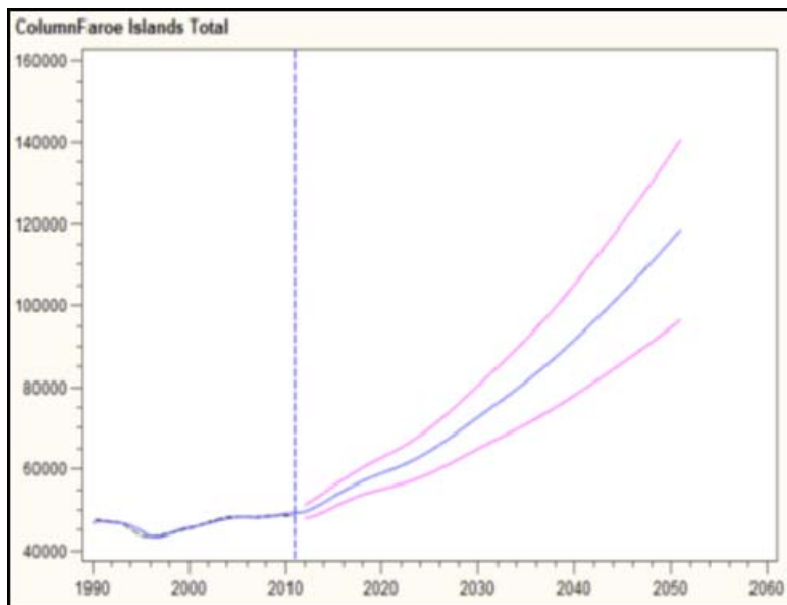


Figure 13: Population forecast for the Faroe Islands 1990-2050 based on cubic regression. Data from Nordic Statistical Yearbook. Results generated by Nordregio.

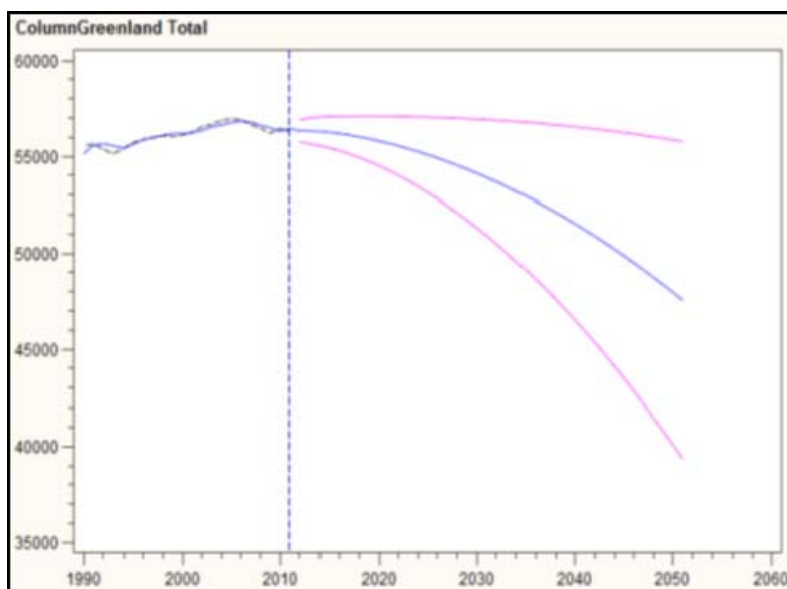


Figure 14: Population forecast for Greenland 1990-2050 based on cubic regression. Data from Nordic Statistical Yearbook. Results generated by Nordregio.

Age Structure

The graphs reproduced in figures 15 to 22 are all based on the results of projections generated by the national statistical agencies in the Nordic countries. They include all but one of the Nordic countries and autonomous territories, namely, the Faroe Islands, which did not provide data for the Nordic Statistical Yearbook in 2010 which was the source of the information. All of the data has been summarised for use in the context of figure 15 showing the total population for the Nordic countries.

They are different from the previous projections in that they are subdivided into age classes 0-14, 15-24, 25-64 and 65 years and above. Basic demographic parameters provided the basis for the projections: total population subdivided into year classes, birth and death rates and net migration rates by age group.

The way in which projections are generated differs between countries but they are all generally based on the same concepts: A model determines the changes from one year to the next by means of yearly projections on the above-mentioned parameters such as age dependent fertility, age dependent death rates and age dependent migration patterns. For each of the parameters the models usually assume two types of variations at the level of change, a short term variation based on data from the previous period, and the long term variations partly based on previous data, but also including a qualitative evaluation of expectations in respect of long term tendencies. In order to be able to react to migration patterns most countries include an ethnic component because there may be marked differences in demographic behaviours between different ethnic groups. Other subdivisions of the population may be appropriate to the extent that group-based differences may influence the final results. Such additional subdivisions may differ between countries, depending on their population characteristics, for instance due to in- or out-migration.

Several challenges emerge in the context of the development of this type of projection. The basic data such as birth rates, death rates etc., subdivided into the chosen groups needs to be present for an appropriate time period in order to provide data for the short term projections. What is

appropriate depends on the variations of the variables over time. Each of the subgroups needs to consist of a considerable number of persons in order to prevent random variations to be decisive for the outcome of the model. In relation to the long term trends, again, a fairly long time series is required, in combination with a good idea of what kinds of changes in the parameters could be expected.

Some of the main trends displayed in the data for the Nordic countries have already been explained in the main text. Firstly, that all Nordic countries are expected to grow in population terms and that the age group 65+ will increase and constitute an ever increasing share of the total population. The pace of change, however, differs markedly from country to country.

In the cases of Greenland, Sweden, Denmark and Finland population increases are limited, while the starting point for age structure development among the latter three already shows characteristics of what is often defined as “mature” populations with a high percentage of older persons as a starting point. In this respect the situation for Greenland differs substantially. The older age group, which only constitutes a fraction of the levels in the other countries, will expand substantially, but the age distribution and size of population remains highly dependent on migration characteristics, where net out-migration patterns for both younger and older persons are major contributors to shaping the development.

The expected increases are much more evident for the others, Norway, Iceland and Åland. In all three cases the expected population increases are marked, and the share of the 65+ population group in particular is expected to become a major part of the population, leading to some of the questions related to the population ageing which has already been experienced in Denmark, Finland and Sweden. It is in this context quite interesting to see how Finland and Åland are currently showing similar age structures, but are, in future, expected to develop along very different paths, Åland by 2040 being the part of the Nordic area with by far the highest old age dependency situation.

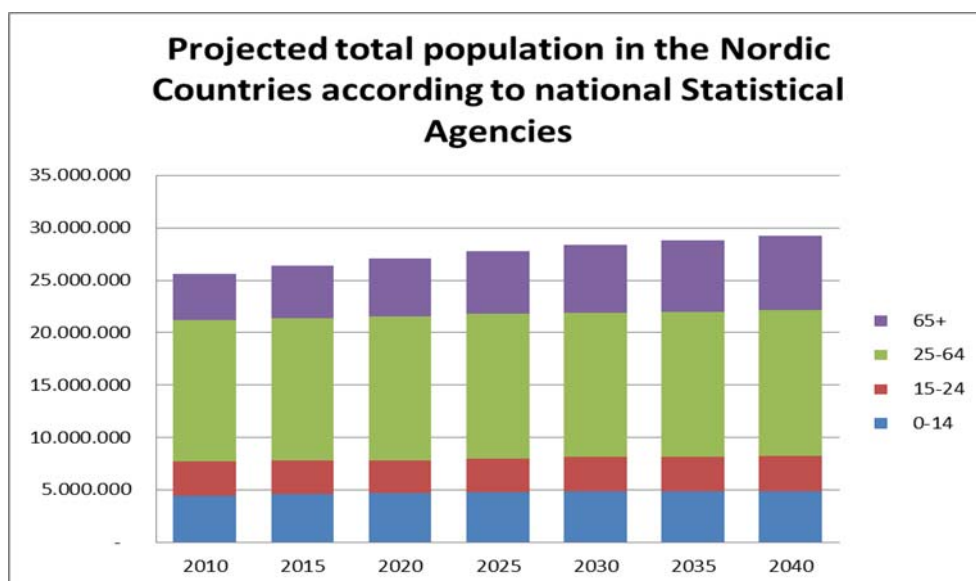


Figure 15: Projected age distribution in the total population in the Nordic countries 2010-2040. According to national statistical agencies. Data from Nordic Statistical Yearbook 2010.

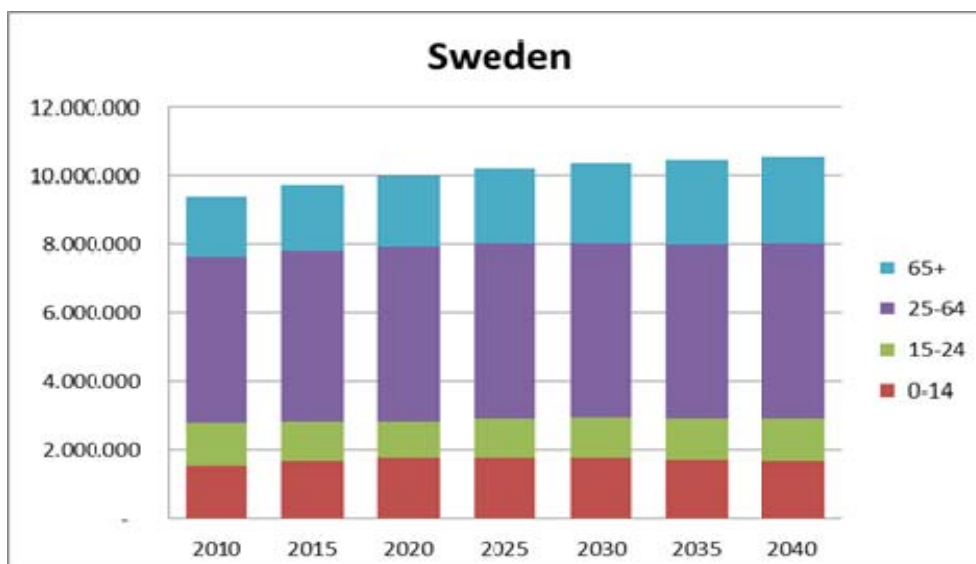


Figure 16: Projected age structure in 2010-2050, in Sweden. According to the national statistical agency. Data from Nordic Statistical Yearbook 2010.

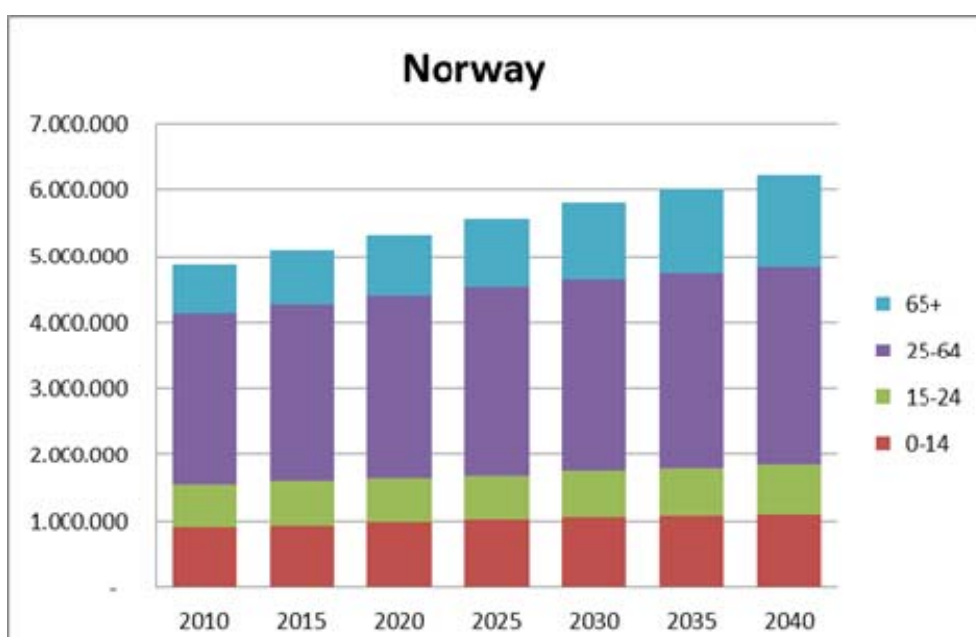


Figure 17: Projected age structure in 2010-2050, in Norway. According to the national statistical agency. Data from Nordic Statistical Yearbook 2010.

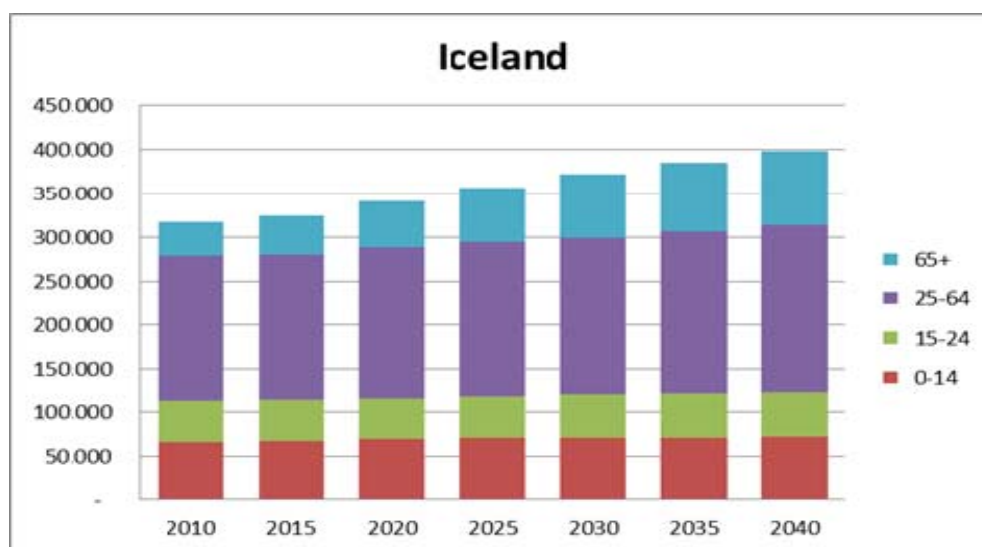


Figure 18: Projected age structure in 2010-2050, in Iceland. According to the national statistical agency. Data from Nordic Statistical Yearbook 2010.

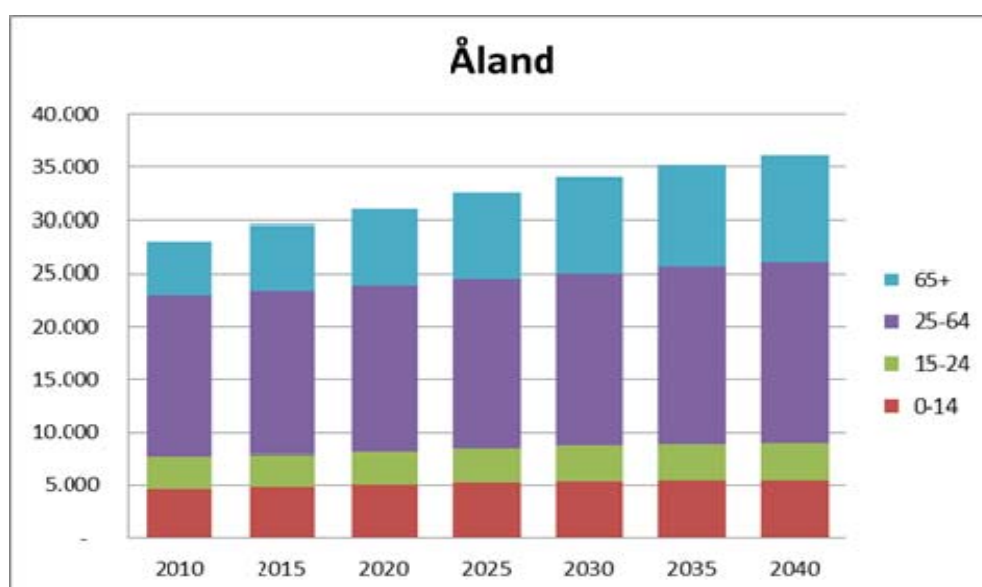


Figure 19: Projected age structure in 2010-2050, in Åland. According to the national statistical agency. Data from Nordic Statistical Yearbook 2010.

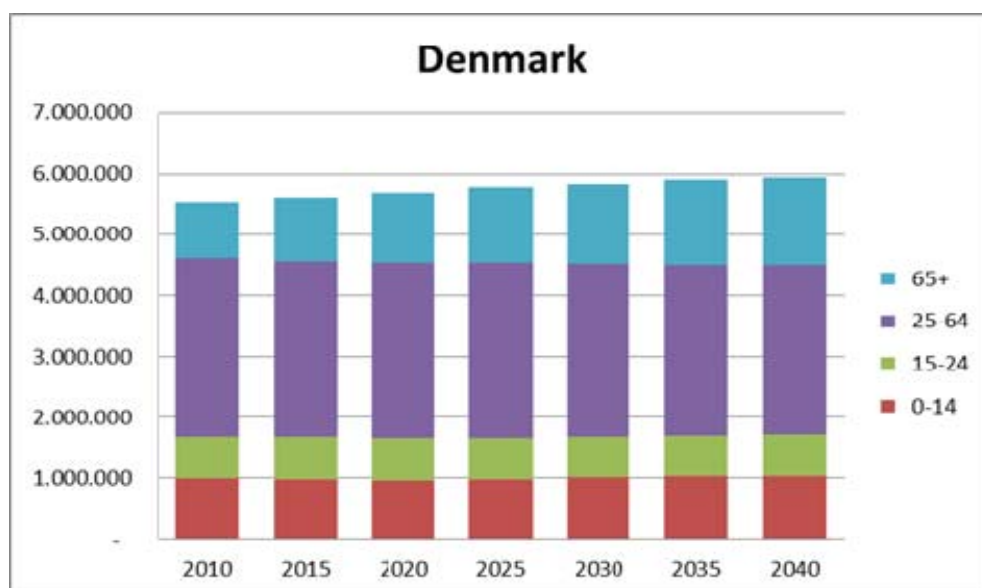


Figure 20: Projected age structure in 2010-2050, in Denmark. According to the national statistical agency. Data from Nordic Statistical Yearbook 2010.

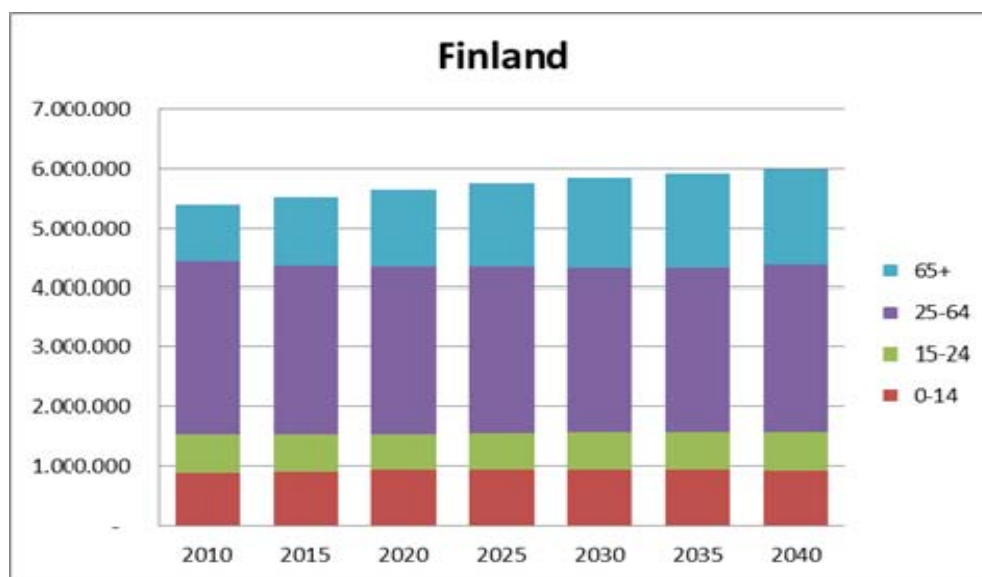


Figure 21: Projected age structure in 2010-2050, in Finland. According to the national statistical agency. Data from Nordic Statistical Yearbook 2010.

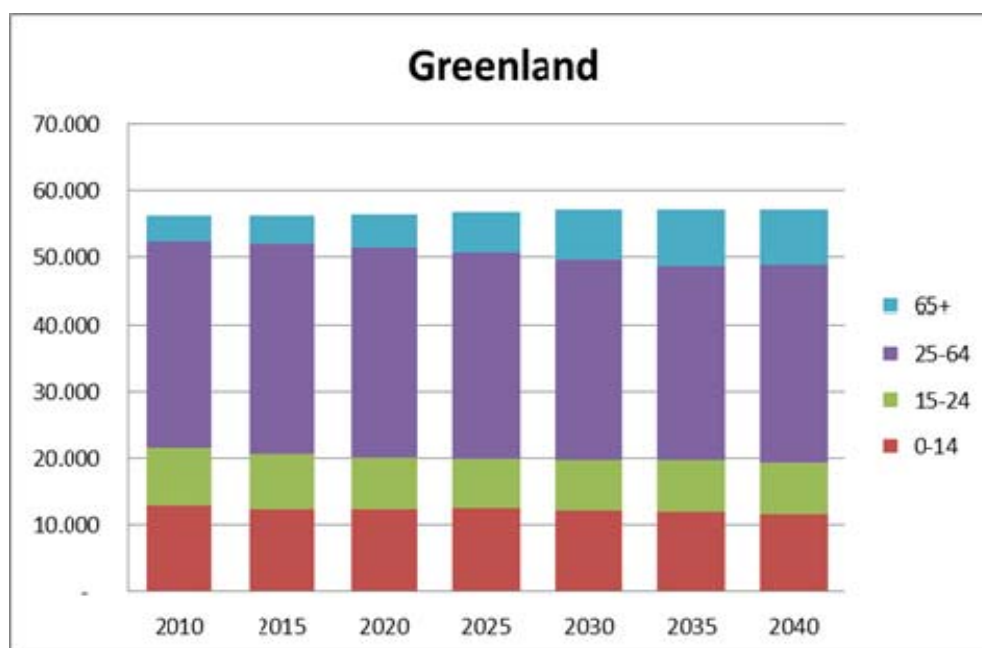


Figure 22: Projected age structure in 2010-2050, in Greenland. According to the national statistical agency. Data from Nordic Statistical Yearbook 2010.

What may not be apparent when referring to individual territories is the general trend in population development across the Nordic countries where an ever smaller fraction of the population is in the age group usually considered to be of 'working age', i.e. the age group from 15 to 65 years.

As shown in figure 23 below the trend seems to be consistent in the forecast outlined above from 2010 to 2040. The precise paths differ to some extent but the trend is quite clear. The only exception to this is Greenland where the last years of the projection, from 2035 to 2040, show an increase in this part of the population. As already seen in connection with the auto-correlations shown previously the projections of small populations are difficult because even small variations can have quite a large effect. Moreover, this effect may not necessarily be immediate

because, for instance, "baby booms" may appear at one point of time and then be reproduced with intervals thereafter, the first time when they become adults and then repeated – usually at a lower level – in the next generation etc.

When looking at the graph something like this could be expected because of the starting point which differs compared to the other Nordic countries. The graph shows a minor increase, and to the extent that this is based on an increase in the number of births, parallel to a marked increase in the group of pensioners, the increase in 2035 fits well with these children entering the labour market after finished training, education etc., around 20 years later. Much more detail on the structure, and especially the migration patterns, would be needed in order to gain a fuller understanding of the development.

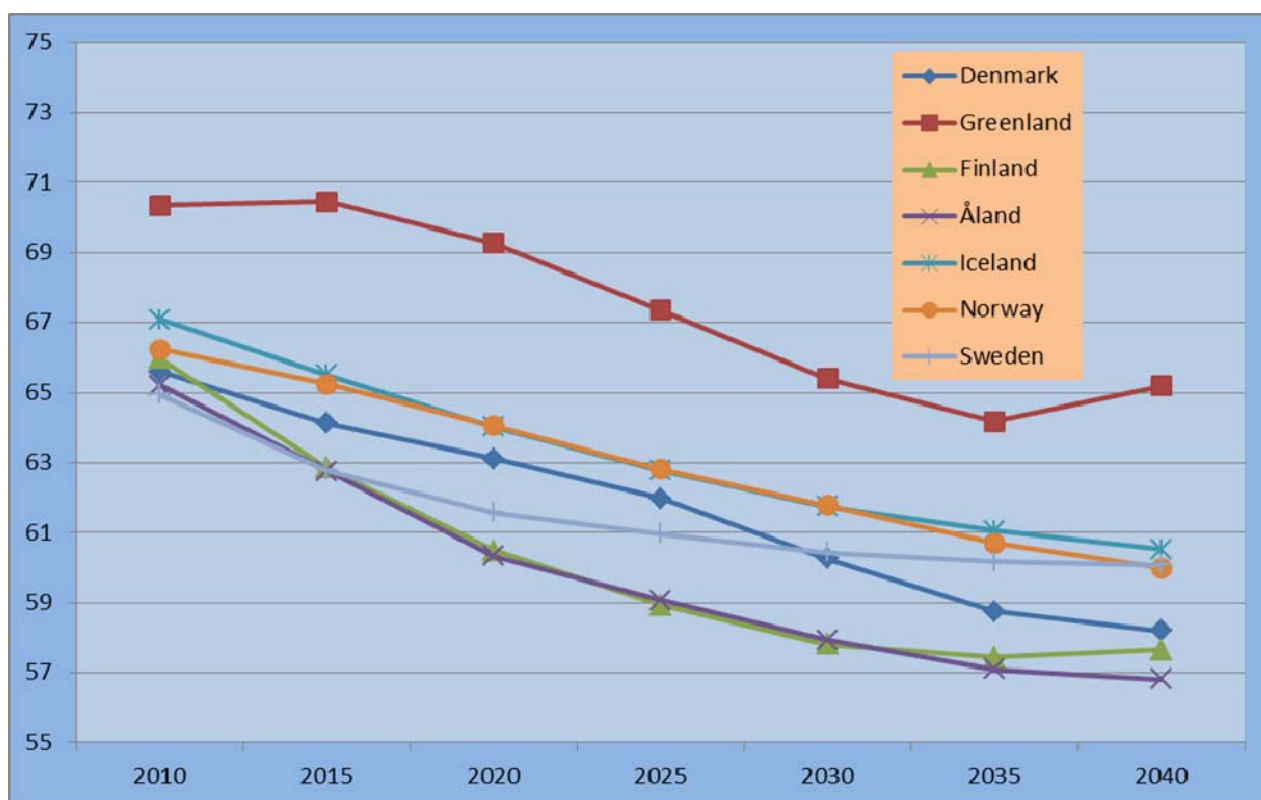


Figure 23: Projected working age population as a % of total population in the period 2010-2040. According to the national statistical agencies. Data from Nordic Statistical Yearbook 2010.

The quality of a forecast may be tested by comparing it with other attempts to do the same, and in this case the OECD has been focusing on the same issue, i.e. the development of the working age population, not only in the Nordic Countries, but in Europe as a whole. By comparing the graph above with the columns in figure 24 which stems from an analysis undertaken by the OECD in 2011 it becomes clear how the same trends appears.

This is not surprising when it comes to the Nordic countries, though, as the OECD usually

uses data generated by the national authorities in these exercises, which is exactly the case here. So just comparing the Nordic countries above with the Nordic countries in the OECD graph basically entails a comparison of the same data.

The important thing here is to check the data by comparing it with countries showing similar development trends as the Nordic countries, thereby creating a kind of measuring stick showing how likely a specific trend could be.

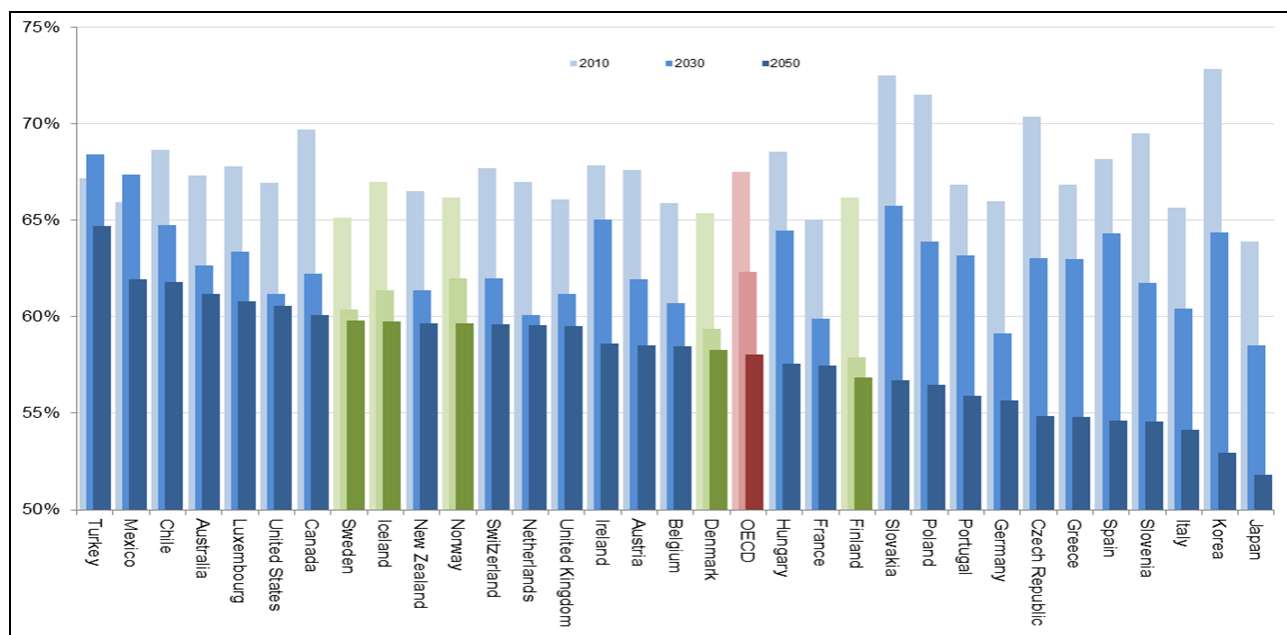


Figure 24: According to the OECD (2011), the share of the working-age populations is expected to decrease by 2050.

Regional consequences

Working with regional data as shown in tables 1 to 9 below does not differ much from the methods already described in the previous section in respect of age structures. The approach works from the same framework, namely a model determines the changes from one year to the next by means of yearly projections of the demographic components including age dependent fertility, age dependent death rates and age dependent migration patterns. In addition, however, the migration patterns not only include net figures for domestic and international migrations, but also connections between the regions included in the model.

For each of the parameters the models also assume two types of variations at the level of change, a short term variation based on data from the previous period and the long term variations partly based on previous data, but also including a qualitative evaluation of expectations regarding long term tendencies. In order to be able to react to differences in both basic parameters and migration patterns the ethnic component would be preferable because there may be marked differences in demographic behaviours between different ethnic groups. Other subdivisions of the population could be appropriate to the extent that group-based differences may influence the final results. A major problem in this context, however, is that such additional subdivisions may be very difficult to gain access to, especially in relation to the longer time series that would be needed in order to provide a proper basis for projections.

The results shown are based on a Nordregio-developed model which can be applied to the individual Nordic territories. Using one model would be an advantage in the sense that the

influence of national differences in approaches could be prevented and the results would therefore be comparable. Moreover, to the extent that data on intra-regional migration between the Nordic countries could be made accessible, the potential impacts of major regional initiatives in one country on other countries and regions could be forecast.

As noted previously several challenges exist in relation to the development of this type of projections. Basic data such as birth rates, death rates etc., subdivided into the chosen groups needs to be available for an appropriate time period in order to provide data for the short term projections. What is 'appropriate' depends on the variations of the variables over time. Each of the sub-groups needs to consist of a considerable number of persons in order to prevent random variations from being decisive for the outcome of the model. In relation to long term trends, again a fairly long time series is needed, in combination with a good idea of what kinds of changes in parameters could be expected. With a regional subdivision of the data the demands in terms of input to the model increase substantially. Regional populations being smaller in number are more exposed to random changes while access to detailed data is more difficult than to aggregated data.

The results generated by the model are discussed in the main texts, and basically confirm what is discussed, namely that there are marked differences between the regions in relation to projected age and gender structures, positioning the regions in very different situations when policies on demographic change are discussed and formulated.

Table 1-3: SE11 Stockholm, SE12 Östra Mellansverige, SE211 Småland med öarna

		1990	1995	2000	2005	2010	2015	2020	2025	2030	2040	2045	2050	%	%	
SE11 Stockholm	Män															
	0-14	147 237	165 090	175 415	176 625	190 508	199 997	209 805	219 612	229 420	239 227	2 48 035	258 842	268 650	18,49	18,92
	15-24	108 448	102 231	100 418	110 017	130 230	125 674	130 839	135 944	141 079	146 214	151 349	156 484	161 619	13,34	11,38
	25-64	440 136	470 305	513 907	530 911	561 735	594 540	624 920	655 301	685 681	716 062	7 46 442	776 822	807 205	55,28	56,85
	64+	100 405	102 472	103 944	110 810	133 727	152 766	140 364	144 212	153 486	160 688	1 67 890	175 092	182 295	12,61	12,84
	Kvinnor	146 426	160 068	169 184	176 301	190 620	199 997	209 805	219 612	229 420	239 227	2 48 035	258 842	268 650	18,49	18,92
	0-14	140 136	146 709	155 064	156 025	169 995	180 044	189 995	199 997	209 805	219 612	2 36 487	243 779	253 085	18,36	17,37
	15-24	110 389	101 945	100 311	108 104	126 517	131 242	134 662	139 981	144 962	150 659	1 56 436	162 174	167 911	13,06	11,57
	25-64	429 297	468 708	511 549	530 109	561 735	594 540	624 920	655 301	685 681	716 062	7 46 442	776 822	807 205	55,28	56,85
	64+	155 601	157 300	154 802	155 338	173 416	177 212	183 404	188 444	192 576	197 967	2 03 357	208 748	214 139	18,40	14,75
Total	942 443	985 058	991 356	991 304	1 000 140	1 000 140	1 000 140	1 000 140	1 000 140	1 000 140	1 000 140	1 000 140	1 000 140	100,00	100,00	
		1 641 689	1 725 736	1 823 210	1 889 945	2 064 345	2 148 732	2 251 659	2 352 440	2 454 784	2 558 957	2 665 091	2 767 244	2 871 397	100,00	100,00
		1990	1995	2000	2005	2010	2015	2020	2025	2030	2040	2045	2050	%	%	
SE12 Östra Mellansverige	Män															
	0-14	136 885	146 872	141 784	133 794	132 284	131 640	129 412	127 184	124 956	122 728	120 500	118 272	116 044	18,92	13,24
	15-24	104 655	98 044	91 234	100 888	112 038	106 655	108 416	110 177	111 938	113 699	115 460	117 221	118 982	14,47	13,58
	25-64	371 099	387 755	396 453	402 785	425 138	415 979	423 890	431 801	439 712	447 623	455 533	463 444	471 355	51,29	53,80
	64+	110 847	111 217	110 035	116 089	135 007	132 587	137 504	143 221	148 938	154 655	160 372	166 089	171 806	15,32	19,38
	Kvinnor	723 486	743 888	759 506	753 537	782 467	786 880	799 631	812 382	825 143	837 905	850 666	863 427	876 188	100,00	100,00
	0-14	129 386	139 417	134 715	127 705	125 195	125 255	123 246	121 237	119 227	117 218	115 208	113 199	111 190	17,60	12,35
	15-24	98 390	93 299	86 822	95 769	106 614	105 447	109 351	113 254	117 157	121 060	124 963	128 866	132 769	13,39	14,05
	25-64	380 364	375 316	383 300	391 437	391 554	400 231	408 960	417 691	426 421	435 151	443 881	452 611	461 341	49,06	53,03
	64+	146 656	149 216	147 735	149 639	165 413	161 512	164 906	168 299	171 692	175 085	178 478	181 871	185 264	19,95	20,57
Total	734 996	757 248	752 572	764 540	786 781	802 445	815 486	827 002	844 446	858 460	872 473	886 487	900 500	100,00	100,00	
0-14	266 271	286 289	276 489	261 489	257 479	256 895	252 668	248 420	244 183	239 946	235 708	231 471	227 235	18,26	12,79	
15-24	305 045	391 549	378 096	396 037	418 032	412 102	417 767	423 481	429 195	434 909	440 623	446 337	452 051	13,82	13,82	
25-64	731 663	765 071	779 753	794 225	794 692	806 210	811 883	817 556	823 229	828 902	834 575	840 248	845 921	50,17	53,41	
64+	227 200	200 403	227 770	202 060	290 422	294 099	302 009	311 320	320 631	329 942	339 253	348 564	357 875	17,60	19,99	
Total	1 458 482	1 501 136	1 492 078	1 518 077	1 569 248	1 589 305	1 615 117	1 640 384	1 665 589	1 690 794	1 715 999	1 741 204	1 766 409	100,00	100,00	
		1990	1995	2000	2005	2010	2015	2020	2025	2030	2040	2045	2050	%	%	
SE21 Småland med öarna	Män															
	0-14	77 172	80 512	75 943	70 238	66 866	64 880	61 792	58 705	55 615	52 526	49 437	46 349	43 260	19,32	10,58
	15-24	57 455	52 405	48 692	53 190	57 671	54 248	54 389	54 491	54 612	54 734	54 856	54 977	55 099	14,39	13,47
	25-64	197 685	204 129	206 485	207 959	206 154	210 715	212 790	214 866	216 941	219 016	221 091	223 166	225 241	49,50	55,08
	64+	67 042	66 361	65 160	67 014	75 300	73 326	75 045	76 760	78 475	80 190	81 905	83 620	85 335	16,79	20,87
	Kvinnor	399 354	423 408	396 280	398 401	425 951	423 167	428 994	434 720	440 446	446 172	451 900	457 626	463 352	100,00	100,00
	0-14	75 124	76 369	72 136	66 365	60 347	61 348	58 345	55 347	52 349	49 351	46 353	43 355	40 357	18,45	9,96
	15-24	52 784	48 996	45 309	50 091	53 713	51 075	51 372	51 671	51 970	52 270	52 569	52 868	53 167	13,13	13,14
	25-64	194 200	196 204	197 932	199 143	197 341	200 099	202 400	204 701	207 002	209 303	211 604	213 905	216 206	47,29	52,25
	64+	84 620	86 201	85 495	86 026	91 239	90 635	91 941	93 248	94 554	95 860	97 167	98 473	99 779	21,05	24,66
Total	1 011 901	1 048 056	1 000 842	1 000 842	1 028 098	1 028 098	1 028 098	1 028 098	1 028 098	1 028 098	1 028 098	1 028 098	1 028 098	100,00	100,00	
0-14	150 426	157 107	148 099	136 631	130 193	126 209	120 114	114 020	107 926	101 832	95 738	89 643	83 549	18,77	10,27	
15-24	110 219	101 402	94 001	103 281	105 741	105 741	105 741	105 741	105 741	105 741	105 741	105 741	105 741	13,76	13,76	
25-64	388 948	400 393	404 417	407 102	425 495	411 612	415 192	418 773	422 353	425 933	429 513	433 094	436 674	48,54	53,67	
64+	151 662	152 562	150 655	153 040	166 539	165 961	166 584	170 008	173 051	176 094	179 137	182 180	185 224	18,95	22,75	

Table 4-6: SE222 Sydsverige, SE23 Västverige, SE31 Norra Mellansverige

		1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050	%	%	%
SE222 Sydsverige																	
Män	0-14	110 601	118 895	118 334	114 979	119 055	120 270	121 570	122 869	124 168	125 467	126 766	128 066	129 365	18,49	15,53	
	15-24	83 913	80 326	76 224	83 767	90 538	97 479	97 851	99 164	97 478	99 791	102 104	104 418	106 731	14,08	12,81	
25-64	308 988	326 037	338 237	338 237	351 083	363 801	367 124	374 222	390 419	401 254	412 089	422 924	433 759	444 594	51,66	53,36	
	64+	94 590	95 660	96 239	101 846	117 229	116 552	121 688	126 845	131 991	137 138	142 284	147 430	152 577	15,82	18,31	
Kvinnor		598 082	620 918	629 094	651 675	686 844	694 484	710 341	735 297	754 891	774 485	794 078	813 672	833 266	100,00	100,00	
0-14	105 765	115 485	112 582	108 809	112 418	113 200	113 200	114 062	114 924	115 786	116 648	117 510	118 372	119 234	17,08	14,10	
	15-24	80 212	77 157	73 484	81 500	90 868	88 341	90 906	95 472	96 057	96 603	101 168	103 734	106 299	12,92	12,57	
25-64	304 145	319 090	332 023	344 107	355 040	368 924	368 924	381 605	394 286	406 967	419 648	432 329	445 010	457 692	54,13	54,13	
	64+	130 998	133 808	132 633	134 069	144 386	143 314	146 029	154 716	156 841	159 807	162 880	165 953	169 026	21,08	19,20	
Total		621 059	645 550	650 712	668 485	702 712	713 778	732 602	751 426	770 250	788 074	807 898	826 722	845 547	100,00	100,00	
0-14	216 366	232 390	230 916	223 788	231 473	233 470	233 470	235 631	237 793	239 954	242 115	244 276	246 437	248 599	17,75	14,81	
	15-24	164 125	157 483	148 708	165 267	184 627	178 878	183 757	188 696	193 515	198 594	203 772	208 151	213 030	13,46	12,69	
25-64	613 131	645 127	670 320	695 190	718 841	736 048	736 048	755 827	784 705	803 221	831 737	853 253	878 789	902 285	50,29	53,75	
	64+	225 529	229 468	228 672	235 915	261 615	259 866	267 727	275 589	283 451	291 513	299 175	307 037	314 899	18,50	18,76	
Total		1 219 151	1 264 468	1 279 616	1 320 160	1 396 556	1 408 262	1 442 943	1 486 723	1 525 141	1 565 559	1 601 977	1 640 395	1 678 813	100,00	100,00	
SE23 Västverige																	
Män	0-14	158 138	173 176	170 381	162 732	161 153	163 784	163 338	162 893	162 448	162 002	161 557	161 111	160 666	18,82	14,43	
	15-24	119 086	109 869	105 467	117 589	129 386	124 795	127 657	130 479	133 321	136 163	139 005	141 847	144 689	14,17	12,99	
25-64	482 914	483 579	471 086	485 605	481 872	511 996	511 996	526 990	536 990	546 990	556 990	566 990	576 990	586 990	51,52	55,41	
	64+	130 200	131 458	130 822	136 305	154 997	153 089	158 533	163 977	169 421	174 865	180 309	185 753	191 197	15,49	17,17	
Kvinnor		840 308	866 082	877 766	902 231	957 408	953 664	976 499	999 334	1 022 168	1 045 003	1 067 838	1 090 673	1 113 508	100,00	100,00	
0-14	145 764	165 481	160 952	153 840	157 040	154 538	154 538	154 538	153 938	153 938	153 938	153 938	153 938	153 938	17,50	13,75	
	15-24	113 961	104 900	100 164	111 087	123 258	118 108	120 586	123 065	125 543	128 021	130 499	132 977	135 455	13,52	12,33	
25-64	419 822	440 208	456 871	471 755	478 884	498 404	498 404	513 376	528 344	543 312	558 280	573 248	588 216	603 179	49,06	54,89	
	64+	172 165	175 158	173 892	175 310	188 151	186 805	189 826	193 047	196 268	199 488	202 709	205 930	209 151	20,12	19,03	
Total		855 710	885 757	881 879	912 062	942 373	957 661	977 827	997 995	1 018 159	1 038 325	1 058 491	1 078 657	1 098 823	100,00	100,00	
0-14	307 922	356 667	331 333	316 672	313 193	318 322	318 322	317 376	316 451	315 486	314 540	313 595	312 650	311 704	18,16	14,09	
	15-24	232 997	214 769	205 631	228 676	252 644	242 904	248 224	253 544	258 864	264 184	269 504	274 824	280 144	13,74	12,66	
25-64	852 736	883 787	927 967	957 360	970 756	1 010 405	1 010 405	1 040 366	1 070 328	1 100 289	1 130 250	1 160 212	1 190 173	1 220 134	50,28	55,15	
	64+	302 365	306 616	304 714	311 615	343 188	339 684	348 359	357 024	365 689	374 353	383 018	391 683	400 348	17,83	18,10	
Total		1 696 018	1 751 839	1 769 645	1 814 323	1 879 781	1 911 324	1 954 325	1 997 326	2 040 327	2 083 328	2 126 329	2 169 330	2 212 331	100,00	100,00	
SE31 Norra Mellansverige																	
Män	0-14	78 338	81 756	75 782	68 643	64 356	61 644	57 584	53 525	49 465	45 405	41 345	37 286	33 226	18,28	8,95	
	15-24	58 252	52 805	47 705	52 447	56 523	52 402	51 638	51 257	50 875	50 494	50 112	49 730	49 348	13,59	13,40	
25-64	217 887	221 386	219 242	218 024	211 475	212 747	212 747	211 128	209 510	207 891	206 273	204 654	203 035	201 417	50,83	54,27	
	64+	74 163	72 688	70 841	72 012	80 826	77 901	79 166	80 431	81 696	82 961	84 226	85 491	86 756	17,30	23,38	
Kvinnor		428 640	428 625	413 570	411 126	413 420	404 684	399 899	395 104	390 309	385 514	380 719	375 924	371 129	100,00	100,00	
0-14	74 072	77 265	71 998	65 353	61 510	58 769	58 769	55 025	51 282	47 538	43 794	40 051	36 307	32 564	17,11	8,95	
	15-24	53 301	48 251	44 130	48 302	52 059	48 379	48 055	47 682	47 349	47 016	46 682	46 349	45 976	12,31	12,64	
25-64	208 418	211 449	209 196	207 744	202 526	202 660	202 660	200 871	199 082	197 293	195 504	193 715	191 927	190 138	48,38	52,26	
	64+	96 040	95 876	93 630	92 512	97 705	95 142	95 139	95 136	95 132	95 129	95 125	95 122	95 119	22,19	26,15	
Total		482 831	483 841	418 954	413 911	413 400	404 950	399 071	393 191	387 312	381 433	375 554	369 875	363 795	100,00	100,00	
0-14	152 410	159 021	147 780	133 996	125 906	120 413	120 413	112 609	104 806	97 003	89 199	81 396	73 593	65 790	17,69	8,95	
	15-24	111 553	102 056	91 835	100 749	108 582	100 780	100 055	99 330	98 606	97 861	97 156	96 431	95 706	12,95	13,02	
25-64	427 305	432 835	428 438	425 768	415 801	415 407	415 407	411 999	408 592	405 184	401 777	398 369	394 962	391 554	49,60	53,28	
	64+	170 208	168 564	164 471	164 524	178 531	173 048	174 305	175 567	176 828	178 090	179 351	180 613	181 875	10,76	24,75	
Total		861 471	862 476	833 524	825 037	826 820	809 643	798 969	788 295	777 621	766 947	756 275	745 599	734 925	100,00	100,00	

Table 7-9: SE32 Mellemsta Norrland, SE33 Övre Norrland and Total

		1990	1995	2000	2005	2010	2015	2020	2025	2030	2040	2045	2050	%	%
SE32 Mellemsta Norrland															
Män															
0-14		35 923	36 548	33 309	30 597	29 282	27 362	25 459	23 515	21 592	19 745	18 022	15 999	18 10	9,22
15-24		27 156	24 544	22 084	22 885	24 190	21 895	21 135	20 376	19 617	18 858	18 099	17 340	16 581	11,00
25-64		100 422	101 359	99 608	98 441	94 753	94 640	93 214	91 789	90 365	88 937	87 512	86 086	84 661	56,17
64+		34 981	32 861	32 859	34 111	36 255	34 657	34 910	34 910	35 047	35 184	35 457	35 593	35 593	23,61
		198 482	196 562	187 862	184 852	184 480	178 593	174 562	170 591	166 619	158 676	154 705	150 734	100,00	100,00
Kvinnor															
0-14		33 933	34 513	31 621	29 301	28 178	26 493	24 830	23 148	21 476	19 804	18 132	16 459	14 787	17,10
15-24		24 901	22 845	19 918	21 331	22 579	20 467	19 852	19 236	18 620	18 004	17 388	16 157	15 157	10,60
25-64		95 731	96 080	94 401	93 371	90 482	90 051	88 730	87 410	86 089	84 768	83 447	82 127	80 806	52,99
64+		43 834	43 874	42 667	41 909	43 597	42 445	42 201	41 957	41 713	41 469	41 225	40 981	40 737	26,72
		198 399	197 312	188 607	185 912	184 656	179 455	175 606	171 750	167 896	164 045	160 192	156 340	152 457	100,00
Total															
0-14		69 856	71 061	64 930	59 898	57 460	53 855	50 289	46 664	43 068	39 473	36 277	32 281	28 886	9,46
15-24		52 057	47 389	42 002	44 216	46 769	42 362	40 987	39 612	38 237	36 862	35 487	34 115	32 738	10,80
25-64		196 153	197 439	194 009	191 812	185 235	184 691	181 944	179 198	176 452	173 706	170 959	168 213	165 467	54,57
64+		78 815	77 985	75 528	74 838	79 852	77 082	76 974	76 867	76 760	76 653	76 545	76 438	76 331	25,17
		396 881	396 874	376 469	370 764	369 316	357 989	350 165	342 341	334 517	326 693	318 869	311 045	303 211	100,00
SE33 Övre Norrland															
Män															
0-14		48 965	51 839	47 670	42 895	39 968	37 786	34 892	31 998	29 105	26 211	23 317	20 423	17 529	7,17
15-24		37 254	35 124	32 857	35 788	37 378	35 954	36 045	36 136	36 227	36 319	36 410	36 501	36 592	14,96
25-64		134 754	138 749	136 734	136 166	132 651	133 774	133 095	132 416	131 737	131 059	130 380	129 701	129 022	52,74
64+		37 456	38 768	39 730	41 518	46 437	46 995	49 067	51 138	53 209	55 280	57 351	59 423	61 494	25,14
		259 429	264 480	256 991	256 367	256 434	254 509	253 099	251 699	250 278	248 868	247 458	246 048	244 637	100,00
Kvinnor															
0-14		47 593	49 193	45 092	40 741	37 844	35 708	32 913	30 118	27 323	24 528	21 733	18 938	16 143	6,81
15-24		34 194	33 179	30 483	32 893	33 838	32 618	32 518	32 418	32 319	32 219	32 119	32 019	31 919	13,47
25-64		127 823	130 467	128 911	127 310	124 265	124 612	123 584	122 564	121 544	120 524	119 504	118 484	117 464	46,38
64+		46 659	48 164	50 401	52 081	55 516	56 954	59 017	61 080	63 143	65 206	67 269	69 332	71 395	30,13
		256 274	262 023	254 887	253 025	251 461	249 949	248 088	246 228	244 368	242 507	240 647	238 786	236 926	100,00
Total															
0-14		97 558	101 032	92 762	83 636	77 812	73 494	67 806	62 116	56 427	50 738	45 050	39 361	33 672	6,99
15-24		71 448	68 303	63 340	68 681	71 216	68 572	68 563	68 535	68 546	68 537	68 529	68 520	68 512	14,23
25-64		262 582	265 216	265 645	265 476	265 914	265 444	265 756	265 025	264 321	263 613	262 905	262 197	261 489	51,19
64+		84 115	87 932	90 131	93 599	101 953	103 949	106 083	112 218	118 352	124 486	130 620	136 755	142 889	27,60
		515 703	536 483	511 878	509 392	507 895	504 458	501 137	497 917	494 646	491 375	488 105	484 834	481 563	100,00
TOTAL															
Män															
0-14		794 279	854 688	836 618	800 501	803 712	807 363	803 851	800 299	796 767	793 235	789 703	786 171	782 639	14,44
15-24		596 169	555 349	534 681	576 571	641 175	612 139	632 283	634 406	645 529	656 653	667 776	678 900	690 023	12,74
25-64		2 203 885	2 303 299	2 381 822	2 430 975	2 465 579	2 541 512	2 600 250	2 668 086	2 730 560	2 795 034	2 855 308	2 917 982	2 980 457	51,93
64+		648 684	652 735	648 632	678 503	779 778	776 853	796 449	821 484	851 865	880 164	908 464	936 764	965 064	17,81
		4 244 017	4 366 071	4 392 753	4 486 550	4 690 244	4 728 888	4 832 812	4 924 285	5 024 721	5 123 086	5 221 451	5 319 817	5 418 182	100,00
Kvinnor															
0-14		753 923	810 674	794 180	760 275	761 247	765 335	761 759	758 184	754 609	751 084	747 459	743 884	740 309	13,57
15-24		568 112	531 572	500 621	549 077	609 446	595 675	607 283	620 789	631 366	644 375	657 385	670 395	683 405	12,53
25-64		2 238 582	2 313 582	2 364 976	2 364 976	2 397 165	2 494 100	2 557 061	2 629 177	2 695 284	2 755 149	2 821 015	2 886 881	2 952 746	54,14
64+		876 512	890 597	881 255	886 874	957 468	953 818	974 482	990 954	1 006 538	1 024 381	1 042 224	1 060 067	1 077 910	19,76
		4 346 613	4 471 425	4 480 039	4 561 202	4 725 326	4 808 927	4 895 585	4 999 104	5 081 797	5 171 940	5 268 083	5 361 226	5 454 370	100,00
Total															
0-14		1 548 202	1 665 362	1 630 798	1 560 776	1 564 959	1 572 698	1 565 591	1 558 483	1 551 376	1 544 269	1 537 162	1 530 065	1 522 947	14,01
15-24		1 164 281	1 086 921	1 025 302	1 125 648	1 250 621	1 207 834	1 230 565	1 235 195	1 237 895	1 240 461	1 242 954	1 245 428	1 247 901	12,63
25-64		4 351 951	4 541 881	4 695 805	4 795 951	4 862 744	5 035 612	5 157 311	5 297 262	5 432 844	5 568 184	5 695 323	5 804 863	5 933 203	54,57
64+		1 526 196	1 543 332	1 530 887	1 550 887	1 737 246	1 721 671	1 765 951	1 812 448	1 858 408	1 904 546	1 950 688	1 996 831	2 042 973	17,77
		8 590 630	8 837 496	8 882 792	9 047 752	9 415 570	9 537 815	9 721 398	9 923 388	10 106 518	10 286 036	10 469 335	10 651 043	10 821 511	100,00

Regional consequences of socio-economic intervention

The advantage of using a regional model to analyse development trends in population structures is the possibility it provides of charting the potential impacts of the introduction of major events, for instance the introduction of a large scale industry in a municipality. The model also provides an opportunity to see how the introduction of such an industry might affect not only the local labour market, but also, to some extent, labour markets in other regions.

The specific case used here is from Greenland, and the tool used in this context is similar to that used in the Swedish example in the previous section. The only difference is the definition of a regional structure where each of the regions is defined by their demographic and economic structures more than by their geographical structures.

The age group division is a little more detailed, including the age groups 0-9, 10-19, 20-29, 30-44, 45-64 and 65 years and above, while the regional structure, which is used, is divided into the four regional units: centre towns, centre villages, peripheral towns and peripheral villages. In addition the gender parameter has also been included, while the major demographic parameters include the natural reproduction parameters as well as national and international migration parameters. In order to trace the details of the latter parameters all internal mobility has been based on mobility patterns between the above-mentioned types of towns and villages over the last 20 years.

As a starting point for the analysis the model's main forecast of population development in Greenland is shown in figure 23 below.

The case study involves the following *problematique*. A large scale industry – in the example an aluminium plant in a region – is introduced in 2012. In the construction phase an unknown number of persons (but probably around 5.000) will be involved, but the company will provide a substantial part if not all of this. During the establishment period, with a duration of some 5 years, a total of 600 permanent jobs will be created, the vast majority based on workers from Greenland. In the planning of the future development the following are assumed:

- 1) The company is established in a city centre area.
- 2) Half of the jobs are taken by the local labour force, the other half are filled through labour coming from villages in the centre area or town and villages in remote area.
- 3) Two thirds of the jobs are considered to be jobs primarily aimed at men while the remainder will be jobs available for women.
- 4) Half of the jobs will be filled by people who come as singles and half the workforce will be with one or two persons in existing families.
- 5) In the family group two out of three would be families without children while one out of three families will be families with two children.

In addition to the direct attraction of new employment opportunities a significant side effect would be the accompanying spouses or partners as well as the accompanying children becoming important parameters in the demographic consequences of the region concerned. In some cases two persons in the same family may be looking for jobs in the new industry, but for many of the accompanying persons the situation would be an additional contribution to the local labour market in the town with the new industry.

Using the model under these constraints the results in output terms are illustrated in figure 24 below:

While the jobs are offered in one of the centre towns the lack of both qualifications and available persons leads to an influx of persons from other towns and villages. The lowest numbers are from the villages in the centre region because the job opportunities in the centre towns are already exploited, leaving the centre-villages either with a lack of persons in the relevant age groups, because they have already moved, or the villages are in such a strong position job wise that only a limited number of persons will be tempted by the new opportunities.

The situation is much different when it comes to what are characterised as “periphery towns”. These towns have marked limitations in what kinds of jobs are offered, so a substantial number of persons will make use of the new opportunities and chose to move. A similar

situation characterises the villages in the periphery, thus from these regions also a substantial number of persons would choose to move.

The moving of several hundred persons from towns in the periphery and around a hundred or so persons from the peripheral village is in itself a problem for these places. What is most challenging, however, is the fact that those choosing the option of moving will likely be that part of the population who are among the best trained and most skilled, leaving surrounding towns and villages with voids in these fields which may be extremely difficult to compensate for because these places may be much less able to attract replacements from other towns and villages.

The direct effects of the introduction of the new activity are seen just before and after the

introduction date. But it is quite clear that the long term consequences are much more substantial than the immediate effects. While the introduction of a new group of young well-qualified workers in the centre town has a continuous positive multiplier effect throughout the whole period, resulting in a situation where the creation of 600 jobs eventually leads to a population increase of around 1 200 persons, the exact opposite outcome is likely to be the case with both towns and villages in the periphery. A continued outflow and thus a decline in the population in both settings are the likely consequences. In tandem with these changes we also see a general decline in the general level of qualification among the population due to the fact that the qualified persons have been attracted away from these places.

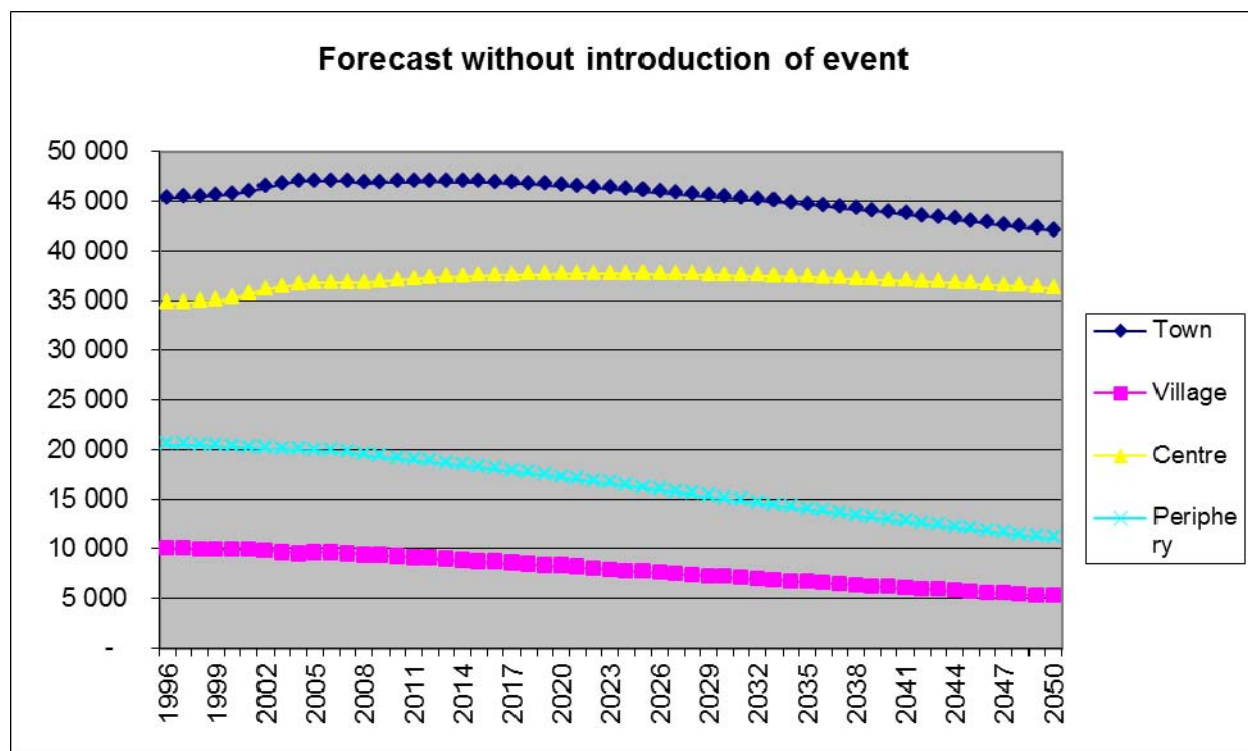


Figure 25: General long term forecast without the introduction of an event.

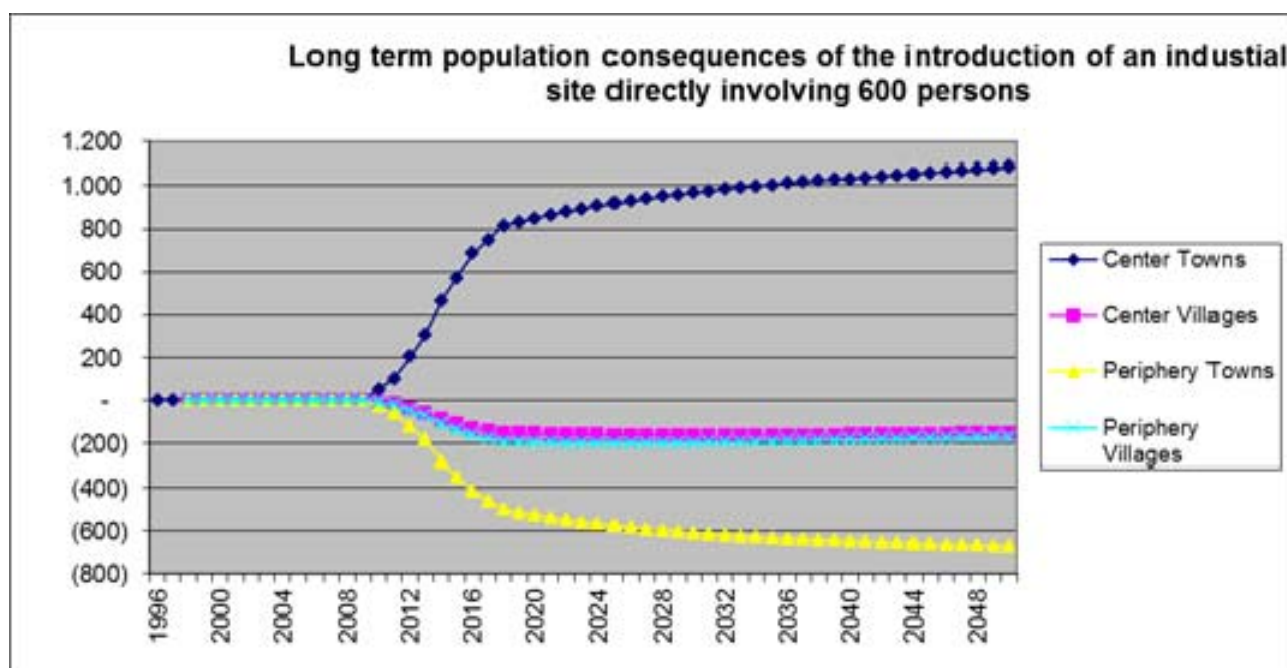


Figure 26: Projected long term population consequences of the introduction of an industrial site in a Greenland centre town. The number of those directly involved includes a total of 6 000 persons, but due to the fact that those involved are accompanied by spouses and children the effect of the initiative includes close to 1 200 persons. The graph shows how four types of settlements: centre towns, centre villages, periphery towns and periphery villages are expected to be influenced by the new activity.

Complex modelling

As indicated in the previous sections forecasting is a risky business when working with complex issues. Moreover, demographic development includes a number of components which may or may not be predictable.

In the previous examples the major elements encompass a model as illustrated below, including some elements which may be predictable within a short to medium timescale such as birth rates, death rates and to some extent also national mobility, because these components will in the main be the result of national policies.

However, in relation to international mobility the mechanisms are way beyond the national policies, though attempts to prevent the effects of what happens internationally may be implemented through precautionary policies. Similarly the consequences of the development of new technologies, the discovery of new resources, the impact of climate change etc., are beyond national or even international control. In addition, the impact of globalisation may have a marked impact on the processes of changes, and may be able to generate changes within a relatively short space of time.

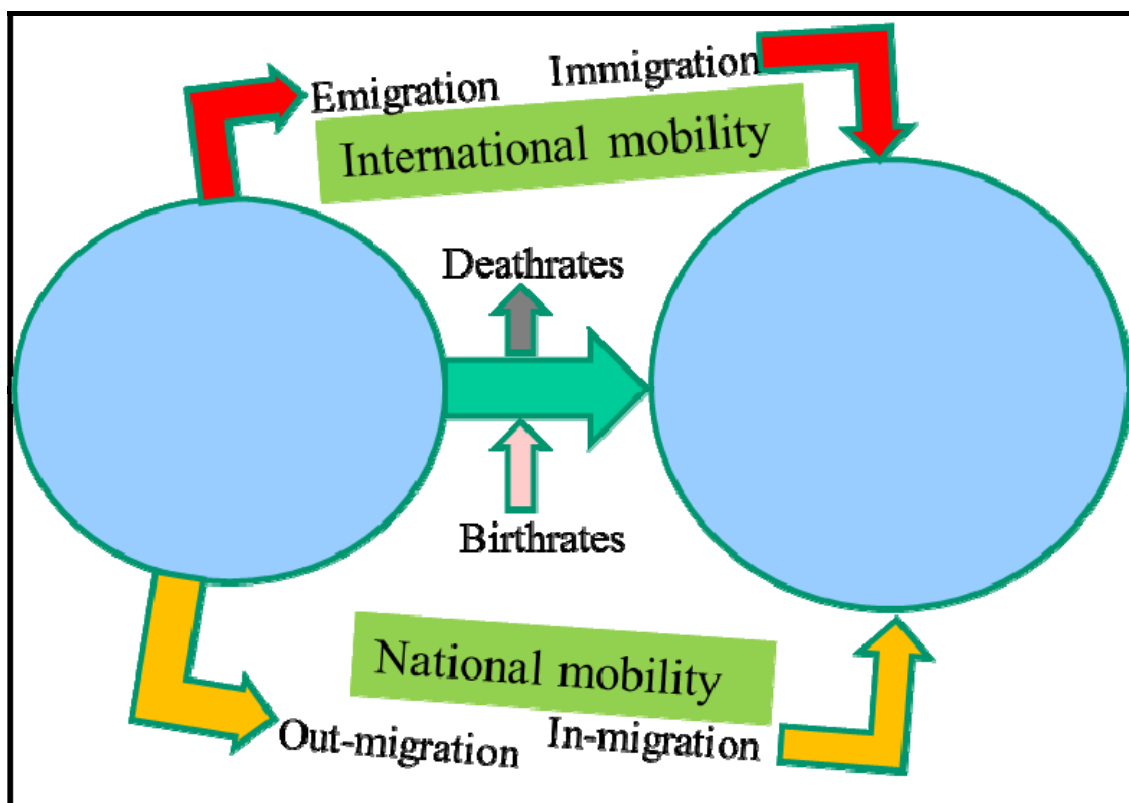


Figure 27: Main components in the modelling of demographic changes.

As a consequence the complex modelling of the demographic components aiming at what previously has been characterised as the generating of a “steady state” forecast, i.e. a forecast based on the evolutionary development of the different components, could be characterised as shown in the illustration below.

When looking at a 5-15 year time span one may consider the outcome to be predictable as long

as there are time series supporting the suggested future trends of the components. In a longer perspective such as 20-30 years the modelling may generate plausible results because such a time span indicates a generation.

Major shifts usually take place in connection with generational shifts. So beyond such a time period one may presume an outcome, while also accepting that major changes in the assumptions are likely to occur.

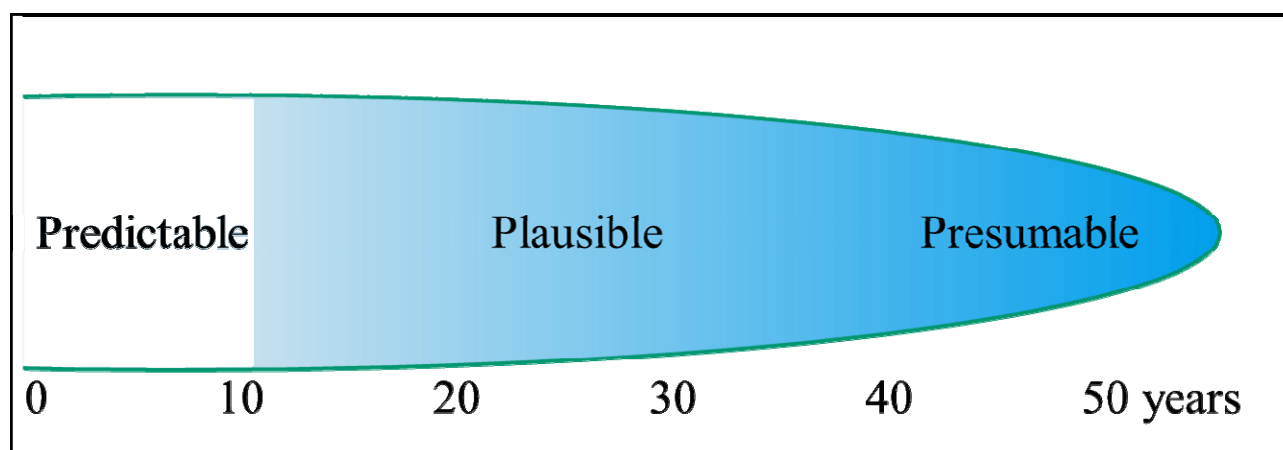


Figure 28: *Durability of “Steady state” forecasts.*

The role of turning points

Turning points are events that tend to change demographic processes from a steady state (described by a certain paradigm) into an unprecedented situation (often referred to as a shift in paradigm). The concept was introduced by Hervé Le Bras (2008) in connection with the OECD's attempt to predict the future needs of Higher Education (OECD: Higher Education to 2030, Vol. 1: Demography).

A major conclusion in the report is that turning points in fact play the most important role in demographic trends and consequently that demographic trends cannot be extrapolated directly

but can only be explored through forward-looking scenarios incorporating political and economic factors which act as drivers in the processes of shifts in demographic paradigms.

Two examples brought forward by the OECD helps to illustrate the level of complexity. The first relates to the question of the predictability of future changes where the changes in fertility from 1955 to 2000 are quite illustrative. The graph below shows the fertility rate for 23 EU countries in 1955-60 on the x -axis and 2000-05 on the y -axis, each dot representing a country.

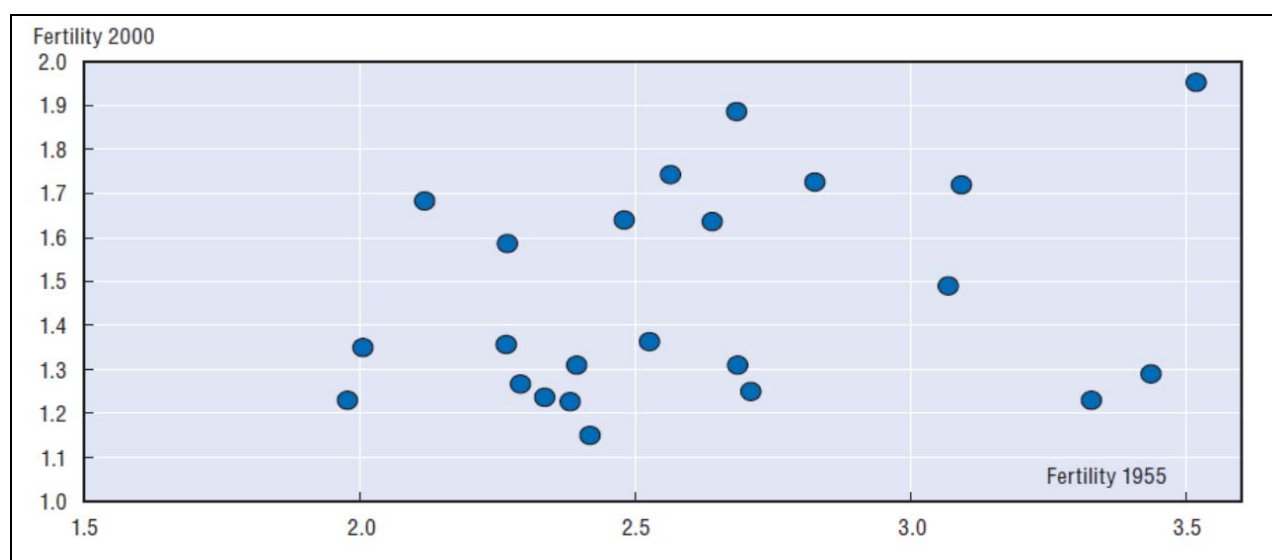


Figure 29: Fertility comparison of 23 EU countries. Fertility in 1955-60 and in 2000-05. Each country is shown by a dot. (EU24 minus Cyprus). Source: Hervé/OECD.

It is quite clear that the fertility level has dropped from between 2.0 and 3.5 down to somewhere between 1 and 2. But there is no clear pattern in the changes. If the drop in fertility had followed a general trend the outcome would have been a more or less straight line, with low values in 1955 dropping to lower values in 2000, and higher values in 1955 would have dropped to lower levels, but still maintained their position at the higher end in 2000. In the high end in 1955, however, we have countries which are still at the high end in 2000 as well as countries which have dropped to the low

end in 2000. Moreover, some countries which were at the low end in 1955 now appear at the high end of the scale in 2000.

The second example, brought forward by Hervé/OECD, is the change in fertility rates in Norway, Sweden and Denmark between 1950 and 2000 by means of the illustration reproduced in figure 30 below. As emphasised by the author there are many common characteristics in relation to the political, cultural, and economic characteristics of these three countries, and as a consequence the

changes in fertility rates have followed more or less similar patterns over this 50 year time period.

The levels differ somewhat as does the exact point of time when trends change. But the patterns run in parallel, with Sweden as the country with the highest level of industrialisation, showing the lowest level during the first 30 years. Denmark is in the middle, between Sweden and Norway as regards industrialisation, while Norway remains predominant in terms of the primary sectors, maintaining also a traditionally higher level of births. The high level of social services in Sweden,

especially after 1985 when – as described in the text: “Sweden adopted a number of measures designed to enable parents to stay at home when their children were very young”. This saw the fertility rate immediately soar.

A number of countries, including France, thought that Sweden had found the magic formula for pronatalism, but they were mistaken. A few years later, once the benefit of the measures had been reaped, the fertility rate fell below Denmark’s, largely offsetting the gain in fertility achieved earlier. Then, at the end of the period, both countries returned to the same rate” (Le Bras 2008,31).

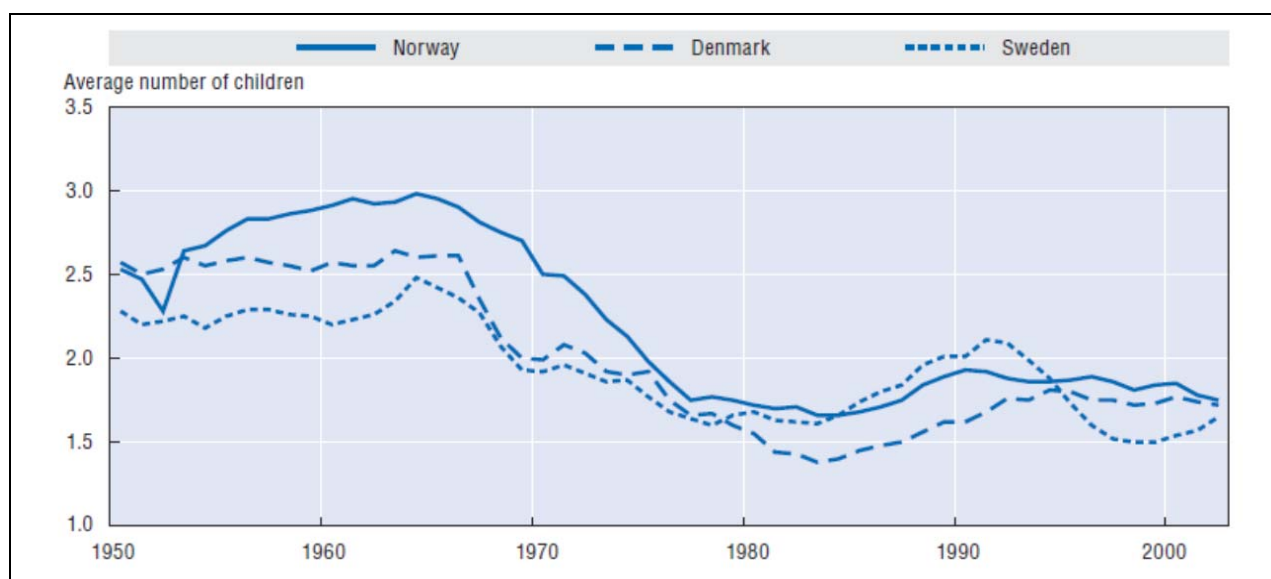


Figure 30: Comparing trends in fertility rates in Norway, Sweden and Denmark from 1950 to 2003. Source: Hervé/OECD.

In addition to the above-mentioned examples the report by Hervé for the OECD is quite clear, namely that the possibilities of forecasting demographic trends seem to be fairly limited. Again, to quote the report: “It is impossible to make a demographic forecast independently of an economic and political forecast. A long-term population forecast assumes implicitly that no event will occur. It drifts in an unreal world aptly illustrated by the migration projections conducted by the United Nations” (Le Bras 2008,38).

The decisive point would be to what extent political and economic events are predictable, and as has been emphasised before, such predictions are dependent on a large number of issues such as technological forecasts, predictions on future resource use, changes in climate etc., **and** the

modelling of the inter-relations between these conditions. In a short term perspective – as long as we are talking about “steady state” situations we may be able to come up with plausible projections and apply pro-active measures in meeting the challenges.

In a long term perspective however a focus on pro-active measures as a secure way of meeting the future has its limitations as the nature of turning points is to be unpredictable the evaluation of long term consequences requires other means and measures. This includes tools such as the development of scenarios where different paths are tested and foresight development where the ability of communities to be reactive and to respond to changes through the exchange of experiences would be more important.

References

Data sources:

NSIs - National statistical institutes:

Danmarks Statistik (Statistics Denmark).
<http://www.dst.dk/>

Hagstova Føroya (Statistics Faroe Islands).
http://www.hagstova.fo/portal/page/portal/HAGSTOVAN/Hagstova_Foroya

Hagstofa Íslands (Statistics Iceland).
<http://www.hagstofa.is/>

Kalaallit Nunaanni Naatsorsueqqissaartarfik (Statistics Greenland).
<http://www.stat.gl/Home/tabid/36/language/da-DK/language/en-US/Default.aspx>

Statistiska centralbyrån (Statistics Sweden).
<http://www.scb.se/>

Statistisk sentralbyrå (Statistics Norway).
<http://www.ssb.no/>

Tilastokeskus (Statistics Finland).
http://pxweb2.stat.fi/database/StatFin/databasetree_fi.asp

Le Bras, Hervé: Are Long-term Demographic Forecasts Possible? Turning Points and Trends. In: OECD (2008): Higher Education to 2030. Volume 1: Demography

Nordic Statistical Yearbook 2010.

Rasmussen, Rasmus Ole, Johanna Roto m.fl. (2010). Mobilitet i Grønland – en sammenfattende analyse. Nordregio 2010. http://www.smv.gl/DK/mobilitet/rapporter/samlet_mobilitet_v04_feb2010.pdf. [Visited 5 August 2011].



NORDREGIO
Nordic Centre for Spatial Development

Nordregio
P.O. Box 1658
SE-111 86 Stockholm, Sweden
nordregio@nordregio.se
www.nordregio.se
www.norden.org



norden

Nordic Council of Ministers

ISSN 1403-2511