STATE OF THE NORDIC REGION 2020



Nordic Council of Ministers

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Julien Grunfelder, Gustaf Norlén, Linda Randall and Nora Sánchez Gassen (eds.)

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Nordic Council of Ministers
Nordens Hus
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COUNTRY CODES FOR FIGURES

AX	Åland
DK	Denmark
FI	Finland
FO	Faroe Islands
GL	Greenland
IS	Iceland
NO	Norway
SE	Sweden

EU	The European Union
EU15	The 15 European Union member States (member countries prior to May 1st, 2004)
EU28	The 28 European Union member States (member countries in 2019)

OTHERS

BSR	Baltic Sea Region
CCS	Carbon capture and storage
CNS	Carbon-neutral scenario
CO_2	Carbon dioxide
EDP	Entrepreneurial discovery process
EFTA	European free trade agreement
ESPON	European spatial planning observation network
HDI	Household disposable income
HDI	Human development index
GIS	Geographic information system
GDP	Gross domestic product
GHG	Greenhouse gas
GRP	Gross regional product
ILO	International labour organisation
ISO	International organization for standardization
kWh	Kilowatt hour
LAU	Local administrative unit
LFS	Labour force survey
LLM	Local labour market
LLMA	Local labour market area
NACE	Statistical classification of economic activities in the European Community
NETP	Nordic energy technology perspectives
NOK	Norwegian crowns
NSI	National statistical institute
NSPA	Northern sparsely populated areas
NUTS	Nomenclature of territorial units for statistic
OADR	Old-age dependency ratio
OECD	Organisation for economic co-operation and development
PPP	Purchasing power parity
POADR	Prospective old-age dependency ratio
R&D	Research & development
RIS	Regional innovation scoreboard
RPI	Regional potential index
S3	Smart specialisation strategy
SCB	Statistics Sweden
SDG	Sustainable development goals
TPES	Total primary energy supply
UN	United Nations
UNFCCC	United Nations framework convention on climate change
WHO	World health organisation

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Preface

STATE OF THE NORDIC REGION 2020

The Nordic Council of Ministers has a vision of the Nordic Region as the most sustainable and integrated Region in the world in 2030. *State of the Nordic Region 2020* takes a closer look at the whole of the Nordic Region, at regional and local level, and at progress towards this goal. The report is a valuable tool for detecting and analysing short- and long-term changes within countries. It is also precisely the kind of tool that will help us realise our vision.

We in the Nordic countries – Denmark, Finland, Iceland, Norway, Sweden – as well as the Faroe Islands, Greenland and Åland are proud of many of the characteristics of our part of the world. We have low levels of inequality, balanced welfare provisions and dynamic, innovative and resilient economies. Our democracy and our welfare model are based on high levels of education and long-life expectancy, combined with substantial investments in research and innovation. Mobility and macroregional integration allow us to study, travel, work and start businesses in each other's countries. The peaceful, democratic and inclusive nature of our communities helps make our societies strong and resilient.

However, we also face significant challenges, e.g. the ageing population will put pressure on the welfare model and affect the state of the labour market. State of the Nordic Region 2020 also reveals what work will look like in the Nordic regions in the future and the changes expected due to rapid automation. Tools already exist to help regions prepare for this: they need to turn these challenges into advantages by focusing on resilience and drawing up smart strategies to respond to change. I am delighted to discover that this work has already started in some of the regions. Others need to be encouraged to do the same.

We have frequently shown that the Nordic countries are stronger together. We learn from each other and share experiences to accumulate knowledge and highlight best practices. Sharing knowledge is also what crystallises the main purpose of this report: to provide insights, from local, regional and national levels to the Nordic level, using infographics, maps, data and analyses. As a Nordic information package, this report is one of a kind. The socio-economic trends studied in it are key indicators for all of us who work with development. It shows the results of our work and helps us detect where a shift in focus is needed. The 12 chapters constitute a basis for policy development in a diverse Nordic Region.

The findings, facts and trends in the report will be fed into the Nordic Council of Ministers and will help it to achieve the vision of being the most sustainable and integrated region in the world in 2030. Let's aim high and work hard to get there. Let's do it together. Starting today.

Paula Lehtomäki
The Secretary General,
Nordic Council of Ministers



PHOTO: UNSPLASH.COM

INTRODUCTION

Chapter 1

INTRODUCTION

Authors: Kjell Nilsson and Johanna Carolina Jokinen
Maps and data: Johanna Carolina Jokinen

The most sustainable and integrated region in the world

The Nordic Region contains a multitude of natural resources, from the marine environments off the Icelandic and Norwegian coasts to the vast forests of Finland and Sweden and the fertile agricultural soils in Denmark. Add to this the rich availability of cheap renewable energy from Danish wind turbines, Swedish and Norwegian rivers, biomass in Finland and hot springs in Iceland, not to mention world-class technological development. Each Nordic country has its own strengths and comparative advantages, and together they form one of the world's most prosperous regions.

At 3,425,804 square kilometers (km^2), the total combined area of the Nordic Region would form the seventh largest nation in the world. However, uninhabitable icecaps and glaciers comprise about half of this area, mostly in Greenland. More relevant is the fact that, together, the Nordic countries comprise the 12th largest economy in the world (World Bank, 2019). Even though the Nordic countries make up a very small proportion of the world's population (0.35%) when they act together, they provide the conditions for increased Nordic influence on solutions to global challenges.

It has repeatedly been shown that the Nordic countries are strongest when they stand together. For example, in terms of gender equality and welfare, the Nordic model has led to Europe's highest employment rates and stable economic growth (OECD 2018). Similar cultures and languages support the development of a common Nordic identity with a unique trust in national, regional and local authorities (Stende 2017). Investment in education, innovation and research is generally high. Mobility and integration are priorities, ensuring that people can study, travel, work and start businesses wherever they want within the Nordic Region. All of these qualities characterise the Nordic Region, creating happy communities that are robust in the face of challenges such as economic crises (Wooldridge 2013, Andreasson 2018).

In its recently adopted vision for 2030, the Nordic Council of Ministers has chosen to focus on the global challenges posed by climate change, pollution and biodiversity threats, as well as on the growing challenges to the Nordic welfare model in which our democracy and open, integrated society are under pressure. The Nordic Council of Ministers therefore has a vision of becoming the world's most sustainable and integrated region by 2030. To realise this vision, we will focus on three strategic priorities extending to 2024:

1. A Green Nordic Region – to promote the green transformation of our societies, and work for carbon neutrality and a sustainable, circular and bio-based economy.
2. A Competitive Nordic Region – to promote green growth in the Nordic economies based on knowledge, innovation, mobility and digital integration.
3. A Socially Sustainable Nordic Region – to promote an inclusive, equal and cohesive region with shared values, stronger cultural exchange and increased welfare.

It has repeatedly been shown that the Nordic countries are strongest when they stand together

Since 2018, the publication of *State of the Nordic Region* has been directly overseen centrally by the Nordic Council of Ministers. The current edition will therefore follow up on these three priorities. A Green Nordic Region is mainly dealt with in Chapters 8 and 11, a Competitive Nordic Region in Chapters 5, 6, and 7, and a Socially Sustainable Nordic Region in Chapters 2, 3, 4, 9 and 10. Chapter 12 deals with both a competitive and a socially sustainable Nordic Region.

Background to the report

State of the Nordic Region is published every two years and describes ongoing developments in the Nordic Region at municipal and regional levels. This is the 16th in a series of publications that has supplied policymakers and practitioners with comprehensive data and territorial analyses on Nordic regional development since 1981. The report is based on the latest statistical data on demographic change, labour markets, education, economic growth and so on, and the analyses use a broad range of indicators covering these areas. This volume also focuses on two issues closely linked to the concept of beyond GDP, namely carbon-neutrality and wellbeing.

State of the Nordic Region builds on the collection and use of Nordic statistics at local and regional levels. The advantage of collating statistics according to different levels of local and regional government is that it coincides with political responsibilities and thus becomes more relevant to politicians and other decision-makers for whom access to comparable and reliable statistical information is vital. This report should not, however, be viewed as being politically guided or seen as offering political pointers or recommendations. It is important to maintain integrity and independence, both for the credibility of *State of the Nordic Region* and for how it is received and used. When it makes sense to include an international benchmarking approach, the Nordic-focused material is supplemented with statistics and maps addressing the pan-European level.

The ambition is to enhance the Nordic Council of Ministers' analytical capacity and its ability to collaborate across sectors and institutions. *State of the Nordic Region* strengthens Nordic identity and community. Thanks to its continuity and solid data, it offers an important basis for assessing the long-term effects of various policy decisions and initiatives. It includes a rich selection of maps, which makes it suitable for communicating with the public and for marketing the Nordic Region internationally. The Nordic Region shows a strong performance against international comparisons (Andreasson 2017), so *State of the Nordic Region* may also contribute to the strengthening of Nordic influence and competitiveness, both within Europe and globally.

The regional approach

The Nordic Region consists of Denmark, Finland, Iceland, Norway and Sweden, as well as the Faroe Islands and Greenland (both part of the Kingdom of Denmark) and Åland (part of the Republic of Finland). *State of the Nordic Region* is based on a suite of statistics covering all Nordic municipalities and administrative regions. It is worth noting here, however, that several Nordic territories, e.g. Svalbard (Norway), Christiansø (Denmark) and Northeast Greenland National Park (Kalaallit Nunaata avannaarsuani kangianilu Nuna Allanngutsaaliugaq), are not part of the national administrative systems, and thus are not included in the maps.

State of the Nordic Region displays data using national, regional and municipal administrative divisions. There are large differences in terms of size and population of the various administrative units at regional and municipal levels across the Nordic Region. The four largest municipalities by area are all Greenlandic; Kommuneqarfik Sermersooq is the world's largest municipality with 531,900 km^2. At 32,000 km^2, even the smallest Greenlandic municipality, Kommune Kujalleq, significantly exceeds the largest Nordic municipalities outside Greenland (i.e. Kiruna and Jokkmokk in northern Sweden, with approximately 20,000 km^2 each). Excluding Greenland and the Faroe Islands, the average size of a Nordic municipality is 1,087 km^2. The smallest are less than 10 km^2 and these are either island municipalities (e.g. Kvitsøy in Norway or Seltjarnarnes near Reykjavik) or municipalities within the greater capital areas (e.g. Sundbyberg near Stockholm, Frederiksberg, surrounded by the municipality of Copenhagen, or Kauniainen, surrounded by the municipality of Espoo near Helsinki).

The average area of a Nordic region is 18,170 km^2. The smallest is Oslo (455 km^2), followed by two Icelandic regions, Suðurnes (884 km^2) and Höfuðborgarsvæði (1,106 km^2). The largest region outside of Greenland is Norrbotten in Northern Sweden (106,211 km^2), followed by Lappi in Northern Finland

Table 1.1 Administrative structures in the Nordic Region on 1 January 2019 (diverging number on 1 January 2020 in brackets).

Nomenclature level	NUTS 0	DK	FI	IS	NO	SE	SNUTS 0	FO	GL
Regional	NUTS 1		Manner-Suomi/ Fasta Finland; Ahvenanmaa/ Åland 2			Landsdel 3	SNUTS 1		
	NUTS 2	Region 5	Suuralue; Storområde 5		Landsdel 7	Riks-område 8	SNUTS 2		
	NUTS 3	Lands-del 11	Maakunta; Landskap 19	Hag-skýrslu-svæði 2	Fylke 18 (11)	Län 21	SNUTS 3		
Local	LAU 1	Kom-mune 98		Landsvædi 8	Økonom-isk region 89		SNUTS 4	Sýsla 6	
	LAU 2	Sogn 2158	Kunta; Kommun 311	Sveitar-félög 72	Kom-mune 422 (356)	Kommun 290	SNUTS 5	Kom-muna 29	Kom-mune 5

Note: Light grey frames represent the regional levels presented in most regional maps in this report, comparable from a Nordic perspective, while dark grey frames show the local units represented in the majority of our municipal level maps. SNUTS stands for Similar to NUTS and embraces areas not included in the Eurostat classification, i.e. Greenland and Faroe Islands. Data sources: NSIs, Eurostat, ESPON.

(just under 100,000 km²). The average population density of a Nordic region is 69 inhabitants per km² with densities ranging from 1 inhab./km² (Austurland, Vestfirðir, Norðurland vestra and Norðurland eystra – all in Iceland) to 1,497 inhab./km² (Oslo Region). Other high-density regions include the capital region of Denmark, Hovedstaden (708 inhab./km²), and Stockholm (340 inhab./km²).

Figure 1.1 shows the urban-rural typology of the Nordic regions. The map is based on the typology provided by Eurostat (2018), in which the 2016 NUTS 3 regions are classified in three categories according to their population density in 2011 and 2015, in 1 km² grids. In predominantly urban regions, at least 80% of the total population is urban, while in intermediate regions, 50–80% of the population lives in urban clusters. In regions that are predominantly rural, less than 50% of the population lives in urban areas.

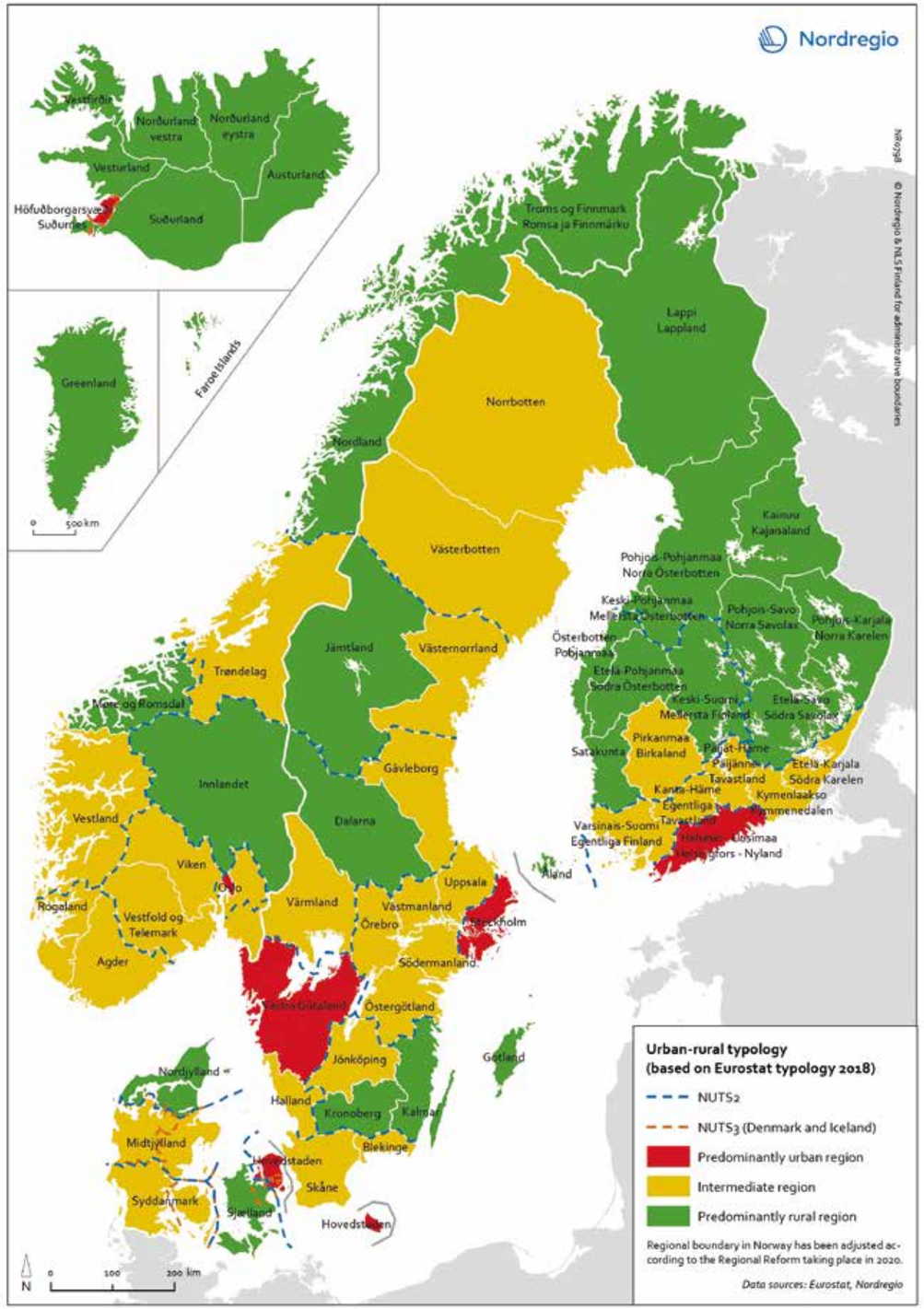
Table 1.1 provides an overview of the administrative structure in each country in the Nordic Region. These administrative structures are the basis for the Nomenclature of Territorial Units for Statistics (NUTS) classification, a hierarchical system dividing the states on the European continent into statistical units for research purposes. The NUTS and Local Administrative Units (LAU) classifications generally follow existing divisions but this may differ from country to country. For example, municipalities are classified as LAU 1 in Denmark but LAU 2 in the other Nordic countries; and regions are classified as NUTS 2 in Denmark but NUTS 3 in Finland, Norway and Sweden.

Both divergence and convergence[1]

There is a common belief among professionals and decision-makers that fewer and larger units are more efficient when it comes to service provi-

[1] The following section has been developed based on personal communications with Holger Bisgaard (Denmark, 9 August 2019); Leif Ehrstén (Finland, 24 October 2019); Katarina Fellman (Åland, 17 December 2019); Terje Kaldager (Norway, 26 September 2019); Sverker Lindblad (Sweden, 7 August 2019); Hanna Dora Holm Masdottir (Iceland, 18 September 2019); Hilmar Høgenni (Faroe Islands, 7 August 2019); and Klaus Georg Hansen (Greenland, 26 September 2019).

Figure 1.1. Urban-rural typology of the Nordic regions.



The Nordic municipalities have considerable power, especially in Denmark, Norway and Sweden, while in Finland they are actually becoming weaker

sion and public administration. On the other hand, concerns remain over the merging of administrative units, especially at municipal level, due to the increased distance this potentially creates between citizens and the local political authority.

The trend towards divergence continues on the Nordic reform scene, but there is some convergence too. On a municipal level there are growing differences in terms of the formal role of local government. Here, Norway is mainly upscaling while Finland is downscaling. At the regional level, too, there are trends in opposite directions, with the regional level strengthening in Finland, Norway and Sweden but weakening in Denmark. From an international perspective, the Nordic municipalities have considerable power, especially in Denmark, Norway and Sweden, while in Finland they are actually becoming weaker. An example of movement in the same direction is the decentralisation of state authorities or responsibilities, which is a common trend in Denmark, Norway and Sweden.

Thus far, the Danish experience, where the number of municipalities was reduced from 270 to 98, provides the best Nordic example of a completed reform process, as it is now more than a decade since the process took place on 1 January 2007. The reform was decided by the government, but the practical implementation (i.e. decisions around which municipalities should merge) was delegated to the municipalities themselves. At the same time, the 13 counties (*amt*) were abolished and replaced by five regions. The reform gave the municipalities increased political weight in society, while decreasing the importance of the regions. In May 2018 the regions' position was further weakened when, as a consequence of the national business promotion reform, the country's six regional growth forums were closed on 31 December 2018. Instead, the EU's Structural Funds are anchored to the Danish Business Authority.

After having failed, for the second time since the turn of the millennium, to implement a major reform of the Finnish municipalities, the government decided on 19 August 2015 that they would no longer be required to look into the possibility of amalgamation (Sandberg 2015). The government still wants to encourage municipal mergers but it believes this should be done on an entirely voluntary basis. Since 2000, the number of municipalities has voluntarily decreased from 452 to 311, but Finnish municipalities still have an average of less than 7,000 inhabitants. After its municipal reform failed, the government decided instead to turn its attention to the regional level and to plan for a comprehensive expansion of the regions' responsibilities. The plan is for the 18 regions (*maakunta – landskapsförbund*) to take over the main health care system from the municipalities. The regions will also assume responsibility for regional development, including business policy. They will also have a directly elected political leadership, and the right to tax will be investigated. Through the reform the municipalities will lose more than half of their budget.

Åland is not included in the administrative reforms of the Finnish regions. For the time being, Åland has 16 municipalities with a combined population of approximately 30,000. However, it is in the middle of an extensive process of reform. In November 2018 the Åland Parliament (*Lagtinget*) passed two laws with the aim of reducing the number of municipalities in a few years. At the same time, another reform is being implemented where the municipalities' social welfare services, apart from child and elderly care, are coordinated in a united municipal association. This organisation should be in place as early as 2021.

On 8 June 2017, the Norwegian Parliament (*Stortinget*) decided on an administrative reform that reduces the number of regions (*fylkeskommuner*) from 18 to 11 and the number of municipalities from 428 to 356 by 1 January 2020. The basic goal of the reform is to transfer resources and responsibilities to local and regional authorities that are more robust. In Norway, the health care system is organised by the state, while the regions' responsibilities include secondary education, regional culture, planning, transportation and regional development. The reform is based on the responsibilities that the regions currently have, but they will also be given new ones. The government has appointed a group of experts to review opportunities to strengthen the regions' role as developer and their capacity to provide a better service for the citizens.

In Sweden, the most recent merger of municipalities took place in 1977. Since then, the number of municipalities has increased slightly to 290, due to the dissolution of existing municipalities. Instead of pushing further municipal mergers, the Swedish Government has in recent years focused on the regions. Since 1 January 2019 all Swedish regional authorities have had the same organisational status and similar tasks. Besides the responsibility for public health care, these include strategies for regional development, transport infrastructure and regional growth. After a failed attempt to split the country into six new major regions, the government decided to switch its focus to the local level. A new parliamentary committee was set up to develop a strategy for strengthening the capacity of the municipalities. The committee looked at the potential of different structural changes, including more cooperation and voluntary mergers, as well as changes in the allocation and execution of tasks, both generally and asymmetrically. The committee will deliver its final report, including proposals, by the end of February 2020.

In common with the Faroe Islands and Greenland, Iceland has only two administrative levels: national and local. In recent times, Iceland has carried through two large reform processes, first in 1993 and again in 2005. On both occasions, consultative referendums were held and, on both occasions, a majority voted against the suggested mergers. Despite the outcomes of the referendums, the reforms resulted in a reduction in the number of municipalities from 196 in 1993 to 89 in 2006. In recent years, the number of municipalities has been further reduced to 72 on a voluntary basis. In autumn 2019, the government presented a proposal to the Icelandic Parliament, *(Altinget)*, on the municipal autonomy and responsibility towards citizens. One reason for this was to ensure the greatest possible equality in rights and access to services. Against this background, legislation is proposed that would necessitate mergers for municipalities which do not have a minimum number of inhabitants (i.e. 250 inhabitants for the municipal elections in 2022 and 1,000 inhabitants from 2026).

The Faroe Islands and Greenland both sought to reduce the number of municipalities through administrative reform processes. The Faroese reform process started in 2000 with a new piece of municipal legislation. The government wanted to encourage municipal mergers but believed this should be done on an entirely voluntary basis. Since 2000, the number of municipalities has voluntarily decreased from 49 to 29. In a 2012 referendum on municipal mergers, the majority in almost every municipality said no to more mergers.

By far the most radical change took place in Greenland, where the number of municipalities fell from 18 to four in 2009

By far the most radical change took place in Greenland, where the number of municipalities fell from 18 to four in 2009. The idea behind the change, which was supported by most of the political parties, was to delegate political decisions and economic resources from the central administration to the municipalities. In reality, only a few administrative areas have been transferred so far, but a number of initiatives are underway. Widespread dissatisfaction with the new municipal structure, especially in Qaasuitsup Kommunia, the largest municipality in the world in terms of square kilometers, led to a political decision to divide Qaasuitsup Kommunia into the municipalities of Avannaata Kommunia and Kommune Qeqertalik on 1 January 2018.

Methodology

In producing the *State of the Nordic Region* report, a specific methodology is applied that requires close dialogue between editors, authors, the GIS team, and a communications and layout team. The editors suggest the main themes and focus areas of the publication, while the authors decide the more specific topics to be included in different chapters. The GIS team members assess data availability, collect data, and provide maps and graphs, which further guide the authors' writing. The communication team's main task is to ensure that the publication's main messages are easily understandable and to find ways to transmit them to policymakers and other target groups. The work is supervised by an internal task force consisting of representatives of the various departments of the Nordic Council of Ministers' Secretariat in Copenhagen. The maps contained within the report can also be accessed through Nordregio´s online map gallery (www.nordregio.org/maps/) and via NordMap (www.

Despite several initiatives, there is still no up-to-date, harmonised Nordic cross-border statistical data

nordmap.se/), which also allows visitors to create their own maps.

When it comes to data management and the creation of maps that cover all the Nordic countries as well as the Faroe Islands, Greenland and Åland, the work done by Nordregio is quite particular.[2] The main steps include the assessment of data availability, data gathering, harmonisation, and choice of suitable methods in order to transfer data into maps. While some data can be collected from Nordregio's core data database, which is updated continuously and includes annual data on demographics, the labour force and the economy at municipal and regional level (Nordregio 2016), other data is provided by National Statistics Institutes (NSIs), Eurostat and other statistical institutions. To make the maps up-to-date and relevant, the core database and the GIS map templates used are updated according to the latest changes in administrative divisions.

Among the Nordic countries, Denmark, Finland (including Åland) and Sweden are Member States of the European Union (EU), although only Finland (including Åland) is part of the Eurozone. Iceland and Norway are members of the European Free Trade Association (EFTA), which consists of four countries that, either through EFTA or bilaterally, have agreements with the EU to participate in its internal market. The Faroe Islands and Greenland are not members of any of these economic cooperation organisations. These differences in supra-national affiliation have an impact on the data that is available for this report. For example, Eurostat, the statistical office of the EU, only provides data for EU, EFTA and EU candidate states, which does not include the Faroe Islands and Greenland. Whenever possible, data for these regions has been supplemented from other sources. The kind of maps that can be produced depends on an overview of existing data regarding available years, administrative levels (e.g. municipal, regional, national) and the definitions used, which may vary between the Nordic countries. In some cases, it is necessary to buy or order data that is not otherwise publicly available. In other cases, alternative data sources are utilised or estimates made to be able to produce maps that are comparable across the Nordic Region. Data harmonising is done in different ways (see also Rispling & Norlén 2018). A simple example is the harmonisation of the reference year of population data. Data for 2018 is collected for Finland and Sweden due to their reference date on December 31, whereas 2019 data is collected for the other Nordic countries which use January 1 as a reference date. Both data sets are included in a map showing the situation for 2019.

A more complex example is the management of labour market statistics, in which Labour Force Survey statistics provided by Eurostat are combined with register data from the NSIs in order to be able to make comparable estimates at municipal level. Some of the maps are based on indicators that are calculated by means of different variables from the NSIs while others are created by using more advanced methods such as cluster analyses. *State of the Nordic Region* also includes indexes created by using data provided by the NSIs and Eurostat, such as the Regional Potential Index, which highlights the strengths and weaknesses of the 66 Nordic regions in relation to one another and identifies the regions with the strongest development potential.

Working with cross-border statistics involves a number of challenges. For instance, despite frequent commuting over national borders in several Nordic regions, there is a lack of data on such commuting between the Nordic countries due to legal obstacles related to the exchange of data. While Nordregio is aware of these challenges, some maps may provide a false impression in some border regions and municipalities due to a lack of cross-border statistics. In the regular register data of Eurostat and the NSIs, which are the two prime data sources for this report, commuters to neighbouring countries are not included. This results in incomplete information (i.e. underestimations) regarding employment, incomes and salaries for regions and municipalities located close to national borders, where a substantial share of the population commutes for work to the neighbouring country. Estimates have been produced in some cases and these are included in this report. Despite several initiatives, there is still no up-to-date, harmonised Nordic cross-border statistical data, other than that provided by some regional authorities.

The concept of *State of the Nordic Region* can be scaled both up and down. An example of scaling up is the TeMoRi (Rispling & Grunfelder 2016), conducted by Nordregio on behalf of the Swedish Agency for Economic and Regional Growth, which focuses on the development of a territorial monitoring approach for the Baltic Sea Region. Examples of scaling down include various assignments that Nordregio has implemented for individual regions such as Lappi, Jämtland and Värmland.

Report overview

The report is divided into five sections. The first three are consistent with previous editions of this publication and explore the thematic areas of demography, labour force and economy. The fourth section seeks to go "beyond GDP" by highlighting aspects of regional performance not captured by traditional economic indicators. The fifth and final section presents the Regional Potential Index (RPI), which ranks Nordic regions based on a series of indicators derived from the three thematic areas of demography, labour force and economy. The main findings of each section are summarised as follows:

Demography (Chapters 2–4): Describes and analyses population trends based on the different life stages, including chapters on fertility and youth, migration and ageing. While the Nordic population as a whole is increasing, the fertility rate is declining across the region, hitting an all-time low in Finland, Iceland and Norway. Population growth has instead been driven to a larger extent by net-migration, with the share of foreign-born in the population increasing significantly over the past thirty years. High levels of internal mobility have also been characteristic of migration patterns in the Nordic countries in recent years, leading to rapidly expanding urban populations and outmigration from rural and sparsely populated areas. Finally, the Nordic Region is facing an ageing population profile, with the proportion of young people and people of working-age in decline in most Nordic municipalities.

Labour market (Chapters 5 and 6): Describes and analyses employment trends, with a focus on the geography of labour and the future of Nordic labour markets. The average Nordic employment rate of 79.4% is well above the EU average of 67.7%. However, the situation differs remarkably between the regions. The Nordic Region is characterised by a high number of independent labour markets especially in the sparsely populated areas of the north. Despite most of these regions experiencing negative net-migration overall, many still succeeded in attracting people of working age to the local labour markets. Looking to the future of Nordic labour markets, the calculations suggest that close to one third of all jobs in the Nordic Region are at "high risk" of automation in the short to medium-term future. Rural municipalities appear to be the most vulnerable, largely due to their less diverse labour-market structures.

Economy (Chapters 7–9): Describes and analyses GDP, household income, regional innovation and the bioeconomy. Income inequality is relatively low in the Nordic countries, however, with the exception of Finland, differences in household disposable income are increasing both within and between municipalities and regions. Nordic regions are traditionally top-performers on the EU's Regional Innovation Scoreboard and smart specialisation, a tool to promote regional innovation, has been widely adopted, especially by Finnish regions. One such area of innovation is the bioeconomy, where employment in new bio-based sectors such as textiles, bioenergy and nature-based tourism, has grown by over 5% in many regions. At the same time, the portion of the population employed in traditional bioeconomy sectors such as agriculture, forestry and fisheries, is decreasing, particularly in Norway and Finland.

Beyond GDP (Chapters 10 and 11): Focuses on social aspects and wellbeing and carbon-neutrality. It finds that, while Nordic countries score well on measures of happiness, life expectancy and education, there are still important regional disparities, gender inequalities and socio-economic differences on these indicators. Education plays a particularly important role, not only in determining health and wellbeing, life expectancy and

[2] Other examples of regional analysis combining data within and across national borders include studies of the Baltic Sea Region and the Alpine region (see also Kommunal- og moderniseringsdepartementet, 2018).

individual opportunity, but also for regional development. With respect to carbon neutrality and environmental aspects, each Nordic country has set ambitious goals toward cutting carbon emissions. The achievement of these goals is far from certain, however, and will rely heavily on innovation in the industrial, transport and building sectors as well as efforts towards behaviour change, particularly with respect to consumption patterns.

Regional Potential Index (Chapter 12): Collates data from the three thematic sections to provide a regional potential score for each region. The Oslo Region comes out on top in the 2020 ranking, followed by the Capital Region of Denmark and Stockholm Region. Amongst the intermediate regions Uppsala is leading in 6th place followed by three Norwegian regions; Trøndelag, Vestland and Rogaland, while Sudurnes, in 8th place, is the most successful rural region followed by another three Icelandic regions and Faroe Islands. The regions with the most improved scores since 2017 include Austurland (+12), Faroe Islands (+7), Varsinais-Suomi and Suðurland (+6) and Vestfirðir (+5).

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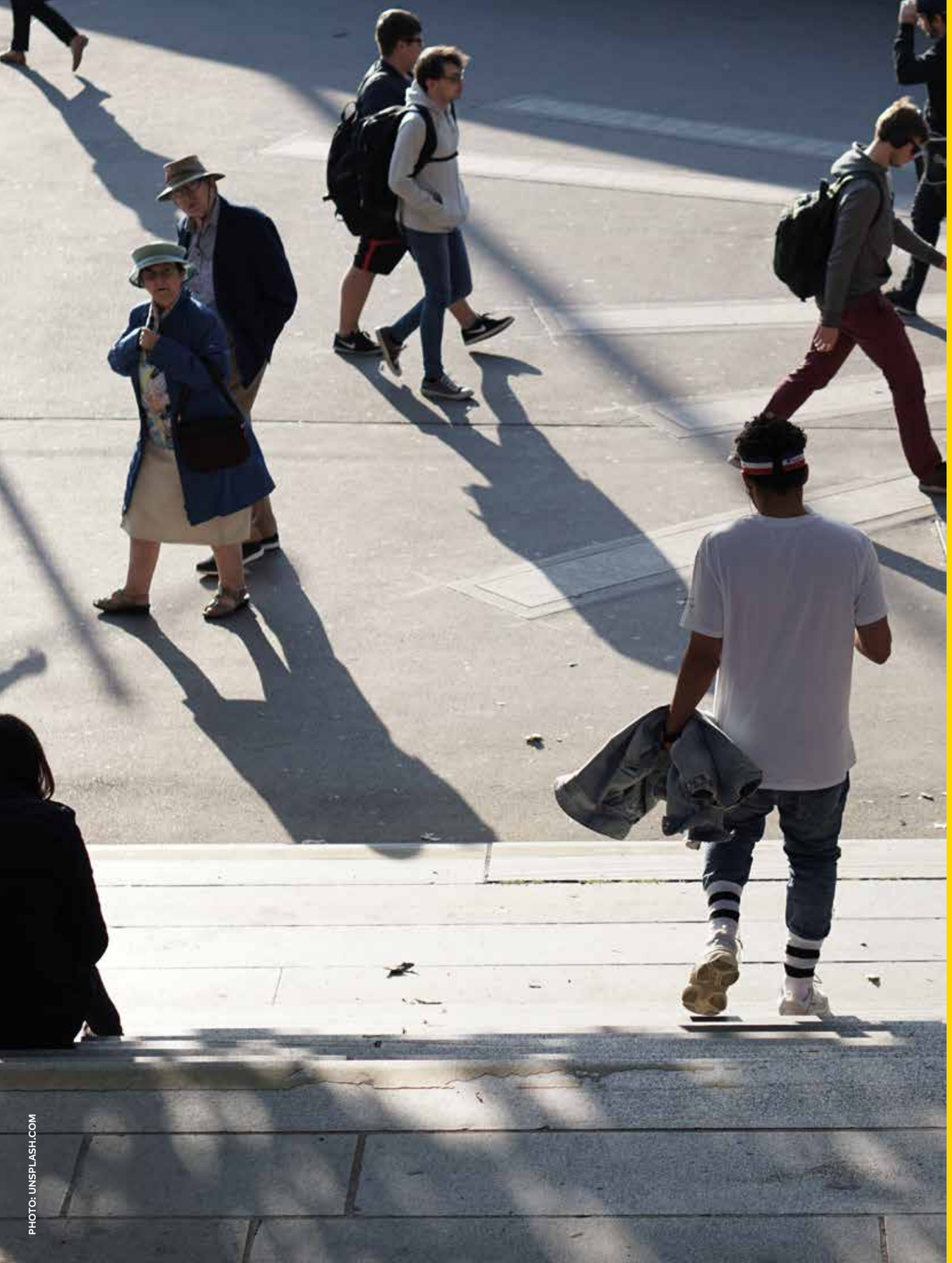


PHOTO: UNSPLASH.COM

THEME 1

DEMOGRAPHY

Ageing population puts the Nordic welfare model to the test

Urbanisation, decreasing fertility rates and increasing life expectancy are changing the demographic make-up of Nordic regions and municipalities. These long-term trends are expected to shape the Nordic societies and test the Nordic welfare model in the years to come. Urbanisation is particularly pronounced in the Nordic countries, where the population is more internally mobile than in other European nations. This shift in the population away from peripheral and rural areas towards urban centres brings planning challenges in both shrinking and growing regions.

The Nordic Region is home to some of the world's most supportive parental leave policies, particularly with respect to promoting fathers' involvement in the upbringing of future generations. Despite this, fertility has hit an all-time low in Iceland, Norway and Finland, and the Faroe Islands is the only place where the rate is high enough to sustain the existing population through natural increase alone. In this context, immigrants are becoming an increasingly important part of the population, particularly in rural and sparsely populated areas. The countries of origin of immigrants, and the reasons they come (e.g. whether they are refugees or labour migrants) are also becoming more diverse. It is worth noting that, although recent discussions about immigration have tended to focus on the big waves of refugees and asylum seekers in 2015–2016, these arrivals are actually part of a broader trend towards a larger and more diverse influx.

Population ageing has been one of the main demographic trends in the Nordic Region in recent decades and projections indicate that this trend will continue. However, the patterns vary considerably in different parts of the Nordic Region, and differences in health and wellbeing show that the older population is far from homogenous. Against this backdrop, it will be increasingly important to plan for an ageing society. This change will entail not only promoting health and wellbeing into older age, but also creating more age-friendly living environments, for example, adapting housing, public transport and urban structures to suit people of different ages and abilities. The older and healthier population should not only be seen as a burden, but also as a source of untapped potential.

INTRODUCTION

The population of the Nordic Region has increased by 18% since 1990 through a combination of natural increase (more births than deaths) and net migration (more in-migrants than out-migrants) (Table 2.0). Most of this increase was due to positive net immigration, a trend which has been especially prominent since 2006. Norway, Sweden, Denmark, and Åland followed this regional trend and all had population increases equivalent to those in the Nordic Region as a whole. Iceland had the highest population growth, fuelled by high natural increase and fluctuating but overall positive net immigration. In Finland, natural increase and net migration contributed equally to population increase, which was positive but lower than in the other four Nordic countries. The population of the Faroe Islands grew from high natural increase which offset out-migration. Greenland continued to have a remarkably stable population size as natural increase was offset by roughly equal levels of out-migration.

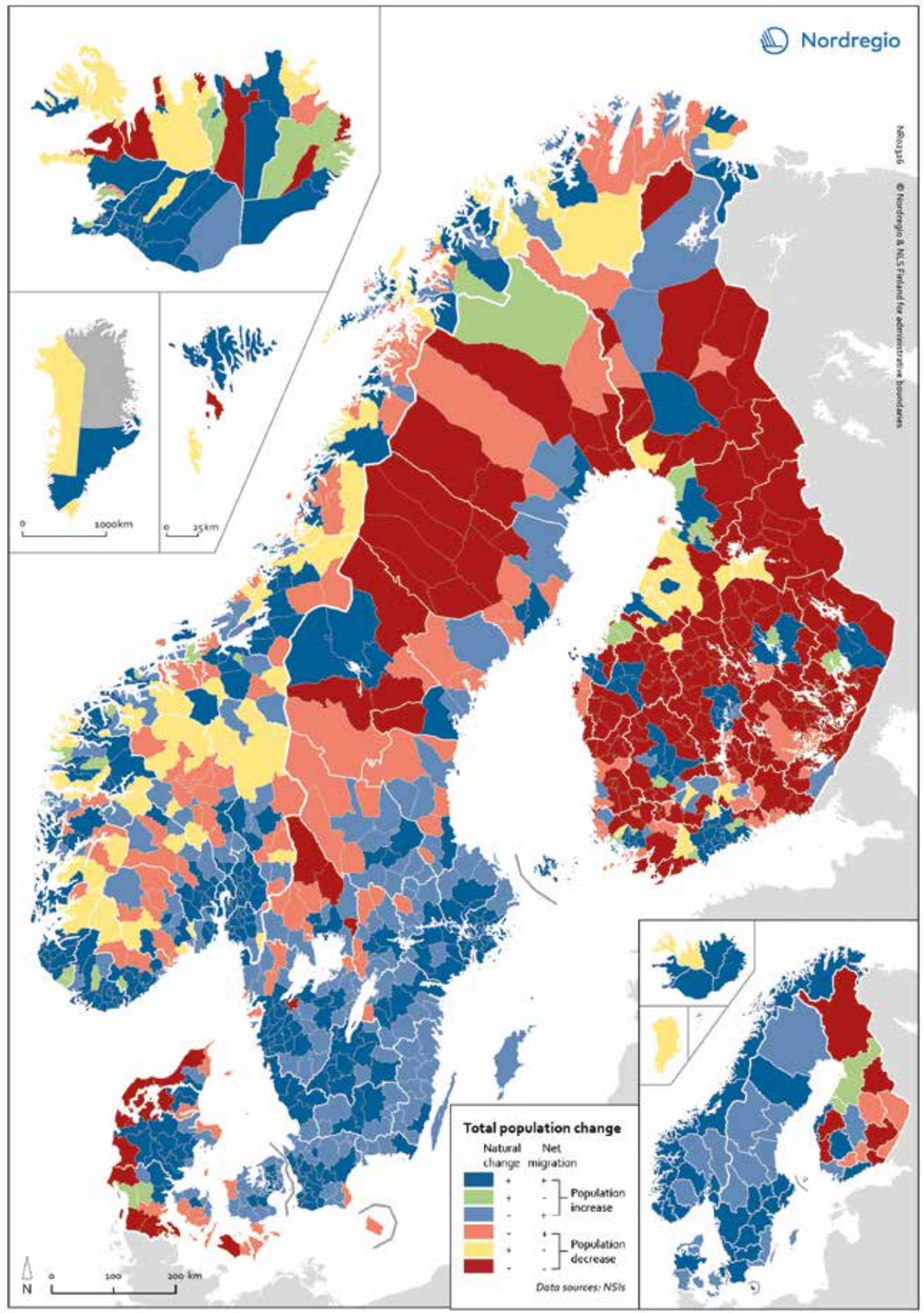
At the sub-national level, population change is the result of the internal migration patterns of resident populations, the settlement patterns of immigrants, different birth and death rates and the age structure of the municipal populations. As Figure 2.0 shows, all regions in Denmark, Norway and Sweden experienced population increase due to either a combination of natural increase and net migration or through net migration alone between 2010-2018. In Iceland, all regions experienced both positive natural increase and positive net migration, except for Vestfirðir and Norðurland vestra, which experienced population decline despite experiencing more births than deaths over the period. The regional picture in Finland was more varied, with population decline most pronounced in the east and the north.

At the municipal level, the highest overall poplation growth can be found mostly in the capital regions and bigger cities (e.g. Tampere and Turku in Finland), Central Jutland (Denmark), coastal areas of Norway, southern Iceland, southern Sweden, the northern municipalities of the Faroe Islands and Sermersooq Municipality (Greenland), which contains the capital of Nuuk. The highest overall population decline can be found mostly in the western and southern parts of Denmark, the majority of Finnish municipalities and most inland municipalities in northern Sweden. While the map shows a snapshot of population change for one decade, these trends of population increase in urban regions and municipalities and decline and aging in periphery regions and municipalities have been underway for some time and are expected to continue into the foreseeable future.

Table 2.0 Population change by component in the Nordic Region, 1990-2019.

	Total population		Population change, 1990-2019 (absolute)			Population change, 1990-2019 (percent)		
	1990	2019	Total	Natural increase	Net migration	Total	Natural increase	Net migration
Total	23,227,060	27,346,716	4,119,656	1,449,533	2,665,341	17.7	6.2	11.5
Iceland	253,785	356,991	103,206	71,159	31,848	40.7	28.0	12.5
Norway	4,233,116	5,328,212	1,095,096	468,207	629,035	25.9	11.1	14.9
Sweden	8,527,036	10,230,185	1,703,149	430,437	1,268,476	20.0	5.0	14.9
Finland	4,974,383	5,517,919	543,536	251,868	282,829	10.9	5.1	5.7
Denmark	5,135,409	5,806,081	670,672	205,115	471,280	13.1	4.0	9.2
Greenland	55,558	55,992	434	14,133	-13,157	0.8	25.4	-23.7
Faroe Islands	47,773	51,336	3,563	8,614	-4,970	7.5	18.0	-10.4
Åland	24,231	29,789	5,558	956	4,381	22.9	3.9	18.1

Figure 2.0 Total population change by main component 2010-2018.



Chapter 2

BIRTHS, CHILDREN AND YOUNG PEOPLE

Authors: Anna Karlsdóttir, Timothy Heleniak and Michael Kull
Maps and data: Oskar Penje

The Nordic Council of Ministers has explicitly stated that it wants the Nordic countries to be the best place in the world for young people and children (Nordic Council of Ministers, 2018a). However, despite the favourable family policies that have been enacted in support of this goal, the birth rate is below replacement levels in almost all Nordic countries. We look into the changes in relation to the composition of the young age groups growing up in the different regions. Knowledge about young people across the regions is of crucial importance if the Nordic countries are to meet their aspirations towards the UN Sustainable Development Goals and support young people to play a key role and actively participate in society (Nordic Council of Ministers, 2018a).

For Iceland, Norway, and Finland, the current fertility rates are the lowest ever recorded

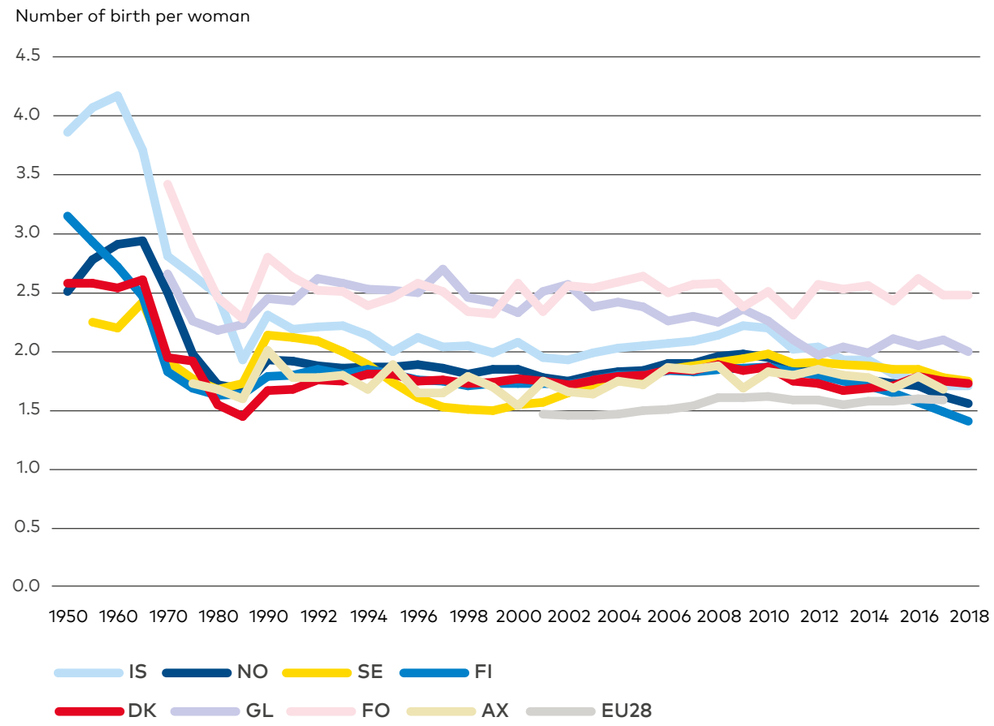
Fertility trends

The number of children that parents have is influenced by a variety of social, economic, cultural, demographic and other factors. In turn, the number of children influences the population profile and growth. In common with many other countries in Europe and advanced countries elsewhere, the number of children being born in the Nordic countries is quite low. Allowing for some mortality, a total fertility rate of about 2.1 children per woman is necessary for a population to replace itself in the long run (see box). Fertility levels above or below replacement level have a stronger influence on population change than mortality levels. The smaller cohorts of young people in recent decades are a major contributor to the ageing of the populations (Heleniak & Sánchez Gassen, 2019).

In most of the Nordic countries, the fertility rate was above replacement level from the post-WWII period until about 1970. With the exception of Iceland, all Nordic countries have had fertility rates at or below replacement level since about 1975 (Figure 2.1). Even Greenland, which has usually been well above replacement level, has seen a decline from 2.5 births per woman in 2000 to 2.0 today. The only part of the Nordic Region that currently has a fertility rate above replacement level is the Faroe Islands at 2.5 children per woman.

Over the past decade or so, there has been a decline in fertility in almost all Nordic countries and regions, with quite steep declines in some. Fertility in Iceland has declined from 2.2 children per woman in 2009 to 1.7 today. In Finland, the fertility rate has declined from 1.9 children per woman in 2010 to 1.4 today. If birth rates remain at their current level, in 15 years' time there will be no regions in Finland where births exceed deaths (Statistics Finland, 2019). The fertility levels for Norway and Finland are now below the EU average. For Iceland, Norway, and Finland, the current fertility rates are the lowest ever recorded. However, as a result of the slightly higher rates in Sweden (1.76) and Denmark (1.72), the average fertility rate for the Nordic Region remains above the EU level, which has been about 1.5

Figure 2.1 Total fertility rate in the Nordic Region, 1950 to 2018.



Data source: NSIs and Eurostat.

Calculating the fertility rate

The general fertility rate measures the ratio of the number of live births to the number of women who are in their childbearing years during a given year. The total fertility rate calculates the number of children a woman would hypothetically have if she passed through her childbearing years at the current age-specific fertility rates. In other words, the number of children a woman entering her childbearing years (15 years old) could be expected to have in her life-time based on the number of children women are currently having in each age group. Figure 2.1 shows the total fertility rate from 1950 to 2018 for each of the Nordic countries and independent territories and for the EU28. The map in Figure 2.2 instead uses the general fertility rate, as data regarding the total fertility rate is not available at the municipal level.

Figure 2.2 General fertility rate, 2016-2018 average.

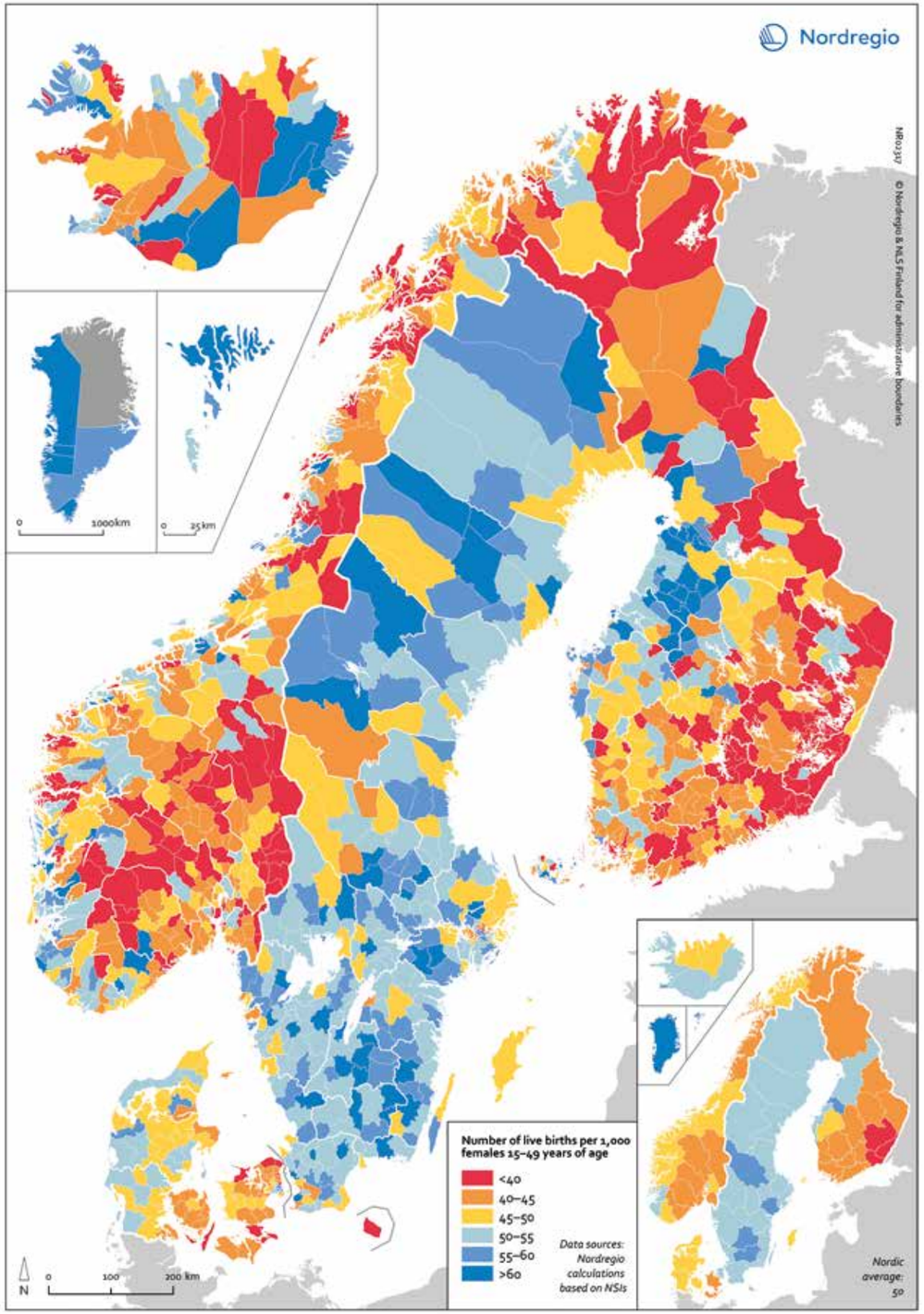
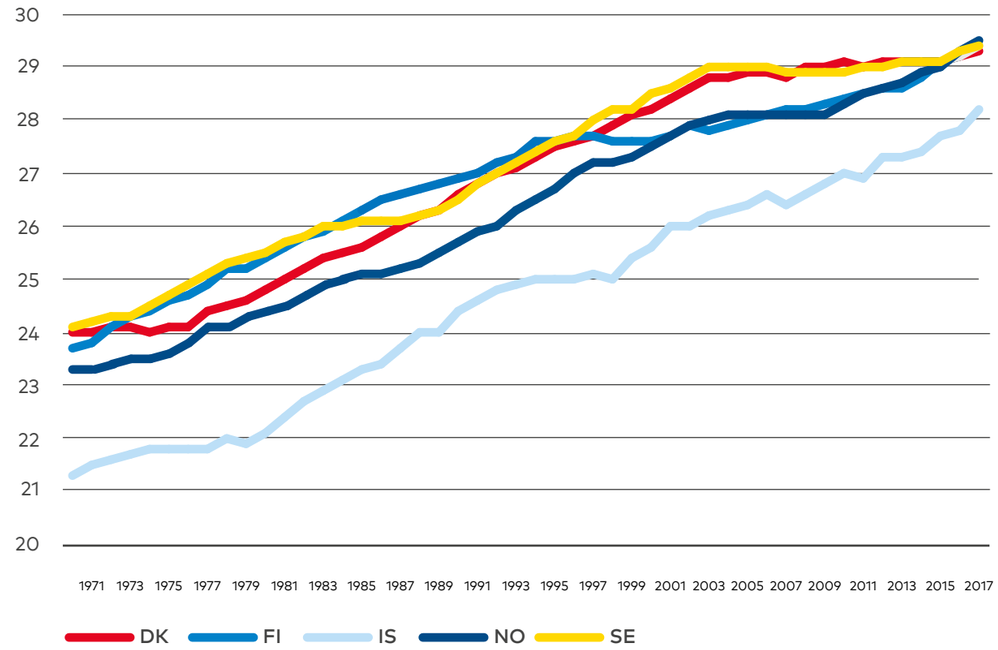


Figure 2.3 Mother's age at first birth and change over time from 1971–2017.



Data sources: NSIs.

or 1.6 children per woman since the turn of the millennium.

The regional patterns of fertility are shown in Figure 2.2. These generally reflect the national levels, with Sweden having slightly higher fertility rates than Norway and Finland. Greenland and the Faroe Islands have the highest rates of the Nordic countries. A higher number of births than elsewhere in the region can be seen in some Swedish regions, for example in North East Norrbotten, in the Sami communities. In parts of Jämtland Region the number of newborns has also increased, for example in Krokom Municipality, which may be explained by more families moving to the region in order to commute to Östersund. Parts of Östergötland also have higher than average birth rates, for example, Valdemarsvik Municipality which had an annual average of over 72 births per 1,000 females 15-49 years of age between 2016 and 2018. The reasons for the higher number of births here is less clear and more research is needed into the variations on why more children are born in particular remote places. Other examples of remote places with higher than average birth rates can be found in Granvin in Vestland and Snillfjord, Tydal, Åfjord and Roan in Trøndelag (all in Norway). Regional difference is also quite striking in Finland. While 25% of Finnish children have no siblings, in parts of Keski-Pohjanmaa and Pohjois-Pohjanmaa around 50% have two or more siblings (Statistics Finland, 2012). This trend has been ongoing for more than two decades.

There has been a shift towards women having children when they are older in the Nordic countries (Figure 2.3), which contributes to lowering the fertility rate. In 1990, women aged 25–29 had the highest fertility rates. Today, the largest number of children are born to women aged 30–34. The average age of mothers when they have their first child has risen from 21 in 1971 to 30 in 2018 (Nomesco, 2019). In the 1990s, it became the norm in many of the Nordic countries to have the first child after completing an education, and this remains the case.

Table 2.1 Parental leave by weeks and share taken by fathers 2015.

	Type of parental leave	Total parental leave (2019)	Share taken by fathers (2015)
Denmark	Special paternal leave was abolished in 2002	52 weeks	10%
Finland	Six weeks are allocated to the father, who can also take 3 weeks together with the mother	52 weeks	11%
Iceland	Both parents get 3 months each and 3 months are shared (each parent gets 5 months and 2 to share from 2020)	40 weeks (52 weeks from 2020)	30%
Norway	Paternity leave was increased from 10 to 15 weeks in 2018	49 weeks full salary or 59 with 80% salary	21%
Sweden	34 weeks for each parent (possible to transfer up to 21 weeks to the other person)	68 weeks	27%

Data source: Nordic Statistics and Nordic Council of Ministers.

Births to women younger than 25 have declined in all Nordic countries and births to women above the age of 35 have risen, as women now spend longer in education and this has changed their priorities in terms of family planning.

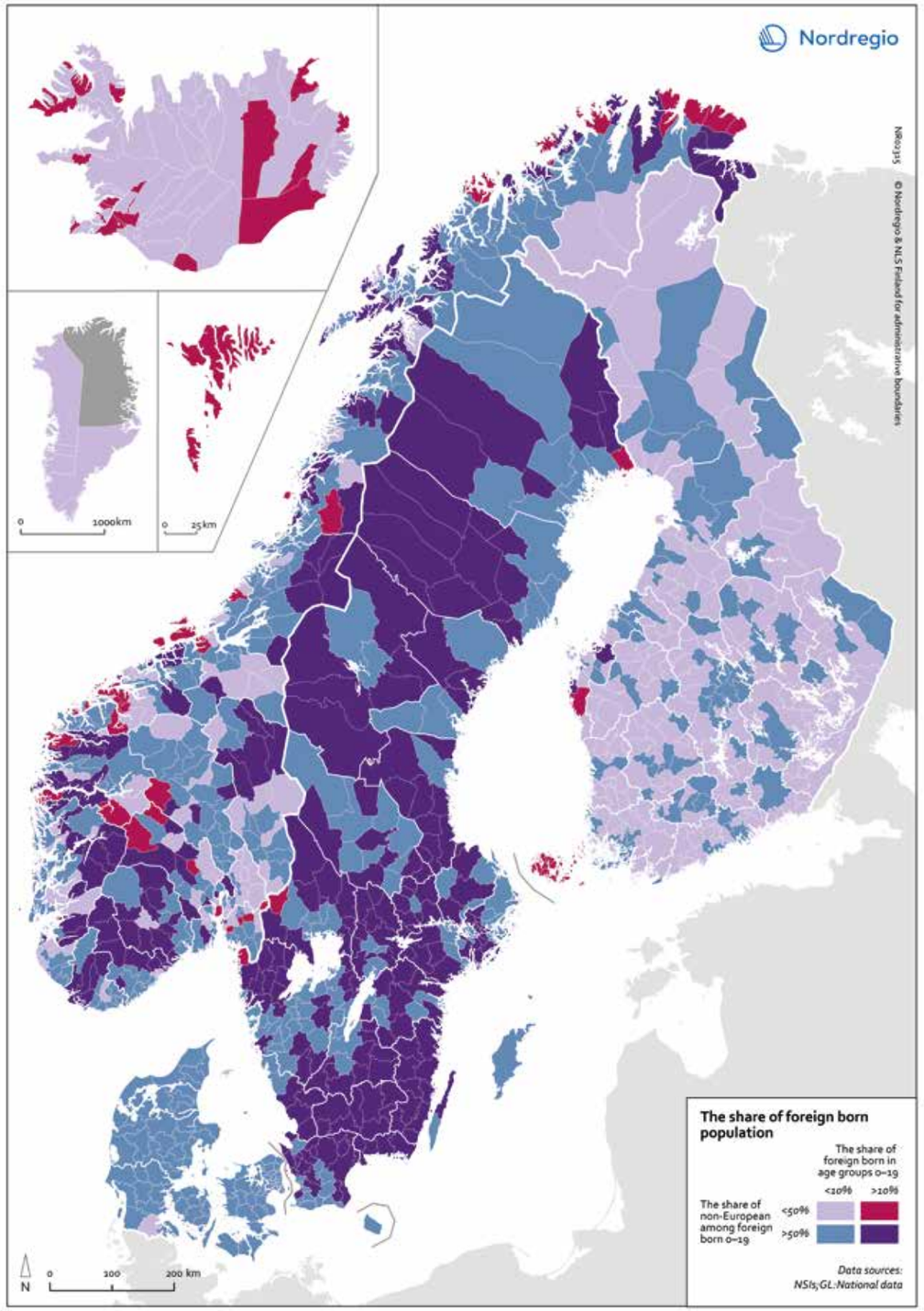
Incorporating gender and social equality measures into labour market and welfare policies may prevent direct or indirect disadvantages in terms of employment and career that result from parenthood. In the Nordic countries, these policies and measures have been in place since the late 1960s in order to increase women's participation in the labour market, promote men's participation in family work and care, and establish a society with gender equality. These policies are considered important factors in maintaining high fertility in the Nordic countries (Jalovaara et al., 2019; Andersson et al., 2009).

Sweden offers the longest parental leave and Iceland the shortest (see Table 2.1). The political drive to provide both parents with leave to spend time with new babies means that Nordic fathers take more parental leave than anywhere else in the world. Norway was the first Nordic country to allocate leave specifically for fathers, the so-called "daddy quota". Now, all the Nordic countries have a "daddy quota" except Denmark, which abolished quotas specially for fathers in 2002. With new regulations (Sigurðardóttir, 2019), fathers' share of parental leave has increased in all the Nordic countries, and is largest in Iceland, Norway and Sweden (Nordic Council of Ministers, 2018). A recent survey of over 7,000 parents in the five Nordic countries found that norms on parenthood can change, with over 90% of respondents believing that both fathers and mothers should be heavily involved in childcare (Cederström, 2019). The number of days for which fathers receive cash benefits in the event of childbirth or adoption has increased in all the Nordic countries since 2005. Fathers in the Faroe Islands took on average the fewest number of days of parental leave (with cash benefits), from 6.6 days in 2009 to 9.4 days in 2017. In 2017, paid parental leave was 29 days in Sweden and 28.8 days in Iceland. In Finland it increased from an average of five days in 2001 to 11 days in 2017. As a result of political endeavours in the Nordic countries, children are also registered with childcare services early to facilitate parents returning to work. In all of the countries except Iceland, families are entitled to childcare services when parental leave ends (Nordic Council of Ministers, 2018).

Increasing cultural diversity in young age groups

Young people are a vitality marker for the regions in which they live. The proportion of the population in the Nordic Region aged 0–14 was 17.1%, and 15–29 years was 18.7% in 2018. Similar level as in the rest of Europe (Eurostat, 2019a). In many rural and remote areas the share of the population aged under 19 has decreased. In some of these areas,

Figure 2.4 Typology of foreign-born population 0–19 years 2019.



however, despite the expectation that ageing would become a major characteristic of the demographic profile, the youth population has increased. This is largely due to the in-migration of people of foreign descent. Some of these are children of immigrants and refugees, some are children of work migrants and some are unaccompanied minors.

Figure 2.4 shows the typology of the foreign-born population age 0–19. It reveals an interesting pattern that reflects increased diversity in the population and a multicultural complexity in the municipalities in the Nordic Region. Some rural and intermediate regions in Sweden and Norway have both a high percentage of foreign-born young people (more than 10%) and a high proportion of non-Europeans among the foreign born (more than 50%) (shown in dark purple in Figure 2.4). The Faroe Islands have a high percentage of foreign-born young people, most of them born in Denmark, while Åland has a high proportion of Swedish-born people.

Twenty six per cent of all Nordic municipalities experienced an increase in population between 2011 and 2016 due to immigration alone (Rispling, 2018). A substantial proportion of these are rural municipalities that for many years have suffered from out-migration, ageing populations and diminishing services. If the integration of young immigrants to these municipalities succeeds, it may be a significant factor in reversing trends in some of those regions, improving social and economic sustainability in the long run (Rispling, 2018; Hadagny, 2019). If integration efforts in the municipalities coloured dark purple in Figure 2.4 are successful, those Swedish and Norwegian regions that have a high proportion of young people from countries outside the EU will have gained valuable human resources that have potential to reinvigorate rural communities.

Transitions to adulthood – major trends and promising exceptions

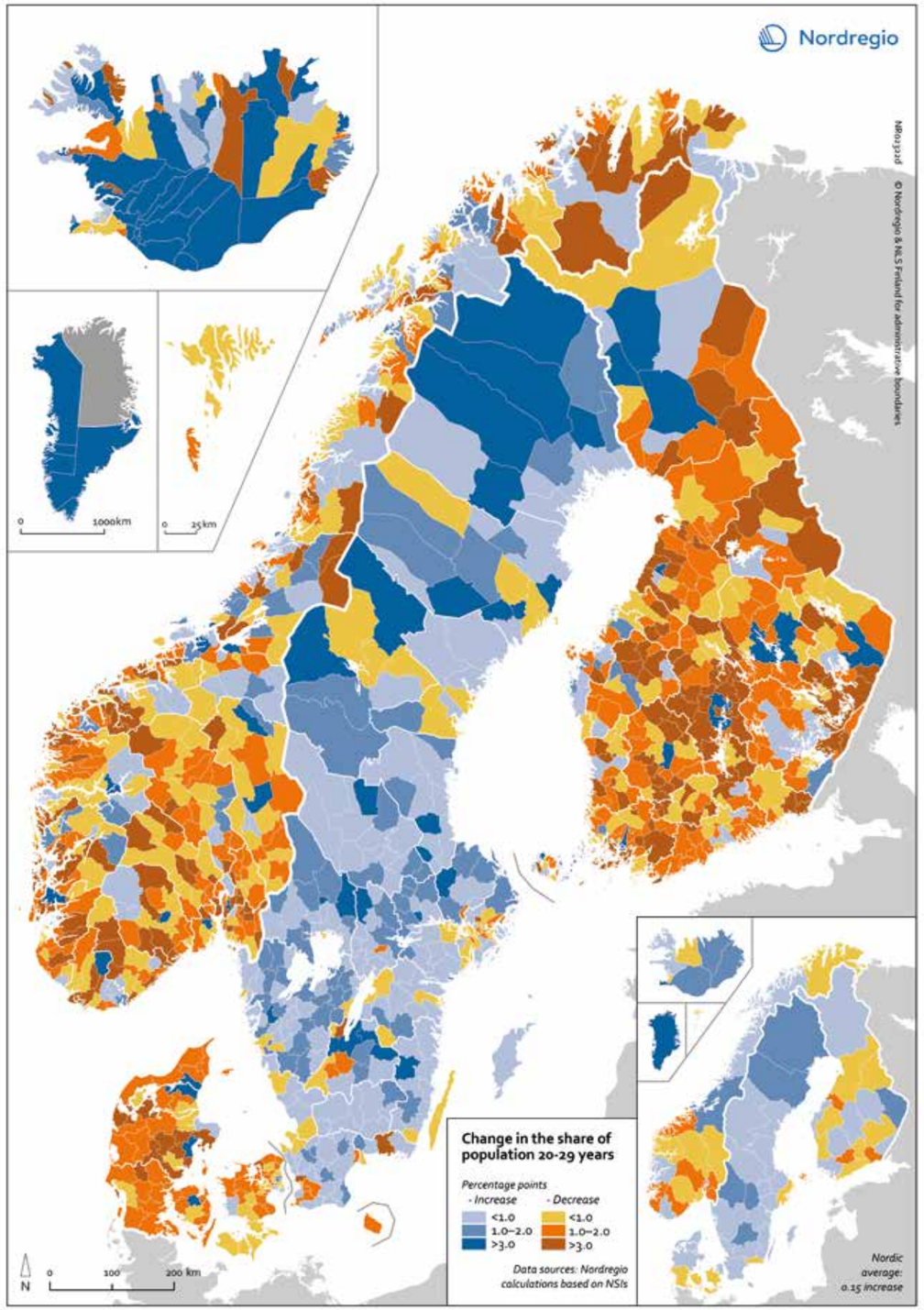
In general, the transition to adulthood for young people living in the Nordic Region is facilitated by things like substantial study grants. Structural mechanisms that facilitate young people being financially independent during their studies through study support and/or loans are available to varying degrees in the Nordic countries. In Sweden, Norway, Denmark, Finland, Åland, Greenland and the Faroe Islands, student grants and benefits have allowed young people to become financially independent from their families quickly (Nordén et al., 2012; Sullissivik, 2019). In Iceland the main form of support is student loans (LÍN, 2019).

In some rural Icelandic municipalities the proportion of young people aged 20–29 has grown significantly

This has allowed young people to move away from the parental home from as young as 18. There are indications that this may be changing elsewhere in the EU, where people are increasingly older when they move away from their parents (on average 26). However, this is not true for Denmark, Sweden, Norway and Finland. Young people in Southern Europe live at home with their parents for 10 to 12 years longer than in the Nordic countries, probably because of less favourable socio-economic conditions and support structures. In Norway, young people are 20 on average when they leave the parental home; the average age is 21 in Denmark and 22 in Finland. In Sweden, the average age has fallen from 21 in 2009 to 18.5 years old in 2018 (Eurostat, 2019b). The availability of youth housing, combined with educational support policies and available jobs for young people, may explain this.

At age 15–19, many young people are still enrolled in education and living with their parents. At age 20–29, they are generally either enrolled in vocational or tertiary education or in work and will tend to have moved away from home. The hegemonic perspective is that urban centres, where jobs are most plentiful, and university cities, are the most attractive option for young people. The settlement pattern for young people aged 20–29 is therefore interesting from a demographic and societal perspective. Not surprisingly, as shown in Figure 2.5, it is mainly rural municipalities that show a negative change in their share of this age group. But the exceptions are interesting here. Although Denmark, Norway and Finland do follow this unsurprising pattern, in some rural Icelandic municipalities the proportion of young people aged 20–29 has grown significantly. Bláskógabyggð, Ásahreppur and Mýrdalshreppur in the south have had between 123% and 225% more young people living in them in

Figure 2.5 Change in young adults (20–29 years), share of total population 2000–2019.



The Nordic countries are global frontrunners in working towards parental equality

the 19 years since the millennium, while Svalbarðsstrandahreppur and Skútustaðahreppur in the north-east have seen increases of 138% and 152%. Northern Västerbotten and Norrbotten also have more young people, as has Greenland.

Finland is in the unfortunate position of having the largest number of rural regions with declining youth populations, and it is not uncommon for 40–60% of their young people this age to move away. Communities in the regions of Lappi, Pohjois-Pohjanmaa, Etelä-Pohjanmaa , Pohjois-Karjala, Pohjois-Savo, Etelä-Savo, Kainuu, Keski-Suomi and Päijät-Häme have lost the most young people. For example, Savukoski in Lappi has lost 58.2% of its young people since 2000 and Avannaata municipality in Greenland has lost over 85%. In contrast, the population aged 20–29 years has risen by 47% in Geta in Åland. Several municipalities in Norway have lost more more than 30% of their young people, such as Beiarn in Nordland (37%) and Loppe in Finnmark (44%). In Denmark, Læsø in Nordjylland and Langeland in Syddanmark have lost the largest proportion of young people, over 43%. Other Nordic municipalities have added exceptionally high numbers of young people aged 20–29, for example, Vestfold in Norway (122%) and Bø in Telemark (70%), which also has the average Nordic proportion of this age group in its population (15%). The proportion of young people is below this level in most rural municipalities, despite the few examples of exceptional growth of this population group among their inhabitants. The contrast between urban and rural areas is sharp. In cities, the share of the population aged 20-29 years old increased by 47% over the 19 year period, while rural areas experienced a 54% decline.

The discussion on young people and regional disparities is associated with rural masculinity and the marginalisation of young men in rural areas (Karlsdóttir et al., 2019). While this perspective has received considerable attention in the literature in recent years (Bye, 2009; Stenbacka, 2011; Gaini, 2006, 2017), the capacity of young people to shape their own futures in less populated regions has not. Also receiving attention is the connection between femininity and rurality, usually linked with women's higher degree of mobility and out-migration from rural areas (Dahlström, 1996; Hutter & Brown, 2011, Bloksgaard et al., 2015). This development has also been termed the 'rural exodus' of women who, to a greater extent than men, envision few job opportunities in rural areas (Holm & Öhrn, 2014). Nordic cooperation has turned its focus to youth and inclusion (MUCF, 2019). It is worth giving attention to those young people in the Nordic countries who deviate from the major trends and feel they are best suited to rural areas where they hold the key to their own future, for example through entrepreneurship. The dominant narrative of the rural flight of young people is not a universal law and, in some cases, there is a mismatch between statistics and how young people feel about living in the countryside (Andersen & Norgaard, 2018). Conditions in some regions outside the main urban centres may for some be more attractive.

At different policy levels, from international to intraregional and here in the Nordic Region, the advice is to make young people the centre of attention and invest in rural youth projects as an investment in the future. Young people have great ideas about how to create cool things and cool jobs.

Concluding remarks

While the fertility rate is declining in all countries in the Nordic Region except the Faroe Islands, one positive development has been an increase in fathers' involvement in bringing up new generations, on paid leave. This makes the Nordic countries global frontrunners in working towards parental equality. While fewer children have siblings and a larger proportion of the young generation live in urban settings, immigrants are making an important contribution to the young population in more rural and remote areas. This is clearly evident in Sweden and parts of rural Norway. Becoming an adult and moving away from home in the Nordic Region is facilitated by student grants and loans (provided by the state) and greater availability of jobs than for young people in other EU countries. Young adults are more concentrated in urban areas that are home to educational institutions and universities, which also implies that a large percentage of the 20–29 age group is in education. The narrative of a rural exodus by young people may not match the experience of some. It is necessary to highlight a plurality of experiences, as statistics show both greater cultural diversity among young people in many rural municipalities and a sense of wellbeing among those young people who have consciously made a choice to live in a rural area. Investing in young people and their ideas for the future may be a vital step towards a more sustainable demographic development and has the potential to revigorate communities with ageing populations.

Young people and rural attractiveness[3]

The Rural Attractiveness in Norden Project, which conducted 14 case studies across the Nordic countries under the Nordic Thematic Group on Sustainable Rural Development, supports the findings of this chapter. The study revolved around young people. They were invited to paint a picture of rural life in 2019 and share their future plans, including studying and returning home again. The young people interviewed expressed their feelings that rural areas were great places to live. For example, interviewees from Närpes in Finland stressed the availability of cultural amenities such as theatres and sports, and facilities such as gyms and good "social spaces".

However, the availability of jobs for more highly educated people was perceived as a challenge in many case study areas, such as the more remote parts of the Faroe Islands like Suðuroy. Despite this, interviewees also told stories about changing trends such as the increase in activities related to the experience economy, e.g. the Sports High School and a related adventure tourism company. New jobs are being created around wellness and similar ventures, the new bioeconomy and smart specialisation.

As many interviewees stressed, it is important to support young people in their attempts to create their own jobs, find new fields and innovative forms of entrepreneurship, and build up networks. In fact, there are numerous initiatives that contribute to this and foster a change in trends, be it in Arctic Finland, Åland or the Faroe Islands. In Åland, for instance, public/private initiatives are seeking to "get the brains back", in other words to inform students about opportunities to return after studying outside the islands. In the Faroe Islands, a change in trend was achieved by encouraging young people to return from studying abroad. This was the result of cooperation between different levels of government and institutions. As a reaction to the decline in population and to motivate students to return, the House of Industries, together with municipal representatives from different Faroese municipalities, spoke to Faroese students abroad to convince them to return after their studies. They gave them information about job opportunities, childcare, health, building/buying houses and trainee opportunities with local companies. Quality of life is seen as a core aspect here and elsewhere.

[3] The content of this box has been developed based on a forthcoming Nordregio publication from Kull et al titled: Attractive Rural Municipalities in the Nordic countries: What are the reasons for success in employment and population? Lesson learned from 14 cases.

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Chapter 3

MIGRATION AND MOBILITY
more diverse, more urban

Author: Timothy Heleniak
Maps and data: Johanna Carolina Jokinen

In recent decades, migration in the Nordic Region has been characterised by two major trends. The first is the large number of international migrants moving to the Nordic countries, causing the foreign-born proportion of the populations to reach historic highs. The second is internal migration within the Nordic countries away from peripheral rural areas towards a few select larger urban areas. Both trends have implications for population structure and economic development at the national and regional levels. This chapter analyses recent trends in international and internal migration before examining the interesting interplay of the two flows at the regional level.[4]

Immigration has accounted for two-thirds of the population increase in the Nordic Region since 1990

Increasing immigration, increasing diversity

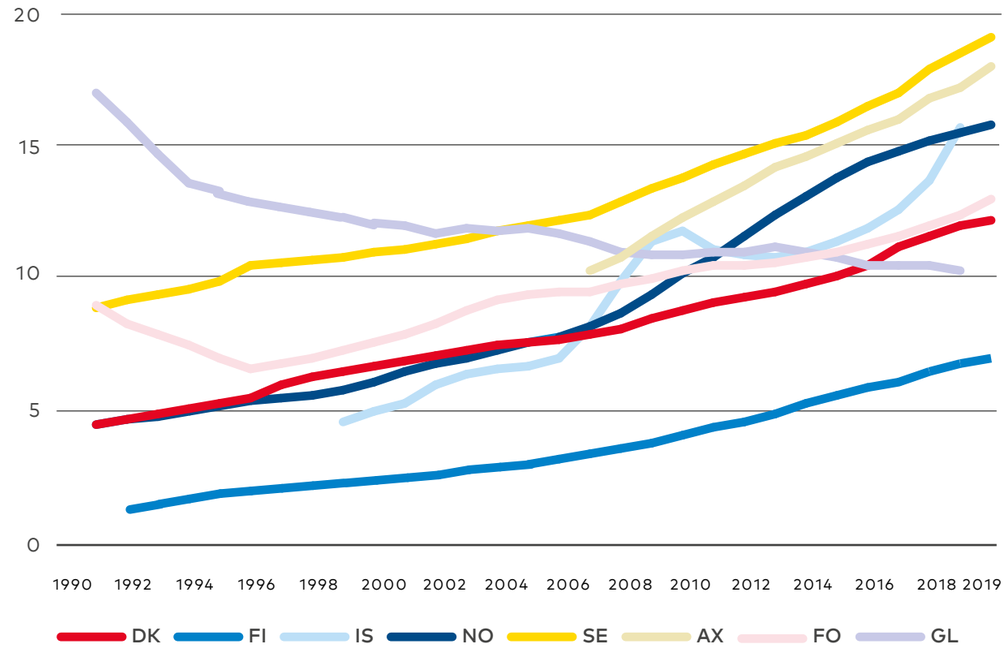
The Nordic countries have long been net recipients of people from other countries, but the numbers have increased considerably in recent decades. Between 1990 and 2005, an annual average of 160,000 people migrated into the Nordic Region. Since 2006, the annual inflow has exceeded 200,000 every year, driven in part by the 2004 enlargement of the European Union to include 10 new countries. Immigration rose to a peak of 374,000 in 2016 during the "refugee wave". It fell to 320,000 in 2018 but this is still double the levels prior to 2005. This trend is most pronounced in Sweden, where immigration grew from an annual average of 56,000 per year between 1990 and 2005 to 163,000 in 2016. Managing the large influx of newcomers is an enormous challenge for the Nordic countries.

As described in the introduction to the demography section, immigration has accounted for two-thirds of the population increase in the Nordic Region since 1990, and even more since 2006. This has caused the foreign-born proportion of the population to rise to historically high levels (Figure 3.1). Sweden has the highest share, 19% in 2019, a significant increase from 1990 when it was 9%. In Iceland and Norway, 16% of the populations are foreign-born and in Denmark 12%. Finland has the lowest share of the countries, 7% in 2019, but this is still a significant increase from 1990 when it was just 1.3%. Greenland is a notable exception to the overall Nordic trend, with a decline in the proportion of foreign-born people in its population from 17% in 1990 to 10% in 2018.

Foreign-born is a useful and comparable measure of the proportion of the population of different origin than the host country and is what the United Nations uses to count the international migrant population at the global level. From an integration perspective, however, *foreign background* provides a much more nuanced portrait. This data is also somewhat more complex due to the different definitions used to classify people with a foreign background in each of the Nordic countries. As such, this data is not presented here but can instead be found in the immigration and integration supplement to *State of the Nordic Region* 2018 (Nordregio, 2018).

[4] International migration is a move across an international border and includes movements between Nordic countries. Internal migration involves movement within one of the Nordic countries.

Figure 3.1 Percentage of the population in Nordic countries that is foreign-born as a share of total population, 1990 to 2019.



Data source: Nordic Statistics.

Responding to increased immigration

It is often repeated that the populations of the Nordic countries are ageing, and to maintain economic growth there is a need for newcomers to play a substantial role in the labour markets at the national and regional levels. The immigrant population is younger than the native populations in the Nordic countries and continued immigration can help to slow but not fully halt the ageing of the populations (Sánchez Gassen & Heleniak, 2016). The generous welfare systems in the Nordic countries depend on high levels of employment and it is imperative that immigrants find their way into employment as quickly as possible (Calmfors & Sánchez Gassen, 2019).

Several decades ago, most migration to Nordic countries was from other Nordic countries (Heleniak, 2018). This was due to the 1952 Nordic Passport Union, which allowed Nordic citizens to move freely and work in other Nordic countries. In the 2000s, people from Poland and other new EU member states made up a large proportion of the people migrating to the Nordic Region. These earlier waves of migrants primarily came for work and many had jobs before or soon after arrival. More recently, people from countries experiencing major conflicts or civil unrest, such as Eritrea, Iran, Iraq, Somalia, Afghanistan and Syria, have been the main groups. Over the past decade, there has also been a shift in

the reasons for immigration. In the 2000s, immigration was largely for work, family reasons, or education. Since then, large numbers have been in various humanitarian categories.

There have been competing reactions to the increase in immigration into the Nordic countries. Because of the need to have high levels of employment among both male and female migrants, there have been numerous efforts to facilitate integration at national and regional levels, with some aimed at specific migrant groups. The Nordic countries are highly ranked in terms of having integration policies and introduction programmes in place, but these have been challenged by the size and composition of recent immigration flows (Barcelona Centre for International Affairs (CIDOB), and the Migration Policy Group (MPG), 2015). Several recent studies carried out by the Nordic Council of Ministers have examined the effectiveness of integration measures (Calmfors & Sánchez Gassen, 2019; Damm, 2017; Hernes, Nielsen Arendt, Joona, & Tronstad, 2019). A key conclusion is that no single policy is enough to fully integrate these newcomers into the labour market. A nuanced combination of education, active labour market polices, social security and wage policies are needed.

As shown in the study *Integrating immigrants into the Nordic labour markets*, in the next few years the immigrants who have arrived for humanitarian reasons in recent years will need to be integrated into the Nordic labour markets, once they have been granted asylum (Calmfors & Sánchez Gassen, 2019). This will be a very challenging process. All the Nordic countries have significant employment gaps between natives and foreign-born people, with particularly large gaps in Denmark, Finland and Sweden (ibid.). The gaps are largest between natives and non-EU immigrants. There tend to be higher unemployment rates among non-European immigrants than among native-born people, and non-European immigrants are overrepresented in fixed-term and part-time jobs. Refugees are more dependent on welfare benefits and less likely to be employed than the native-born population.

The increase in immigration has been accompanied by a rise in anti-immigration parties and segments of the population opposed to further immigration (Widfeldt, 2018). These parties have gained between 13 and 21% of the seats in recent parliamentary elections, enough to influence national immigration policies (Tanner, 2016). In response to the influx of refugees and asylum seekers, the Nordic countries took various measures to stem immigration. The combination of policies aimed at reducing the number of refugees and intensified efforts to integrate those already in the Nordic countries reflect the complex policy challenges arising as a result of the high and increasing numbers of people of foreign origin.

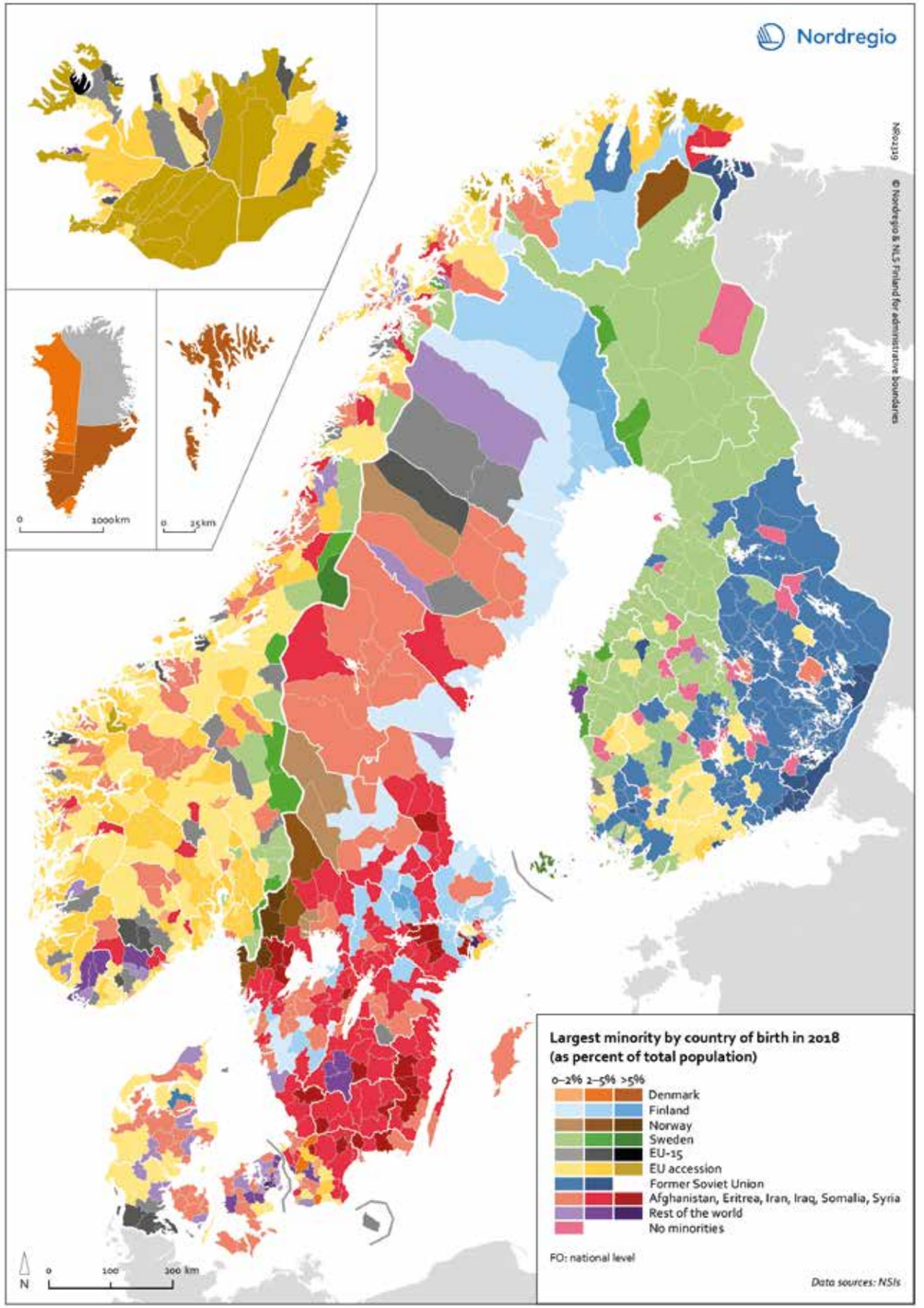
There has been an increase in foreign-born populations in almost every municipality

The immigrant population spreads out

With the high levels of immigration to the Nordic countries in recent decades, there has been an increase in foreign-born populations in almost every municipality. Because of past and more recent immigration and settlement patterns, the largest minority group (defined by country of birth) among municipalities shows an interesting pattern (Figure 3.2). The figure shows the largest minority group in each of the municipalities and the proportion of the total municipal population made up by that group. For simplicity and for analytical purposes, the map shows the country group to which the largest minority belongs. For example, black shading on the map means that the largest minority group in that municipality comes from a single country within the EU-15 (e.g. Germany) and that people from that country alone make up over 5% of the population.

While there has been increased immigration into the Nordic countries from outside the Nordic Region, intra-Nordic immigration remains considerable. People born in Norway are the largest minority group in 17 municipalities in Sweden, mostly along the southern portion of the border, and make up more than 10 per cent of the population in some municipalities. People born in Sweden make up the largest minority in 160 municipalities outside Sweden, mostly in northern and western Finland, and account for more than 10% of the population in several municipalities in Åland. People born in Finland are the largest minority group in 79 municipalities, nearly all in Sweden, with the highest shares being in municipalities in the north near the border

Figure 3.2 Largest minority group by municipality 2019 (based on country of birth).



with Finland. People born in Denmark are the largest minority in all regions of Greenland and the Faroe Islands and a few other municipalities in the other Nordic countries, mostly in southern Sweden. Places where people born in one Nordic country are the largest minority group in another represent historical patterns of migration or more recent cross-border flows.

People born in one of the EU-15 countries are the largest minority in 47 municipalities; most of them were born in Germany. Some of these municipalities are in southern Denmark, just across the border from Germany. The proportion of people from any single EU country in any municipal population is quite small, and never accounts for more than 5% of the population.

A much larger category is that of people born in the EU accession countries,[5] who represent the largest minority group in one-third of municipalities. This group includes people born in Poland or one of the Baltic States. The reason for separating people from the EU-15 and accession countries is that while people from both groups now have the same access to the labour markets in the Nordic countries, this was not always the case and the two groups have different migration histories. People born in Poland are the largest minority group in many municipalities, mostly in Iceland and Norway, where they have arrived as labour migrants. In many municipalities in Iceland, they make up more than 10% of the population. People born in Estonia are the largest minority in many regions in Finland, to which they have linguistic and historical ties. People born in Lithuania are the largest group in several Norwegian municipalities, including large concentrations in several regions in northernmost Norway.

People born in the former Soviet Union (including those listed as being born in the former Soviet Union, Russia or Ukraine but not the Baltic states) are the largest minority group in 100 municipalities. Nearly all the municipalities in which this group is the largest minority are in south-east Finland, which borders Russia. In most cases, the proportions are quite small, never more than 4% of the total municipal population.

Another category is that of countries experiencing major conflicts or civil unrest. This category includes people born in Afghanistan, Eritrea, Iran, Iraq, Somalia and Syria. People born in one of these countries make up the largest minority group in 21% of municipalities. These municipalities are in a large cluster in Southern Sweden and a few in Norway. In some municipalities, people from one of these countries make up more than 5% of the population. A final group are the 25 municipalities in which there are no foreign-born people; apart from one (Skorradalshreppur in Iceland), these are all in Finland.

Several decades ago, most migration to Nordic countries was from other Nordic countries

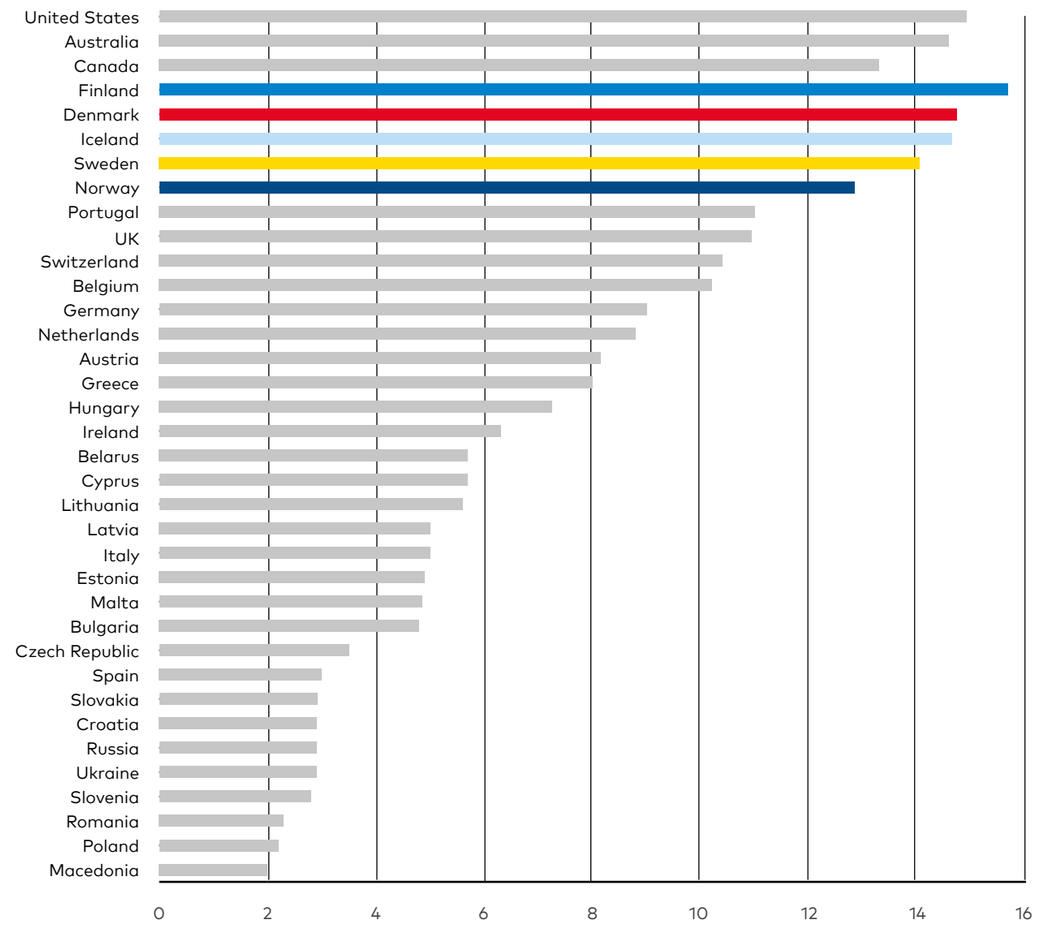
Urbanisation and internal migration

Internal migration refers to any permanent change in residence within one of the Nordic countries or autonomous territories. There are various measures and concepts that can be used when analysing internal migration, depending on the research and policy question (Champion, Cooke, & Shuttleworth, 2019). In this chapter, two aspects of internal migration within the Nordic countries are examined: comparisons of the internal mobility of the populations of the Nordic countries to other countries; and analysis of regions that have gained or lost people to other regions within the same country over the past decade.

Much of the population in the Nordic countries is concentrated along the coasts and in a few large urban settlements, leaving large tracts of uninhabited or sparsely populated territory including portions in the Arctic Circle (Stjernberg & Penje, 2019). These sparsely populated regions and their need for special treatment were acknowledged by the EU when Sweden and Finland became members in the 1990s. The long-term depopulation and ageing of the populations in these sparsely-populated regions is a concern to the national governments as they try to provide equal opportunities and living conditions for all inhabitants, regardless of where they live

[5] The EU accession countries include the 10 nations – Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia – that joined in 2004, Romania and Bulgaria, which joined in 2007, and Croatia, which joined in 2013.

Figure 3.3 Crude migration intensities for selected countries (circa 2010).

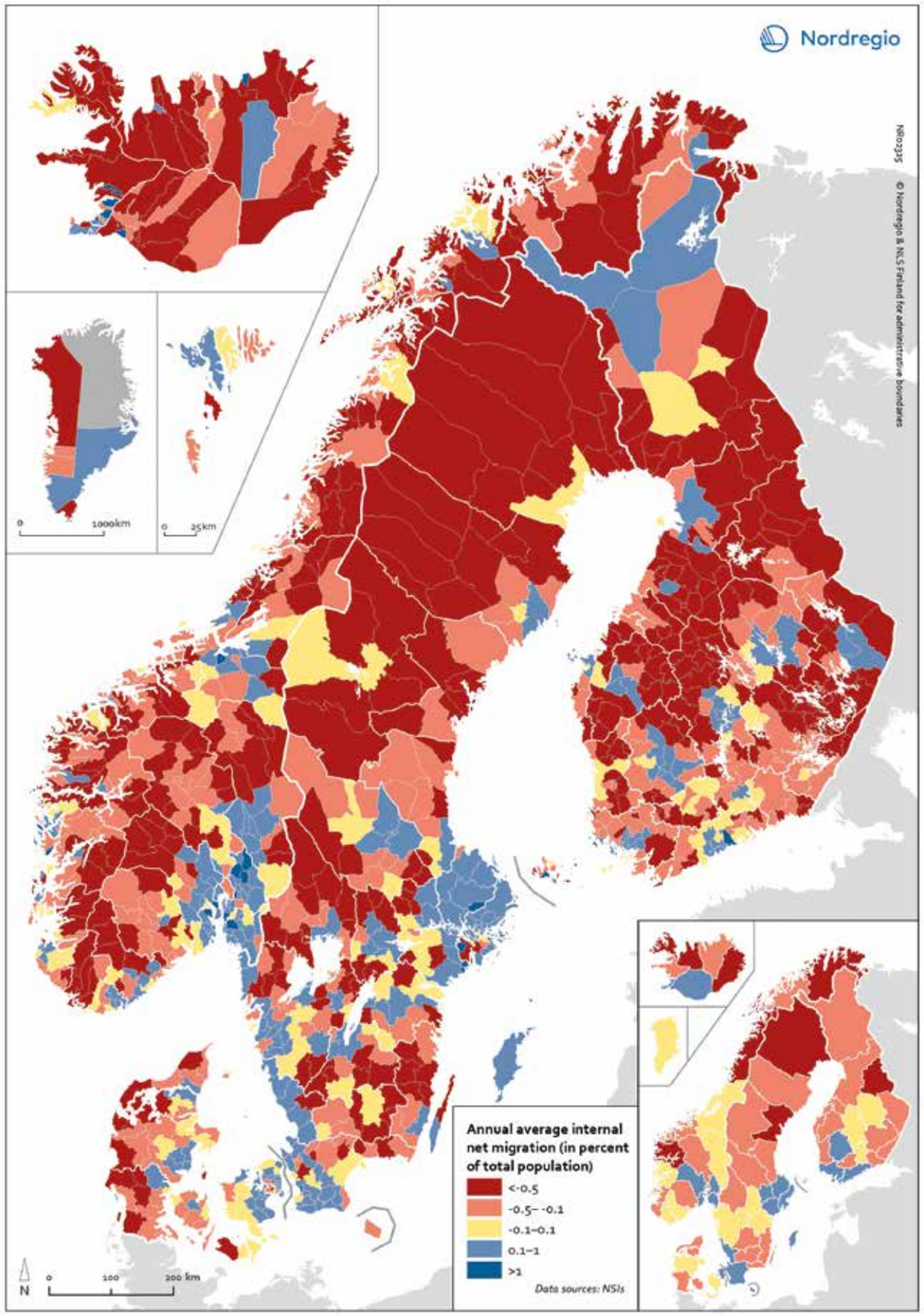


Data source: Champion, Cooke, & Shuttleworth, 2019.

(Löfving, Borén, Heleniak, & Norlén, 2019). During the 20th century, all the Nordic countries underwent structural changes in their economies and societies, which resulted in the redistribution of their populations and concentration into larger urban centres. This process continues to the present, albeit at a slower pace than in the past.

Crude migration intensity is the best measure for comparing levels of migration and mobility across and within countries. This is the sum of all changes in residence as a share of the population. Compared to other countries in Europe, the populations of the Nordic countries stand out as being the most mobile (Figure 3.3), with 13–16% of the population changing residence in any given year. These migration intensities are comparable to other highly mobile societies such as the United States, Canada and Australia. There is evidence that populations in the advanced world are becoming less mobile (Champion, Cooke, & Shuttleworth, 2019). However, it seems as if mobility in the Nordic countries has not declined. One explanation for this is that, with social services such as education and health being distributed equally geographically, it is easier to resettle

Figure 3.4 Net internal migration as percentage of population, 2010–2018.



Compared to other countries in Europe, the populations of the Nordic countries stand out as being the most mobile

elsewhere (Shuttleworth, Östh, & Niedomysl, 2019). The implications of this high mobility among Nordic populations is that the spatial distribution of the population will change in the long term, which can be positive for economic growth and regional development as people move to where they are most productive. However, there can also be negative impacts in regions where there is high out-migration.

Shifting focus from the individual to the regional and municipal level shows the effects of these internal moves on population change (Figure 3.4). The map in Figure 3.4 shows the percentage change from internal migration for the period 2010 to 2018. Internal or domestic migration refers to migration between municipalities and regions within the same country.

The blue areas on the map show municipalities/regions with positive internal net migration (i.e. more people arriving than departing), the red areas show municipalities/regions with negative internal net migration (i.e. more people departing than arriving) and the yellow areas show municipalities/regions with balanced internal net migration rates (i.e. comparable numbers of people arriving and departing). The trend revealed is that internal migration movements are directed towards larger city regions, with many rural periphery regions losing people. The loss of people in some of these regions is felt especially acutely because of the age selectivity of migration, with young people leaving in large numbers, accelerating the ageing of the population structure in regions with high out-migration.

Combining internal and international migration

The map in Figure 3.5 shows the combination of domestic migration (left-hand bar) and international migration (right-hand bar), with red indicating net out-migration and green indicating net in-migration, for the 66 regions within the Nordic Region in the period 2010 to 2018. The size of the bar indicates the size of the net flows. All regions have had positive international migration since 2010, which is not surprising given the size of the international migration flows into the Nordic Region in recent years.

A first group of regions are those that have had both positive domestic and international migration. In Sweden, the regions containing the three large cities – Malmö, Gothenburg and Stockholm – and several others fall into this category. In all these regions, the amount of international migration far exceeds the amount of domestic migration. The other regions of Sweden fall into a second category where there has been domestic out-migration combined with international in-migration. In all cases, the size of the international inflows far exceeds that of the domestic outflows.

In Norway, only four of the 11 regions combine both positive domestic and international migration: Viken, Vestfold og Telemark and Agder in southern Norway, and Trøndelag. All other regions in Norway had net internal population losses combined with international migration gains. For most regions, the size of the net international inflows far exceeded the domestic outflows. For example, Oslo had an internal migration loss of 8,000 and an international migration gain of 50,000.

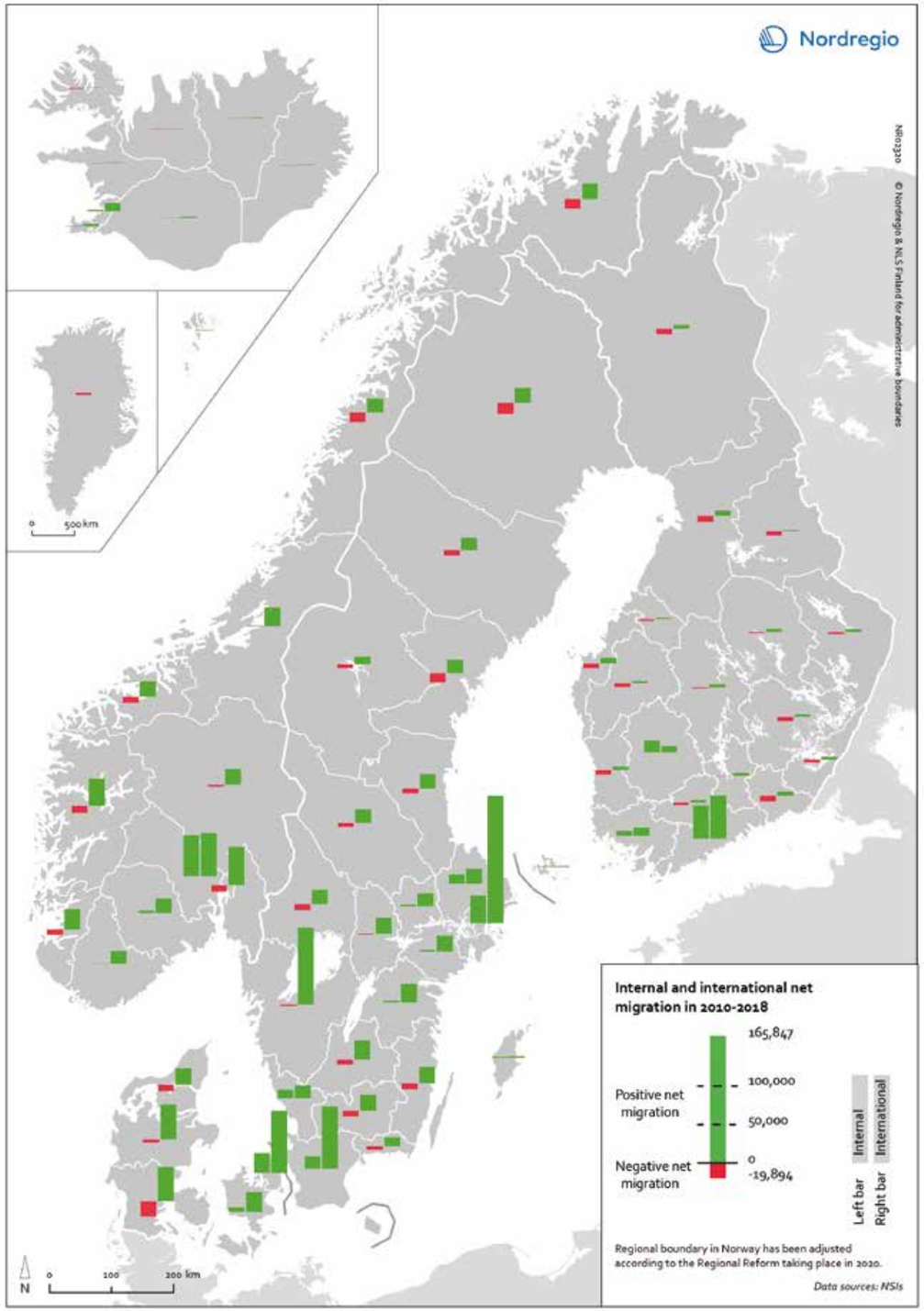
In Denmark, the two eastern regions of the Capital City Region and Zealand had positive internal and domestic migration while the three western regions had internal migration losses and international gains. The size of the international inflows far exceeded the domestic migration streams.

Only four of Finland's 19 regions combined positive domestic and international migration, including the three large cities – Helsinki, Turku, and Tampere – and Åland.

For Iceland, the capital area and several surrounding regions had gains from both internal and international migration. Most regions outside of the capital had domestic migration losses and international migration gains.

Overall in the Nordic Region, there were either domestic migration losses and international migration gains or gains from people moving both from elsewhere in the country and from abroad. The gains from international migration far exceeded those of internal migration in almost all regions that experienced net gains from both streams. Due to these

Figure 3.5 Domestic and internal migration, 2010 to 2018.



different patterns of internal and international migration, nearly all regions are becoming much more diverse in terms of the size of foreign-born populations.

Concluding remarks

The two trends of positive immigration into the Nordic countries and urbanisation are projected to continue (Sánchez Gassen & Heleniak, 2019). The past and expected continued immigration will lead to more diverse populations for the Nordic countries and regions but this presents a challenge, especially for those who arrive as refugees on humanitarian grounds. With the high levels of immigration to the Nordic countries in recent decades, there has been an increase in foreign-born populations in almost every municipality.

Compared to other countries in Europe, the populations of the Nordic countries stand out as being the most mobile which contributes to the ongoing urbanisation of the population. This shift in the population away from periphery rural areas towards urban centres brings about planning challenges in both shrinking and growing regions.

Nearly all regions are becoming much more diverse in terms of the size of foreign-born populations

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Chapter 4

AGEING AS A MAJOR DEMOGRAPHIC TREND

Author: Mats Stjernberg
Maps and data: Oskar Penje

Population ageing has been one of the main demographic trends in the Nordic Region during recent decades. The process of population ageing can be understood as an upward shift in the population age structure. This means that there is a decline in the proportion of children and young people, along with an increase in the proportion of older age groups. As population ageing is a major development that can be seen throughout the Nordic countries and elsewhere in Europe, it has emerged as a central question in public debate and on the policy agenda. Ageing is perceived as a challenge that will result in greater economic and societal demands in all countries, and it is widely considered vital to plan and prepare for its impacts.

The main focus in this chapter is on the population aged 65 and over in the Nordic Region. The chapter examines the magnitude of population ageing that has occurred in different parts of the Nordic Region over time and what the current population age structure looks like in different Nordic municipalities. While ageing is a major demographic trend, its intensity has varied considerably between different types of municipalities and regions. The chapter also touches on aspects such as regional and gender differences in the life expectancy of older people and explores the type of policy action that has been taken to address population ageing.

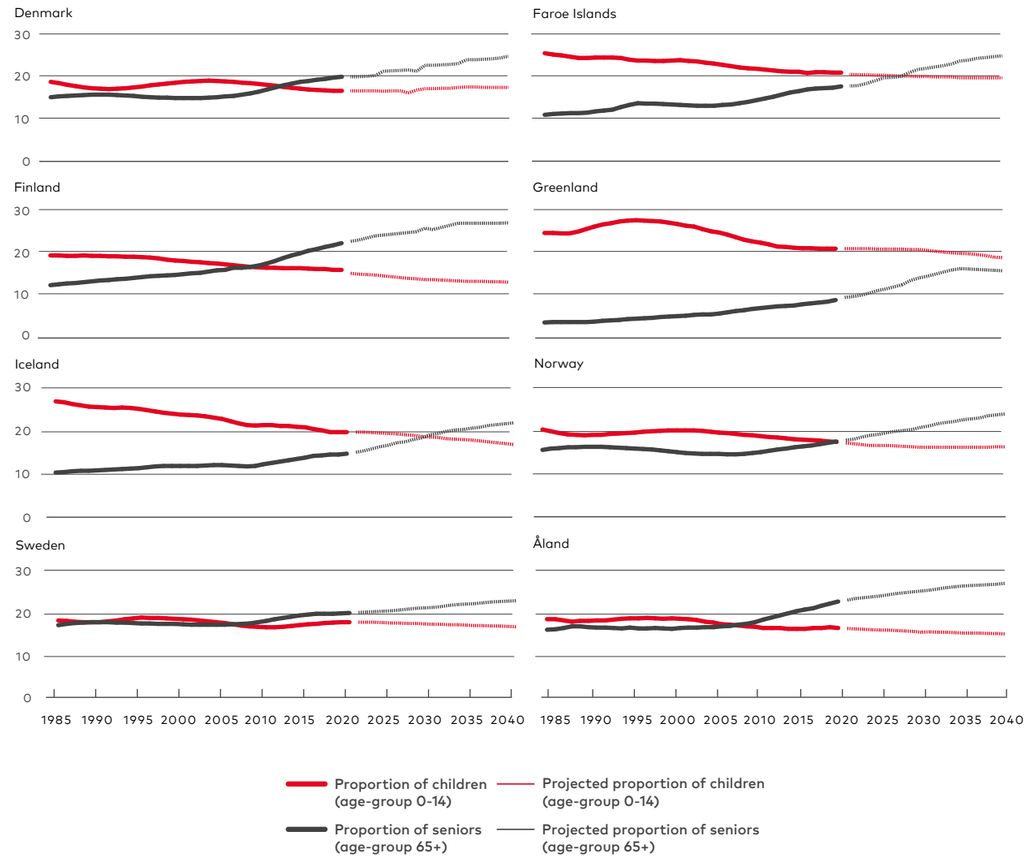
An overview of population ageing

Figure 4.1 provides an overview of the changes in the age structure of the populations in the Nordic Region since 1985. The figure illustrates how the proportion of children (aged 0–14) and older people (aged 65 and over) has changed between 1985 and 2019, as well as the projected change up to 2040.

The ageing of the population structure is a characteristic feature throughout the Nordic Region

The ageing of the population structure is a characteristic feature throughout the Nordic Region, but there are noticeable differences within the region in this regard. In Denmark, Finland, Sweden and Åland, older people now outnumber children, while in Norway there were nearly equal numbers of older people and children in 2019. The proportion of people aged 65 and over, however, is also expected to surpass that of children in Norway within the next few years. Sweden has long had the oldest population profile in the Nordic Region, but it has recently been overtaken by Finland and Åland, which clearly have the highest proportions of older people at the moment. The developments in Iceland, the Faroe Islands and Greenland differ considerably; in all three cases, the proportion of children remains higher than that of people aged 65 and over, even though this difference has diminished over the decades. Compared to other Nordic countries the development in Greenland differs the most, as the proportion of children (21.0%) was more than twice as high as that of older people (8.5%) in 2019. This can be related to Greenland having a combination of comparatively high fertility rates (see Chapter 2) and the shortest life expectancy in the Nordic Region (Jungsberg et al., 2019).

Figure 4.1. Number of children (aged 0–14) and older people (aged 65 and over) as a proportion of the total population (in percentages), 1985–2019, and projections to 2040.



Data source: Nordic Statistics.

Population ageing in the Nordic Region can be attributed to a number of parallel developments. The first and most central is that the baby boom generation, born roughly between the mid-1940s and 1960s, has increasingly approached older age during the past decade. The two decades following the Second World War were characterised by historically high birth rates, especially in Finland, Iceland and Norway, but also in Sweden and to a lesser extent in Denmark (Van Bavel & Reher, 2013). For instance, children constituted roughly 31% of the total population in Finland and 35% in Iceland in 1960, while older people accounted for around 7 and 8% respectively (Nordic Statistics, 2019). The steep increase in the proportion of people aged 65 and over that can be seen in all Nordic countries, especially during the 2010s, can largely be attributed to this baby boom generation reaching the age of 65 (Van Bavel & Reher, 2013; Sánchez Gassen & Heleniak, 2019). A second parallel development is that people are now healthier and live longer than before, contributing to an increasing number of people in the older age groups (Christensen et al., 2009). In an international comparison, average life expectancies are high in the Nordic Region except Greenland, and these are estimated to increase in the five Nordic countries, reaching around 87 to 88 years for men and 91 to 92 years for women

Figure 4.2 Prospective old-age dependency ratio 2019.

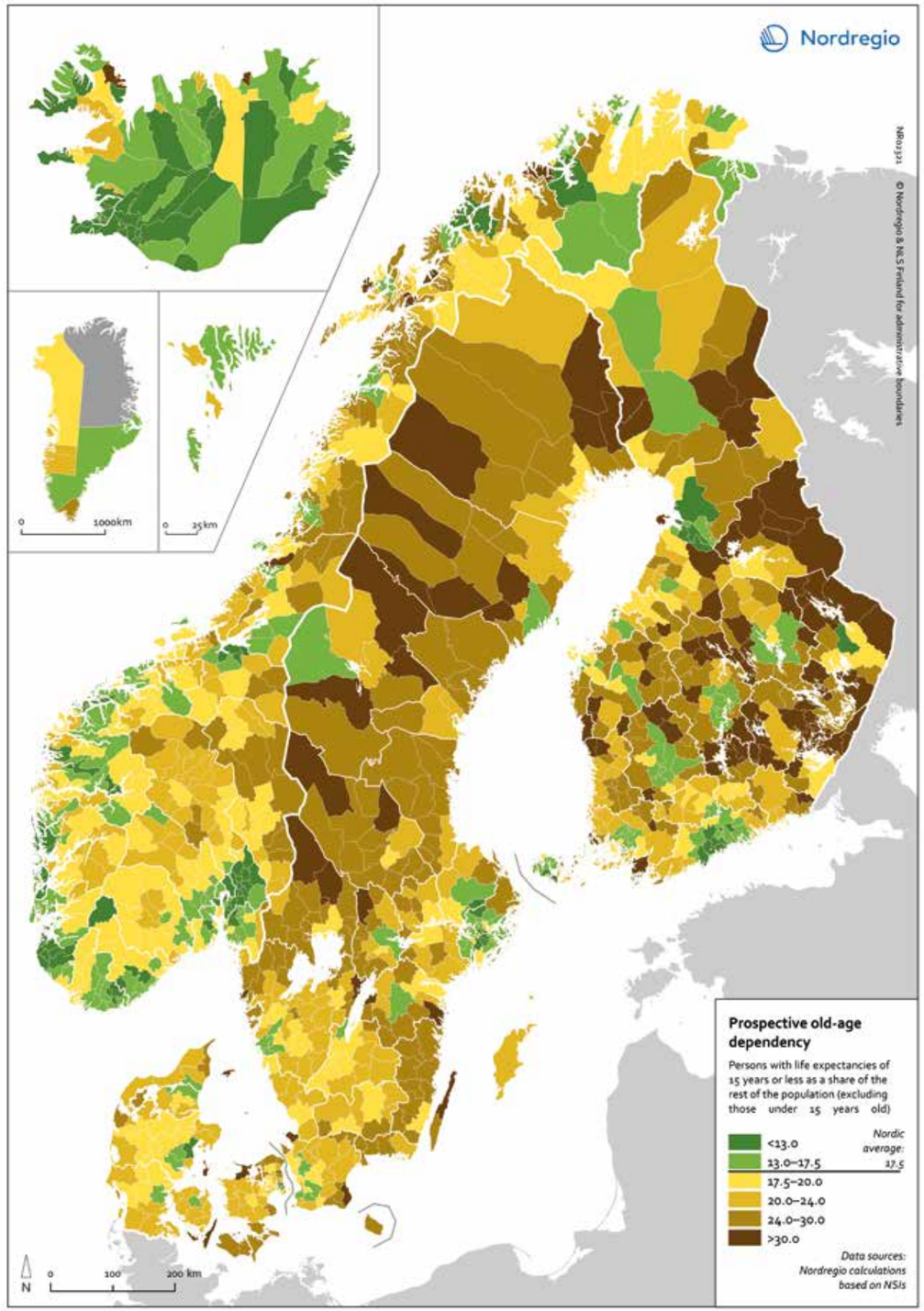


Table 4.1 Prospective old-age dependency ratio 2019, averages by country and municipality type (in percentages).

	Urban	Intermediate	Rural	Total
Denmark	17.4	21.1	23.6	21.6
Faroe Islands	–	–	17.2	17.2
Finland	14.8	20.1	26.0	24.5
Greenland	–	–	19.9	19.9
Iceland	13.0	10.5	14.2	14.0
Norway	13.8	16.3	19.4	18.6
Sweden	15.2	21.8	25.9	23.3
Åland	–	15.1	19.0	18.7
Nordic Region	15.3	19.6	22.2	21.2

Data source: Nordregio's calculations based on NSIs.

in 2080 (Jönsson, 2018). Finally, birth rates have dropped over the past decades in many countries, for instance Finland where they are now historically low (OSF, 2019), which means that the proportion of younger people has gradually decreased at the same time as there is an upward shift in the age profile of the Nordic population. As indicated in Figure 4.1, projections suggest that population ageing will continue in the Nordic Region during the decades to come.

As previously discussed, population ageing trends differ quite considerably between countries, but differences within countries and between regions and municipalities are in some cases even more significant than national averages might suggest. Figure 4.2 portrays the types of difference that can be seen in the age structures of Nordic municipalities according to a measure known as the prospective old-age dependency ratio (POADR). This indicator compares the population in age groups who have a life expectancy of 15 years or less with age groups who have more than 15 years of remaining life expectancy and who are at least 15 years old. This measure can be used as a way of comparing the number of people who are at the end of their lives and for whom the probability of health impairments and the need for care increases, with the number of people who are younger and therefore on average less likely to need costly care; and hence for assessing the societal impacts of population ageing (Sanderson & Scherbov, 2007). A more elaborate discussion about this measure and its advantages compared to the more commonly used old-age dependency ratio (OADR) measure is provided in the box titled "Alternative ways of measuring population ageing".

The municipalities coloured dark brown on the map in Figure 4.2 have the highest prospective old-age dependency ratios, meaning they have a comparatively high proportion of people with a life expectancy of less than 15 years compared to the rest of the population aged over 15. The municipalities in this category are primarily found in Finland (69 municipalities) and Sweden (25 municipalities). The predominance of Finnish municipalities can be related to the fact that Finland has the oldest age profile of all the Nordic countries; especially in the northern, eastern and central parts of the country. Similarly, northern Sweden is characterised by a high proportion of older people. The majority of municipalities with the lowest prospective old age dependency ratios are in Norway (60 municipalities) and Iceland (34 municipalities). Iceland in particular stands out, and this is related not only to the country's comparatively young age profile but also to the long remaining life expectancy of older people in Iceland (see Figure 4.3).

A comparison of internal differences in the countries shows that many rural and sparsely populated municipalities in particular have a high prospective old-age dependency ratio (see Table 4.1). This could be considered logical as rural areas generally have older age structures (e.g. Sánchez Gassen & Heleniak, 2019) and therefore, as would be expected, often have a comparatively high proportion of people with a life expectancy of less than 15 years. This can be a challenge as these municipalities have a comparatively high proportion of people who are

Alternative ways of measuring population ageing

There are different ways of studying and measuring trends in population ageing. One of the most commonly used indicators is known as the old-age dependency ratio (OADR). OADR is most often calculated as the ratio between the number of people aged 65 and over (people who are presumed to be retired or economically inactive) and the number of people aged between 15 and 64 (working age population). OADR is used not only for comparing different population age groups but also often to assess the societal impacts of population ageing. One of the advantages of OADR is that it is relatively straightforward to calculate, as data on the number of people in different age groups is widely available for most countries, regions and municipalities. Nevertheless, one of the main criticisms of OADR as a way to measure the societal and economic impacts of ageing is that the economically inactive and working age populations are defined on this indicator somewhat arbitrarily according to the age thresholds of 15 and 65 years (Sánchez Gassen & Heleniak, 2019). OADR is not necessarily the best suited measure for examining the relation between those who are working and those who are "dependent", as not everyone aged between 15 and 64 is working and not everyone who is 65 or older is retired or economically dependent, particularly as people now remain active and live longer and healthier lives than before.

An indicator known as prospective old-age dependency ratio (POADR) has been proposed as an alternative way of examining population ageing and its impacts on society (Sanderson and Scherbov, 2007). This indicator is based on the notion that the need for acute care and associated costs for health and care systems generally increase steeply towards the end of one's life (e.g. Miller, 2001, Seshami and Gray, 2004). Rather than defining old age according to a fixed age, the "dependent" population is defined by the age when remaining life expectancy is 15 years or less, which is an age that differs between regions and countries. POADR (as calculated for Figure 4.2 of this chapter) is most commonly calculated by dividing the number of people with a remaining life expectancy of 15 years or less by the number of people with more than 15 years left to live (excluding those aged 0–14 years). Statistics on remaining life expectancy are available for different ages, calendar years and territorial levels from the Nordic national statistical institutes, and this data can be used for calculating the POADR.

Overall, while a person aged 65 would be considered as "dependent" according to the OADR, this is not the case according to the POADR, as people at this age tend to have a longer remaining life expectancy than 15 years in the Nordic Region (see Figure 4.3). Hence, the POADR could be considered better suited for addressing the societal impacts of ageing, as people at age 65 may still work or contribute to society in other ways. It was therefore considered preferable to use the POADR rather than the OADR in this chapter.

Active ageing refers to the process of optimising the opportunities for health, participation and security in order to enhance quality of life as people age

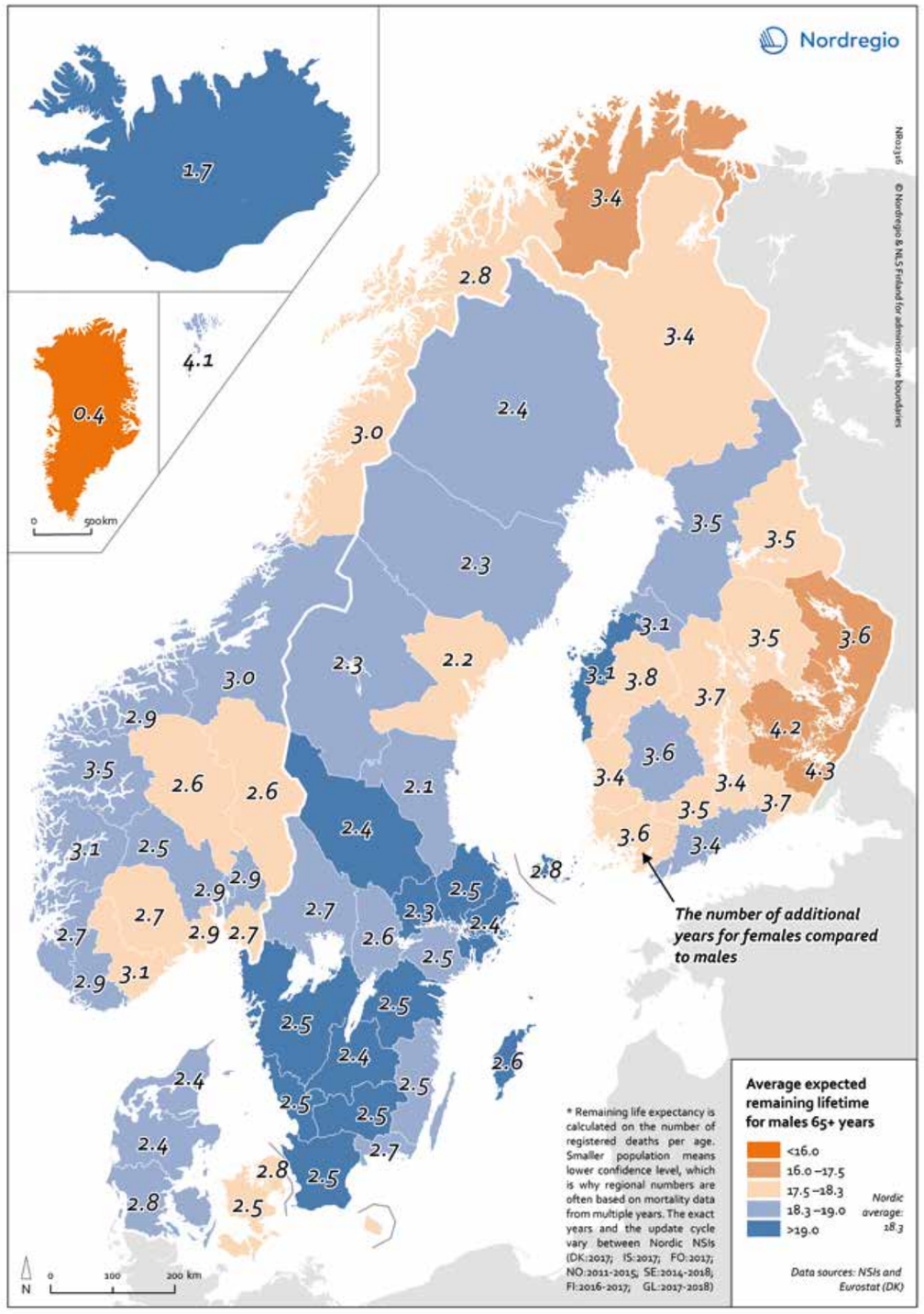
approaching the final years of their lives, when health impairments and the need for intensive care increases, and relatively few people in the younger age groups who could provide such care and support. This is the case especially in Finland, where the municipalities that have high scores on this measure are predominantly rural, and also in Sweden, where several municipalities in the sparsely populated north also clearly stand out. When the northern parts of Finland, Norway and Sweden are compared, a noticeable difference emerges between the countries; in the Norwegian Arctic, municipalities such as Tromsø and Alta have some of the lowest prospective old-age dependency ratios, whereas most northern municipalities in Finland and Sweden have high scores on this indicator. In contrast, the general trend in all countries is that the largest cities and main urban regions are characterised by low prospective old-age dependency ratios. For instance, Copenhagen and Aarhus in Denmark, Helsinki and Oulu in Finland, Reykjavik in Iceland, Oslo and Trondheim in Norway and Stockholm in Sweden are all among the municipalities with the lowest prospective old-age dependency ratios. This can be related to the general picture for large cities and urban regions in the Nordic regions, which is that they typically have comparatively a young population age profile (see Chapter 2). Nonetheless, urban areas are also witnessing population ageing, which means that it is increasingly important for cities to plan to adapt to this demographic challenge and create more inclusive and age-friendly urban environments (OECD, 2015; WHO, 2007).

As population ageing has attracted increased political concern, the promotion of health and wellbeing has become a key policy objective, not only in the Nordic Region but also more generally in Europe and globally. The World Health Organization (WHO), the United Nations (UN) and the Organisation for Economic Co-operation and Development (OECD), in particular, have actively pushed the subject on the global policy agenda since the 1990s, and two closely related concepts that they have actively promoted are active ageing and healthy ageing. Active ageing refers to the process of optimising the opportunities for health, participation and security in order to enhance quality of life as people age (WHO, 2002). Similarly, healthy ageing refers to the process of developing and maintaining the functional ability that enables wellbeing in older age (WHO, 2019). These concepts have become central, as one of the most important aims in ageing policies is for people to remain in good physical and mental health for as long as possible. In Europe, the European Commission has also played an important role in promoting active and healthy ageing. A key initiative in this regard is the EU Covenant on Demographic Change, launched in 2015, one of the purposes of which is to encourage local, regional and national authorities and other relevant stakeholders to commit to working together and implementing evidence-based solutions to support active and healthy ageing (EU Covenant on Demographic Change, 2015).

Figure 4.3 shows the average life expectancy at the age of 65 for men and women at regional level throughout the Nordic countries.[6] In most regions, men aged 65 still have around 18 to 20 years left to live, while women have, on average, two to three years longer to live than men. The most obvious differences can be seen when comparing Iceland and Greenland. Iceland has the highest remaining life expectancy at 65, where men are expected to live for an additional 19.6 years on average compared to 21.3 years for women. Greenland stands out with clearly the lowest remaining life expectancy; here, men aged 65 are expected to live for an average of 12.7 additional years compared to 13.1 for women. This corresponds to the situation more generally in Greenland, where life expectancy is about 10 years lower than in the rest of the region, largely due to high infant and child mortality, suicide, accidents and violent deaths, as well as lung and cervical cancers (Rehn-Mendoza & Weber, 2018). The most noticeable regional differences within the countries can be seen in Finland and Norway. In Finland, the average remaining life expectancy for men aged 65

[6] See Chapter 10: Wellbeing in the Nordic Region, for analysis based on average life expectancy at birth.

Figure 4.3 Remaining life expectancy* for male population at the age of 65, with female to male difference.



The older population in the Nordic Region is far from homogenous

is highest in Ostrobothnia (19.3 years) and lowest in South Savo (17.2 years), while in Norway, the highest remaining life expectancy for men aged 65 is found in Møre og Romsdal (19.0 years) and the lowest in Finnmark (16.9 years). The general picture in Sweden shows that the regions in the southern parts of the country have the longest life expectancy for older people.

Women generally live longer than men and this is also evident in all regions shown on the map. This gender difference is especially noticeable in Finland, where women at age 65 are on average expected to live more than three years longer than men in all regions. In Finland, the most pronounced difference in average life expectancy between men and women aged 65 can be seen in the south-eastern parts of the country, where life expectancy for older people is also generally the lowest. In Denmark and Sweden, this difference is between two and three years in all regions. The lowest differences in average life expectancy between men and women at age 65 can be observed in Iceland (1.7 years) and Greenland (0.4).

The previously discussed differences in remaining life expectancy demonstrates that the older population in the Nordic Region is far from homogenous. As illustrated in Figure 4.3, regional and gender differences are noticeable, but it should be considered that the health and wellbeing of older people is affected by a multitude of other factors such as income, educational level, ethnic background, physical activity, dietary habits, family situation and living and housing arrangements (WHO, 2002). While poor people of all ages face an increased risk of ill health and disabilities, older people with low incomes and low levels of education are particularly vulnerable and are less likely to have access to nutritious food, adequate housing and health care than their peers with higher socio-economic status (WHO, 2002). Household structure also plays a role, as older people who live alone generally have less good health than those who live with someone else (Jönsson, 2019). Overall, health in older age is to a great extent determined by earlier life events, which means that the best way to ensure good health as people become older is to prevent diseases and promote good health throughout their lives (WHO, 2002).

Concluding remarks

The whole of the Nordic Region has witnessed an ageing of the population profile over the past decades. This means that the proportion of older people has grown while the proportion of young people and those in the working-age population has either remained constant or decreased. Population projections indicate that the trend towards ageing populations will continue during the coming decades, although at different rates in different parts of the Nordic Region.

These demographic changes mean that population ageing is clearly a challenge that will result in increased economic and societal demands, and it will be necessary to plan for an ageing society. At the global level, the WHO, the UN and the OECD have played a pivotal role in raising policy awareness about ageing and health since the 1990s, and in Europe, the European Commission has launched several policy initiatives dealing with ageing, particularly during the 2010s. Promoting health for all ages is vital as it will not only improve wellbeing but also mitigate the cost of health and long-term care. In promoting active and healthy ageing, the importance of local and regional authorities is emphasised, as in many cases they are the most relevant actors for implementing measures in policy areas such as social services, healthcare, education and training, entrepreneurship, labour market, infrastructure and transport (EU Covenant on Demographic Change, 2015). As discussed in this chapter, population ageing has been most significant in rural

Overall, health in older age is to a great extent determined by earlier life events, which means that the best way to ensure good health as people become older is to prevent diseases and promote good health throughout their lives

areas, but cities and urban areas are also confronted with it and, especially with ongoing and accelerating urbanisation in the Nordic Region (e.g. Smas, 2018, Stjernberg & Penje, 2019), it will be increasingly important for cities to plan for population ageing. Many Nordic and European cities are working towards becoming more age-friendly, which means, for instance, adjusting their infrastructure and urban configurations, public transport systems and housing stock to be more accessible for people of all ages and abilities (WHO, 2007, Jönsson, 2019). In addition, creating age-friendly environments is also about enhancing social inclusion and participation in order to counteract involuntary isolation and feelings of loneliness (WHO, 2017). Essentially, age-friendly communities are places that foster healthy and active ageing and enable wellbeing throughout life (WHO, 2015).

While population ageing undoubtedly brings challenges, it also presents a number of opportunities for society. Health in older age is important as older people can be an increasingly valuable resource, especially as life expectancies are expected to rise. A diminishing labour supply is a challenge for many countries, and older generations can be an important resource in dealing with this. However, mobilising older people is not only important for economic and societal engagement but also central to improving the quality of life of older people while also minimising the risks of social isolation (OECD, 2015). Overall, instead of only preparing for the negative expected effects of population ageing, it seems extremely important to consider how best to harness the potential opportunities and benefits that an older but healthier population may bring.

While population ageing undoubtedly brings challenges, it also presents a number of opportunities for society

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PHOTO: MAUD LERVIK, NORDEN.ORG

THEME 2

LABOUR MARKET

New geographies of labour, the potential for automation and the future of work

Work is an important part of our lives. But how can we understand it better from a geographical perspective? Municipal statistics shed light on where people live and pay taxes, but they reveal very little about the geographic structure of work, commuting patterns, etc. Chapter 5 demonstrates that looking at labour market statistics from the perspective of Local Labour Market Areas (LLMAs) may be a useful way of overcoming these limitations. LLMAs are defined on the basis of where most of the resident population works. The concept is increasingly used to understand economic and social relations in a specific area, regardless of administrative boundaries. The LLMAs that existed in 2010 have since grown, suggesting an increasing proportion of workers commuting longer distances to work.

Another important question dealt with in this section concerns the future of work. What will the Nordic labour markets look like in 2040? The proportion of the population of working age is expected to decrease, with the impact of this trend likely to be more pronounced in rural and intermediate areas. As such, future competitiveness may rely on the smart allocation of the workforce, rather than just job creation. Closely linked to this are questions about the ways in which the supply of jobs will be affected by automation. The capacity for artificial intelligence to automate tasks associated with middle and even highly skilled jobs is of particular interest. Our calculations suggest that up to one-third of Nordic jobs could be at "high risk" of automation in the short to medium-term. Municipalities in Denmark appear to be most heavily affected, along with many rural municipalities in the other Nordic countries.

Of course, it is important to recognise that, just because a task can be automated, does not mean that it will be. Multiple social, legal and institutional factors affect the adoption of new technologies, and this gives the labour market time to adapt, creating new jobs and changing the nature of others. Despite this, it is important to acknowledge that the changes to the labour market brought about by automation are unlikely to be evenly distributed from a spatial perspective. Different places will be affected in different ways.

As such, it is necessary to consider the capacity of different types of regions and municipalities to adapt to new labour market structures. Part of the challenge will be ensuring that skills and knowledge in a region are consistent with the employment opportunities on offer. This balance is particularly relevant in the Nordic Region's sparsely populated areas, where the relatively small labour markets are sensitive to the changes brought about by in- and out-migration. Establishing equilibrium between the qualifications and competencies needed in these areas and those moving in and out will be vital in sustaining these communities into the future.

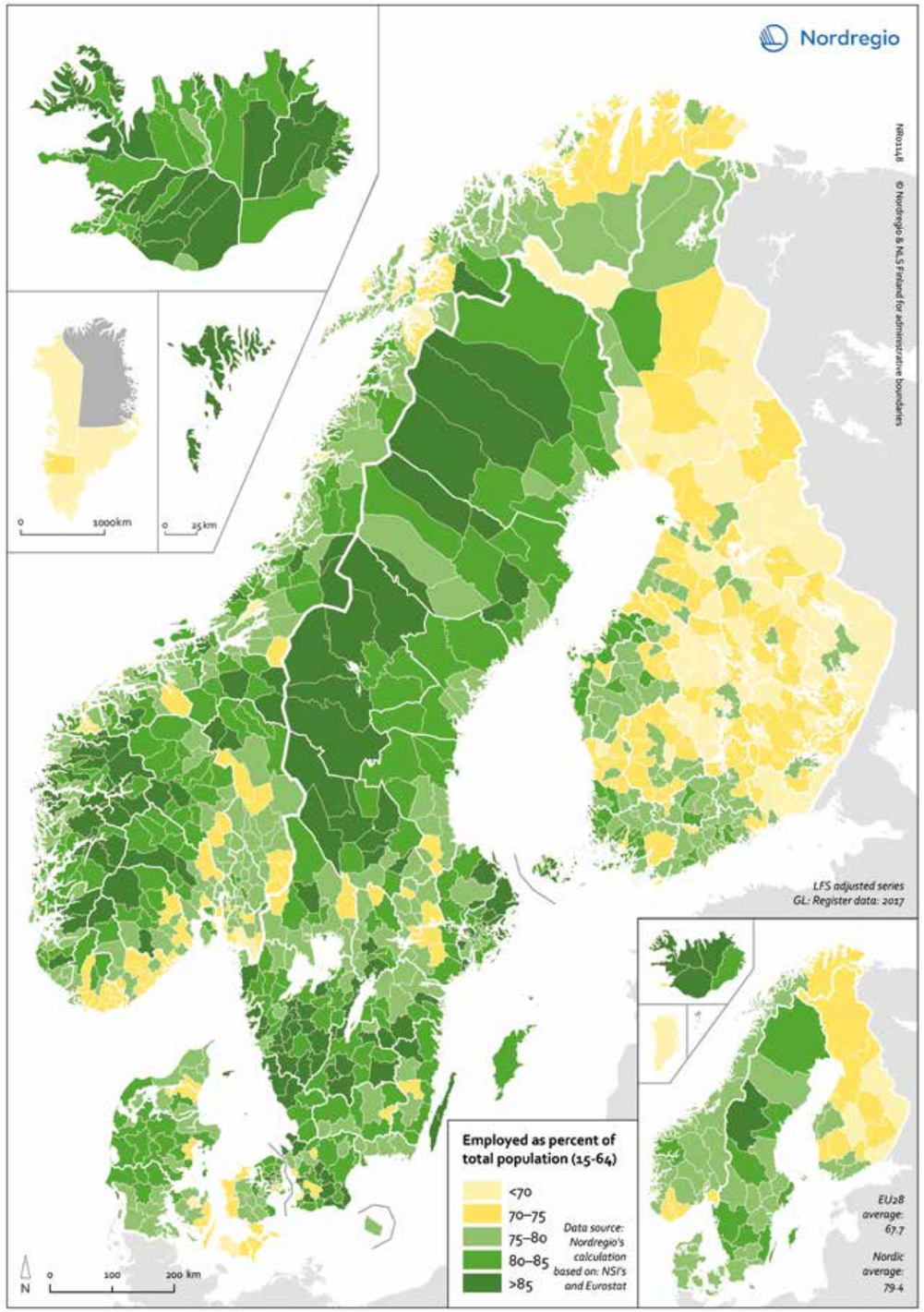
INTRODUCTION

Full employment is one of the cornerstones of what is known as the Nordic model and, historically, the Nordic countries have enjoyed comparably high employment rates, particularly for women and older workers. The employment rate measures the number of people in work as a proportion of the working age population (aged 15–64) as a whole. The employment and unemployment rates are the most commonly used indicators for measuring the status of labour markets. While the unemployment rate is a good short-term indicator of how much of the available workforce is being utilised, there has been a gradual shift towards monitoring the employment rate as well. The strength of the employment rate as an indicator is that it covers the whole working age population and not only those actively seeking work. As such, the employment rate has been used as a target indicator, for example, in the EU2020 strategy and in the Sustainable Development Goals (SDGs). The EU2020 strategy aimed for an employment rate of 75% (aged 20–64) by 2020, and Goal 8 of the SDGs includes the target of "[...] full and productive employment, and decent work for all". It is, however, worth noting the limitations of the employment rate as an indicator. It does not tell us anything about productivity, salary levels, employment status (e.g. full-time, part-time, casual) or working conditions and must thus be complemented by other indicators and qualitative data about the employment situation in the various regions.

The average Nordic employment rate was 79.4% in 2018, considerably higher than the EU28 average of 67.7%. In recent years, and in line with a growing economy, the employment rate has increased throughout the Nordic Region. It is still lowest in Finland and Greenland, although the increase in Finland between 2016 and 2018 was faster than the Nordic average.

As Figure 5.0 shows, the employment rate is highest in the Faroe Islands and many of the smaller municipalities in Iceland, Norway and Sweden. Most of the municipalities in the local labour market area (LLMA) of Stockholm, as well as municipalities in the LLMAs of Copenhagen (e.g. Gentofte, Vallensbæk, Tårnby, Lyngby-Taarbæk and Greve) and Reykjavik (Hafnarfjörður, Mosfellsbær, Garðabær, Kópavogur) have employment rates above 80%. All 30 of the municipalities with the lowest employment rates are in Finland or Greenland. The lowest rates are in Puolanda, Paltamo and Suomussalmi in Kainuu, Finland.

Figure 5.0 Employment rate 2018.



Chapter 5

GEOGRAPHIES OF LABOUR

Author: Luciane Aguiar Borges
Maps and data: Johanna Carolina Jokinen and Gustaf Norlén

The target of the European Commission's Europe 2020 strategy is a total employment rate of at least 75% for people aged 20 to 64 in the EU by 2020. This strategy emphasises smart, sustainable and inclusive growth as a way to overcome the structural weaknesses in the European economy, improve its competitiveness and productivity and underpin a sustainable social market economy. In the Nordic Region, the employment target was even higher, with Sweden and Denmark aiming for 80% and Finland 78% employment by 2020. In 2018, Sweden had already reached this target with an employment rate of 82.6%, but Denmark (78.2%) and Finland (76.3%) have not yet achieved their targets (Norlén, 2019).

Employment rates may not be a reliable indicator of the sustainability of the market economy, for two reasons. First, there have been significant changes in people's working lives, such as the downward trend in full-time permanent employment in Europe from 62% in 2003 to 59% in 2015 (Broughton et al., 2016), with permanent jobs replaced by atypical employment such as fixed-term contracts and temporary work. In Europe, this has led to a rise in underemployment, with people appearing as employed in the statistics but earning salaries that are insufficient to meet their daily needs (Cymbranowicz, 2018).

Second, data on employment is provided at administrative level, which usually corresponds to governing divisions. However, as administrative boundaries are the result of geographic and historical circumstances, the administrative level is not always an appropriate unit for measuring the current social and economic process, especially concerning the mobility of labour that is not constrained by boundaries. This is the case with "dormitory municipalities", where most of the residents commute

Employment rates may not be a reliable indicator of the sustainability of the market economy

to neighbouring municipalities for work, and with large city centres that usually receive a significant inflow of workers without offering sufficient housing opportunities. Local Labour Market Areas (LLMAs) have increasingly been used as a concept that overcomes some of the limitations of labour statistics and offers a better understanding of the geography of the labour market (Coombes, Casado-Díaz, Martínez-Bernabeu & Carausu, 2012; ISTAT, 2015).

Focusing on labour mobility, this chapter analyses the changes in the LLMAs in the Nordic Region 2010–2018. A further analysis looking at the employment rates in LLMAs helps identify the regions lagging behind the European target of 75% employment. Finally, attention is given to specific features of the geography of labour in the Nordic Region with an emphasis on the Northern sparsely populated areas (NSPAs).

Local labour market areas: a new statistical geography

Local Labour Market Areas (LLMAs) are economically integrated spatial units defined based on where most of the resident population works within the area (Carlsson, Johansson & Tegsjö, 1991, 1993; Coombes et al., 2012). LLMAs reveal the effects of commuting in the labour market centres and their hinterlands (ISTAT, 2015). By doing this, LLMAs reflect economic and social relations in a specific area, regardless of its administrative boundaries. Yet the municipal level is the basic unit that holds the statistical information that provides knowledge about the LLMA. The formation of LLMAs, therefore, depends on the pattern and intensity of commuting flows between different municipalities (Carlsson et al., 1991, 1993) (see Text box below).

The LLMAs do not allow the identification of different commuting patterns for different segments of the working population. As they merge different municipalities into the same functional area, they may also conceal relevant information for local planning (e.g. municipalities with low GDP but high income and employment rates as people com-

Calculating Local Labour Market Areas

The data analysis is based on national statistics on the employed day population (i.e. places of employment), the employed night population (i.e. employed residents) and commuting over municipal borders, as municipal divisions at 1 January 2019. For Norway, the data was from 2018, for Denmark and Sweden from 2017, for Finland from 2016 and for the Faroe Islands from 2011. In Greenland, due to the large distances between municipalities, there is no daily commuting over municipal borders. Iceland lacks commuting statistics; therefore, the Icelandic LLMAs were delineated based on a study of commuter areas by the Icelandic Regional Development Institute (Byggðastofnun, 2015). The delineation of the LLMAs was based on the methodology applied by Roto (2012), which comprised the following steps:

- **LLMA centres should fulfil the conditions that: 1) the share of out-commuters from a municipality is no more than 20% of its employed night population (Carlsson et al., 1991, 1993), OR 2) the employed day population of a municipality is higher than its employed night population AND 3) the highest single out-commuting flow to another municipality is not more than 10% of its employed night population.**
- **Municipalities belonging to an LLMA should have a single out-commuting flow to another municipality that is more than 7.5% of its employed night population.**
- **LLMA secondary centres should fulfil the conditions that: 1) the share of out-commuters of a municipality is not more than 25% of its employed night population (Carlsson et al., 1991, 1993) AND 2) the highest single out-commuting flow to another municipality is not more than 7.5% of its employed night population AND 3) the municipality has its own LLMA by having other municipalities that belong to it.**

There were three exceptions to the general rules in cases when there were single out-commuting flows of over 7.5% to another municipality that could not be defined as an LLMA centre or a secondary LLMA centre. First, the municipality having its highest single out-commuting flow of over 7.5% to another municipality that was not an LLMA centre or a secondary LLMA centre but belonged to an LLMA was also included as part of the same LLMA (for instance, Tierp was included in the LLMA of Stockholm). Second, two municipalities that could not be defined as an LLMA centre or a secondary centre were identified as having a common centre, as both had their highest single out-commuting flow of over 7.5% to each other (e.g. Nyköping-Oxelösund LLMA). Third, an LLMA was created when a municipality had its highest single out-commuting flow of over 7.5% to another municipality that could not be defined as an LLMA centre or a secondary LLMA centre and that did not belong to an LLMA (e.g. Lidköping LLMA).[7]

[7] The complete list of such LLMs: DK – Holbæk, Næstved, Slagelse, Vejle; FI – Raasepori; NO – Eigersund, Flekkefjord, Høyanger, Kragerø, Nord-Fron, Salangen, Seljord, Vinje; SE – Lidköping, Uddevalla.

Table 5.1 Comparison between local labour market areas 2010 and 2018.

Country/ territory	LLMAs		Independent LLMs (municipalities outside LLMAs)		Total number of municipalities	
	2010	**2018**	**2010**	**2018**	**2010**	**2018**
Denmark	17	17	7	5	98	99
Finland	47	45	66	41	336	311
Iceland	13	13	11	6	75	72
Norway	75	75	91	70	429	422
Sweden	45	52	62	33	290	290
Faroe Islands	n.d	1	n.d	2	n.d	6
Greenland[8]	n.d	0	n.d	5	n.d	5
Total	**197**	**203**	**237**	**162**	**1,228**	**1,205**

Data source: Nordregio based on data from NSIs.

mute to other municipalities for work). Despite these shortcomings, the LLMAs provide a better understanding of the real situation in the regional labour markets. Confining the supply of and demand for work into integrated spatial units, LLMAs hold useful information on employment, unemployment and workforce availability and, as such, they are suitable for examining labour mobility and the development of labour markets (Franconi, Ichim, D'Alò M. & Cruciani, 2017). Given these arguments part of this chapter focuses on updating the study by Roto (2012), which provided a harmonised methodology to identify LLMAs in the Nordic Region.

The diverse geographies of Nordic local labour market areas

With the purpose of comparing the changes in the LLMAs over time and geographically across the region, the Nordic LLMAs were clustered into the same classes as the study from 2012 (Roto, 2012) (see Figure 5.1). As Table 5.1 shows, between 2010 and 2018 the number of LLMAs has been quite stable except in Sweden and Finland. In Sweden, seven new LLMAs have emerged as a consequence of increasing commuting flows and in Finland, the number of LLMAs has decreased from 47 in 2010 to 45 in 2018 that probably is an effect of decreasing amount of municipalities. Despite the decreased number of municipalities in Finland and Norway, there is a noticeably lower, but still persistent, number of municipalities that have not been integrated to LLMAs (e.g. independent labour markets).

When it comes to the size of the LLMAs (number of municipalities), few changes are observed. While the number of LLMAs formed by 2 municipalities (75 in 2010 and 74 in 2018) and between 3 and 6 municipalities (91 in 2010 and 88 in 2018) remained quite stable, the number of LLMAs that included between 7 and 20 municipalities rose from 25 in 2010 to 34 in 2018. This reflects the fact that LLMAs that existed in 2010 have since grown in size and suggests an increasing proportion of workers commuting longer distances to work.

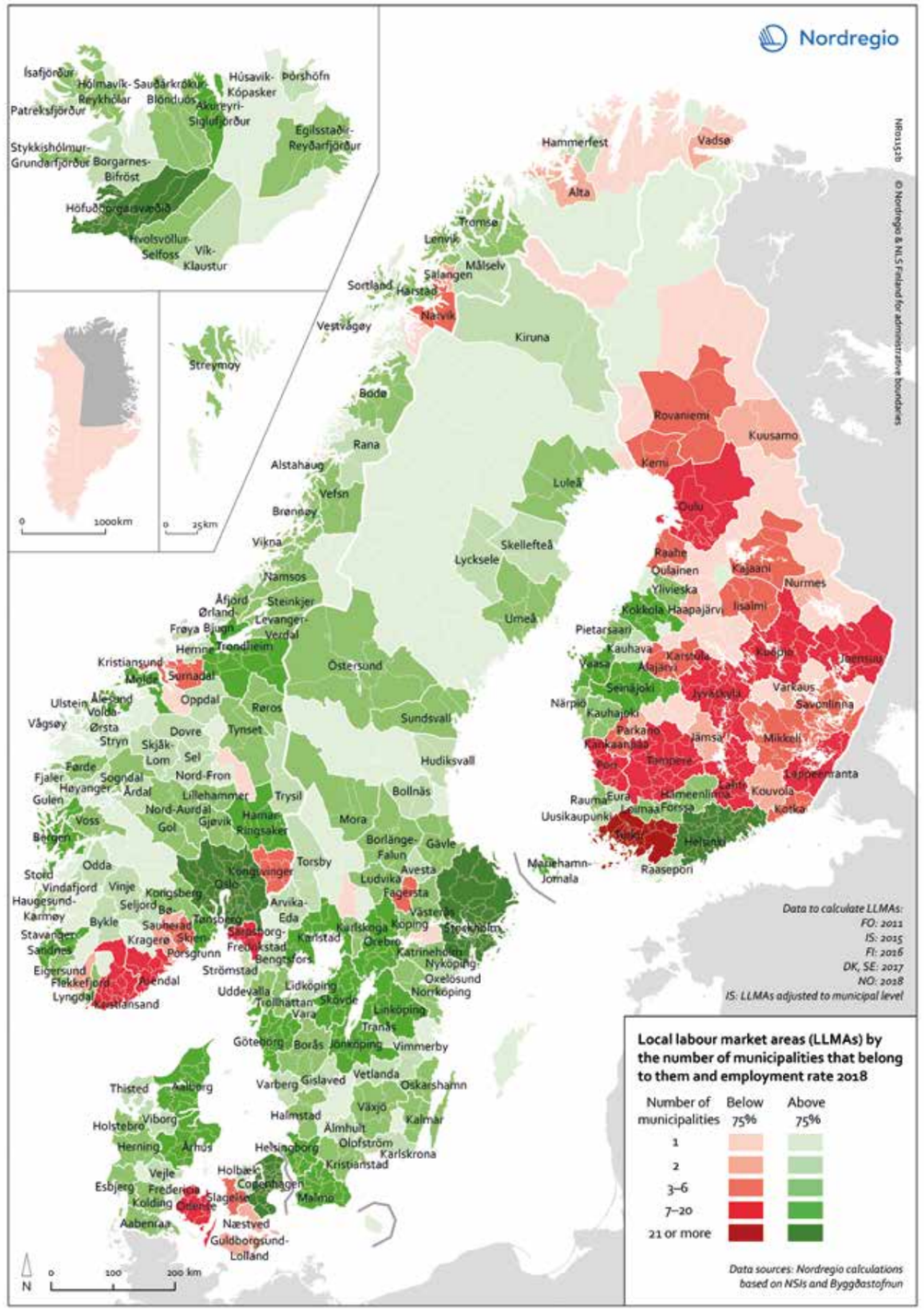
Figure 5.1 shows the Nordic LLMAs in 2018, based on their size (number of municipalities) and whether the employment rate was above or below 75%.[9]

Based on the number of municipalities included in the LLMAs, five types of LLMA can be distinguished: metropolitan LLMAs, regional LLMAs, intermediate LLMAs, small LLMAs and independent LLMs. LLMs are single municipalities whose commuting flows are not sufficient to characterise integration to other municipalities and/or another LLMA. The characteristics of the different types of

[8] The large size of the municipalities and the lack of transport infrastructure between the different settlements results in quite small and isolated Local Labour Markets – LLM.

[9] The figures for employment rates are based on the age group 15+ as a share of the working age population aged 15–64, therefore they are not directly comparable to the 20–64 age group that was used in the EU2020 strategy.

Figure 5.1 Nordic local labour market areas 2018.



Nordic LLMA are described and discussed in the bullet points below.

- **Metropolitan Local Labour Market Areas** (LLMAs integrating more than 20 municipalities): Includes all the Nordic capitals and Turku in Finland, which with the annexation of Salo LLMA has expanded significantly in relation to data from 2010. Copenhagen LLMA has decreased in size due to the diffuse commuting patterns of employed residents of Holbæk, Slagelse and Næstved to places other than Copenhagen. With the addition of Ringenike, there has been a slight increase in the size of Oslo LLMA. Turku stands out as the only LLMA in this category with employment rates lower than 75%. This probably reflects the changes in the economic structure of Salo, which has been reeling from the loss of jobs at Nokia's flagship plant and since 2008 has experienced a steady decrease in employment rates (e.g. 74.7% in 2008 and 65.5.% in 2013) The employment rate in Turku as a whole (74.9%) remains higher than the Finnish national average (74.2%)

- **Regional Local Labour Market Areas** (LLMAs including between 7 and 20 municipalities): In Finland, a few LLMAs have been merged into larger labour markets. Joutså, for example, became part of Jyväskylä LLMA, Sastamala has joined with Tampere and Alavus has joined with Seinäjoki. Oulo, Kuopio, Joensuu and Kokkola LLMAs have also expanded, incorporating neighbouring municipalities into their areas. Despite the integration of the labour market in these centres, most of the regional centres have employment rates below 75%. Exceptions are Seinäjoki (78.3%), Vaasa (75.5%) and Kokkola (75.5%) in 2018. A possible explanation for the lower employment in most of the Finnish regional centres may be the larger proportion of young people in their population, as all of these centres host universities. In Denmark, the enlargement of Aalborg and Odense LLMAs is also noted but both regions perform differently regarding employment, with Odense having the lowest employment rate in the country. In Norway and Sweden, the LLMA regional centres remained quite stable in size. Nevertheless, while in Sweden all the regional centres have higher employment, in Norway some LLMAs perform below the 75% threshold – Arendal (72.6%), Kristiansand (72.4%) and Sarpsborg-Fredrikstad (70.6%) are all located in the south of the country (around Oslo).

- **Intermediate Local Labour Market Areas** (LLMAs integrating between 3 and 6 municipalities): Existing LLMAs in Sweden (Östersund, Sundsvall, Mora, Luleå, Bollnäs in the north and e.g. Kristianstad and Karlstad in the south), Norway (e.g. Namsos, Vefsn, Bodø, Lenvik and Harstad) and Finland (Rovaniemi and Kemi) have expanded, integrating neighbouring municipalities within their boundaries. In terms of employment rates, most of these LLMAs are above the threshold of 75%. Finnish LLMAs located on the west coast (e.g. Närpio and Kauhajoki) and surrounding Helsinki and Turku LLMAs (e.g. Hämeenlinna and Loima Forssa) have the highest employment in the country. In Denmark, LLMAs located on the west coast (Herning and Aabenraa) also experienced growth while keeping their employment rates above the threshold. When it comes to Norway, Åfjord is a new LLMA with a high employment rate (83.7%) but other Norwegian LLMAs, such as Narvik, Kristiansund, Surnadal located on the east coast and Kongsvinger along the southern border with Sweden, still have employment rates below 75%. Fagersta that has lost a lot of job opportunities during the past decades is the only Swedish LLMA that is below the threshold (74.9% in 2018). The Faroe Islands has only one LLMA that includes 4 out of 6 municipalities.

- **Small Local Labour Market Areas** (LLMAs integrating 2 municipalities): The new small LLMAs in Sweden are spread throughout the country, with three located in the north (Kiruna, Skellefteå and Bollnäs) and five in the south (Vetlanda, Varberg; Gislaved, Olofström and Avesta). The size of these municipalities is quite different, however, with the new LLMAs in the north much larger than those in the south. The formation of new LLMAs is also seen in Norway, where Rana (77.9%), Frøya (80.2%) and Hemne (82.1%) all have employment rates above 75%, and in Finland, with Uusikaupunki (82.1%) and Raasepori (75.5%) in the south and Kuusamo (71.9%) in the north. Other Finnish LLMAs that existed in 2010 (e.g. Oulanien, Nurmes, Kouvola and Varkaus) have employment rates below 75%. Small Norwegian LLMAs with employment rates below 75% are found in the north (Vadsø, Alta and Salangen) and the south (Bø-Sauherad, Flekkefjord, Kragerø). In Denmark, Næstved, which in 2010 was part of Copenhagen LLMA, is a bit below the threshold (74.5%), as is Guldborgsund-Lolland (70.1%).

- **Independent Local Labour Markets** (single municipalities): There are still a large number of municipalities that are not in LLMAs, constituting independent labour markets. This is particularly noticeable in the northern part of the Nordic Region, where the geography has specific characteristics. For example, in the northern part of Norway, most of the independent labour markets are coastal areas and islands, and in Sweden and Finland, most of them correspond to sparsely populated areas (SPAs). The pattern of employment is quite diffuse across these areas but it is noticeable that in Sweden there are employment rates above 75% in SPAs. Nevertheless, the high employment rates in these areas conceal high outmigration flows (see Figure 3.4 in Chapter 3) and a shrinking working population (see Figure 5.2). When it comes to independent labour markets with employment rates below 75%, Finland has the greatest number (32 municipalities) with Puolanka having the lowest employment rate at 57.1%. Fifteen Norwegian municipalities also have independent labour markets, and here Hasvik has the lowest employment rate at 67.2%. In Sweden, the municipalities of Haparanda (68.5%), Filipstad (73.4%) and Eskilstuna (73.7%) also have employment rates below 75%. In Greenland, all five municipalities are independent labour markets, and here Kujalleq has the lowest employment rate at 62.8%.

The geography of labour in the Nordic Region has many similarities with other European regions, such as large LLMAs in metropolitan regions and regional LLMAs. What stands out is that, regardless of the increasing number of municipalities that joined existing LLMAs or formed new ones, there are still large areas of the Nordic Region that consist of independent labour markets, especially in the northern part of the region. This is a consequence of specific characteristics of the Nordic territory such as islands, mountains and sparse population. These territorial specificities influence the configuration of LLMAs not only in terms of the area they cover but also in terms of the functions they can have. Geographically, it is likely that natural barriers and long commuting distances between the central places in the municipalities prevent the accessibility and mobility of labour, therefore in many cases, the centres of the LLMAs will be a small part of the territory (e.g. a valley in a mountain range, a part of an island or a town in a sparsely populated region). Functionally, due to the lack of critical mass, the centres could be a part of a wider LLMA. For example, islands may constitute an LLMA together with the adjacent mainland if they are physically connected.

There are still large areas of the Nordic Region that consist of independent labour markets, especially in the northern part of the region

Nordic specific spatial economy – northern sparsely populated areas

As seen in the previous section, the Nordic Region has specific types of spatial economies. Among these are the northern sparsely populated areas[10] (NSPAs). The NSPAs account for a large proportion of the Nordic Region, play a role in the national economies and are home to a significant proportion of the population (OECD, 2017). Currently, 39 LLMAs and 82 independent LLMs (municipalities outside the LLMAs) are found in the NSPAs (see Table 5.2).

The NSPAs have diverse economic bases (e.g. forestry, mining, oil, agriculture, energy, manufac-

[10] The NSPAs include the four northernmost regions of Sweden (Norrbotten, Västerbotten, Jamtland-Härjedalen, and Västernorrland); the eastern regions of Finland (Lappi, Pohjois-Pohjanmaa, Keski-Pohjanmaa, Kainuu, Pohjois-Karjala, Pohjois-Savo and Etelä-Savo); and Northern Norway (Nordland and Troms og Finnmark).

Table 5.2 Characteristics of the northern sparsely populated areas.

Country	NSPAs characteristics by country[11]			LLMA	LLMs
	Proportion of territory	Share of economy	Share of population	2018	2018
Finland	66.9%	19.6%	23.9%	17	32
Norway	35%	7.7%	9.4%	15	32
Sweden	54.6%	8.6%	9.1%	7	18
Total				39	82

Data source: OECD (2017) and Nordregio based on data from NSIs.

turing) and benefit from a large proportion of public-sector jobs (32% of the total employment in the NSPAs in Sweden, 28% in Finland and 35% in Norway) (OECD, 2017). As Figure 5.1 shows, all the Swedish and most of the Norwegian NSPAs have employment rates above 75%. The picture is a bit different in Finland, with some sparsely populated regions below 75% but noticeably few independent LLM with employment rates above 75% in the Northern part of the country. It is, however, worth noting that employment rate, in general, is lower in Finland.

The NSPAs are characterised by long distances between urban settlements, remoteness from markets, harsh climates and lack of critical mass (Dubois and Roto, 2012; Gløersen, Copus & Schürmann, 2005; OECD, 2017). While larger cities (e.g. Umeå, Oulu and Tromsø) – usually the centres of LLMAs – have an important role to play in making the labour market run smoothly in these regions, independent LLMs generally have little diversity of economic activities, the size of their labour markets is restricted, they have limited opportunities for further education and service provision is fragile. In small, isolated communities such as these, migratory movements that would be negligible in other contexts can have a major impact. For example, the loss of people with key competencies, such as doctors, can significantly affect a local community. At the same time, an inflow of just a few individuals or families with the right qualifications can trigger a positive development dynamic (Dubois, 2019). A cautious look at the migration patterns may reveal 'who' and 'for what purposes' people are moving in and out these regions and what effects these mobilities may have on the LLMs. In this respect 'zero net migration' does imply a stable population but it does not deliver the message of stability in the labour market. It could rather mean that while younger people are leaving these areas, pensioners are staying or moving in with ageing as one result and this will probably have significant implications for the local labour market that may need to be adjusted to meet new demands (e.g. more jobs in the health sector). Table 5.3 describes the number of LLMAs and independent LLMs that had a positive and negative total net-migration in the NSPAs in 2018.

Figure 5.2 shows the internal net migration rate in the NSPAs in 2018. Although many regions experienced negative net migration (map on the left), this was not the case for all segments of the population. The map on the right of Figure 5.2 shows the age groups in which more people moved in than moved out, despite these regions having negative net migration overall.

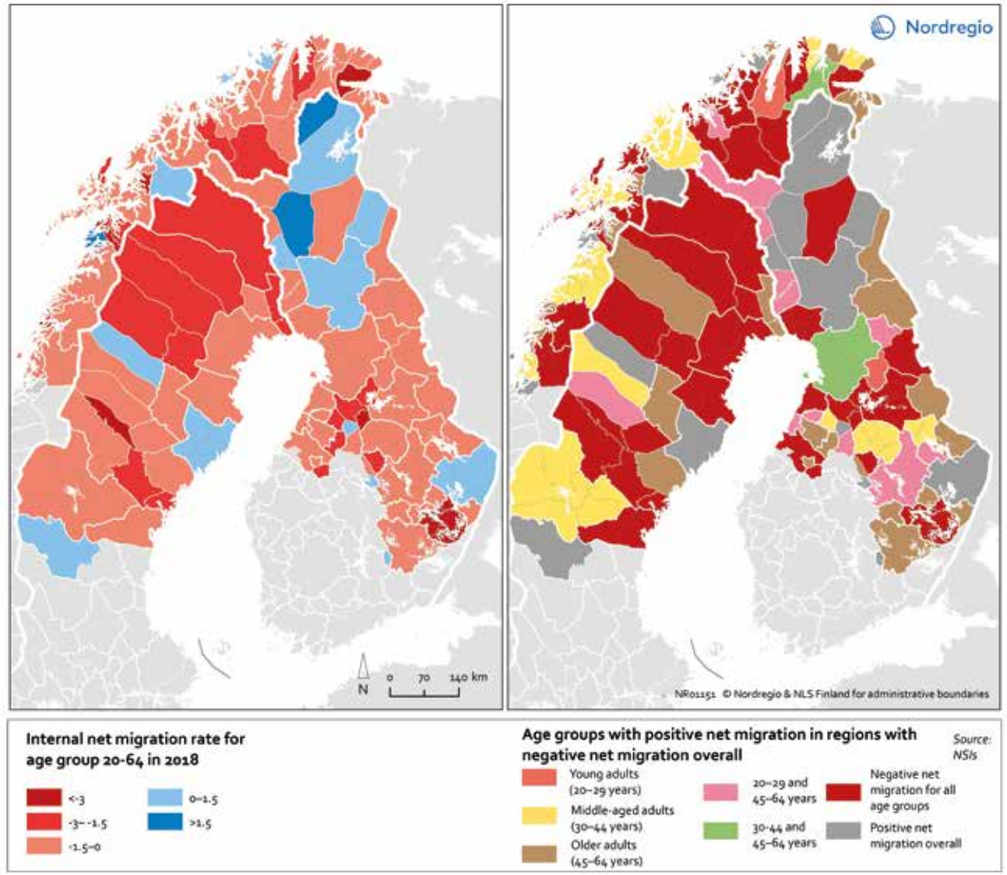
Table 5.3 Total net-migration 2018.

NSPAs	Total net migration		Total
	Positive	Negative	
LLMAs	4	35	39
Independent LLMs	14	68	82

Data source: Nordregio based on data from NSIs.

[11] OECD (2017).

Figure 5.2 Internal net migration by age group in the Northern sparsely populated areas 2018.



Note: the analysis of in-migration flows based on one single year may present some distortions as migration flows may vary between years.

The NSPAs are characterised by long distances between urban settlements, remoteness from markets, harsh climates and lack of critical mass

Inward and outward migration are slightly different in the LLMAs compared to the independent labour markets. Among the LLMAs, Rovaniemi is the only one that has positive net migration in all age groups. This positive development may be due to the number of governmental offices, the strength of the tourism industry and the presence of two universities. On the contrary, 18 LLMAs – four in Sweden, nine in Norway and five in Finland – have negative net migration in all age groups. Out-migration of young adults is seen in most of LLMAs, the exceptions being Umeå, Målsev, Joensuu and Oulu. The inflows of young adults in these regions reflect the presence of the universities in Umeå, Joensuu and Oulu and the army bases in Målselv. Despite this positive inflow, most of these LLMAs are unable to retain adults in the older age groups (30-64), except Oulu, which has positive net migration of older adults. On the contrary, the LLMAs of Bodø and Brønnøy in Norway and Iisalmi in Finland have a negative net migration of younger and older adults and positive of middle-age adults.

Table 5.4 Number of municipalities that have positive migration by age group despite the total negative net migration in 2018 in the NSPAs.

NSPAs	Positive development by age-group					Negative development (all age-groups)	TOTAL
	20-29	30-44	45-64	20-29 and 45-66	30-44 and 45-64		
LLMAs	0	5	8	1	3	18	35
Independent LLM	2	8	18	1	13	26	68

Data source: NSIs.

In regard to the independent labour markets, the municipalities of Steigen, Hasvik, Måsøy in Norway and Pertunmaa in Finland all have positive net migration for all age groups of the working population in 2018. As expected, in many municipalities (26) the working population in all age groups is shrinking. Among these, nine are in Sweden, 11 in Norway and six in Finland. An interesting finding is that 21 municipalities with out-migration of young adults do well at attracting middle-aged and older adults. This may suggest that young adults leave to pursue further education but some of them return afterwards. Another striking result is that eight municipalities have succeeded in attracting young adults. Among these, Kittilä in Finland stands out with the highest inflow of young adults. This may be the result of the Kittila mine that is the largest primary gold producer in Europe, and the tourism industry providing jobs in ski resorts.

As Table 5.4 shows, regardless of the negative net migration in many LLMAs and independent LLMs in 2018, some of them are able to attract people of working-age.

Given these findings, it might be argued that the labour market in the NSPAs cannot be self-sustaining. It is well known that these labour markets are unable to provide a variety of options regarding education and services. As a result, the out-migration of young people to pursue qualifications should be perceived as beneficial rather than harmful to these areas. What is needed, then, are effective policies and incentives to encourage people to return if they have acquired the qualifications needed in the region. Sustainable labour markets in the NSPAs may, therefore, rely on balancing inflows and outflows of individuals regarding their profiles, competencies and aspirations. More in-depth knowledge of the factors that trigger these flows would inform economic and social development policies in these areas.

Concluding remarks

This chapter has shown how the LLMAs in the Nordic Region have changed in the period 2010–2018. The enlargement of some LLMAs and the emergence of new ones suggests that workers are willing to travel longer distances to work. Comparing employment rates in Nordic LLMAs shows those currently failing to meet the 75% target. Nevertheless, it has not been possible to correlate the number of municipalities of the LLMAs with employment rates, which suggests that other factors (e.g. national policies, economic climate and technological advances) have a greater influence on employment than geographies of labour.

Due to the fact that it has been restricted to looking at commuting flows within national boundaries, this chapter lacks information about cross-border commuting, which would provide a more reliable picture of the integration of labour markets in the Nordic Region.

Further analysis of the NSPAs has shown that despite their fragility some of these labour markets are attractive to people of working age. This finding supports the argument that the sustainability of labour markets in NSPAs may rely on establishing equilibrium between in- and out-migration, and more precisely between the qualifications and competencies needed in these areas.

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Chapter 6

THE NORDIC LABOUR MARKETS IN 2040

Authors: Gustaf Norlén and Linda Randall
Maps and data: Gustaf Norlén, Nora Sánchez Gassen and Linda Randall

What is the future of work? This question has attracted substantial attention in recent years from both researchers and policy makers. According to the International Labour Organisation (ILO), the answer will be shaped in large part by four global megatrends: demographic change, technological change, globalisation and climate change (ILO, 2017). Though the significance of these trends is hard to dispute, the outcome is in no way predetermined. Political and institutional frameworks will play an important role in shaping the way they play out, and, as Nordic researchers have pointed out, the Nordic model will both shape and be shaped by these changes (see Dølvik & Steen, 2018 for an excellent account of the Nordic future of work). Open discussions about the potential challenges that lie ahead are a vital step towards the development of effective policy responses. Within this conversation, it is important to go beyond the national perspective and consider the potential for these trends to affect local labour markets in different ways. As such, this chapter explores the future of work from the perspective of regional and local labour markets. It first considers the implications of demographic change on the future labour supply, highlighting population ageing and urbanisation as key trends in this regard. It goes on to explore the potential for automation in Nordic labour markets, including a brief discussion of human capital and the future of work. In choosing the 2040 horizon we follow the example set by the Nordic Future of Work project – looking far enough into the future to provoke inspired debate but close enough to incite action now (Dølvik & Steen, 2018).

The majority (72%) of Nordic municipalities are projected to experience a decrease in the size of the working age population

A shrinking working age population

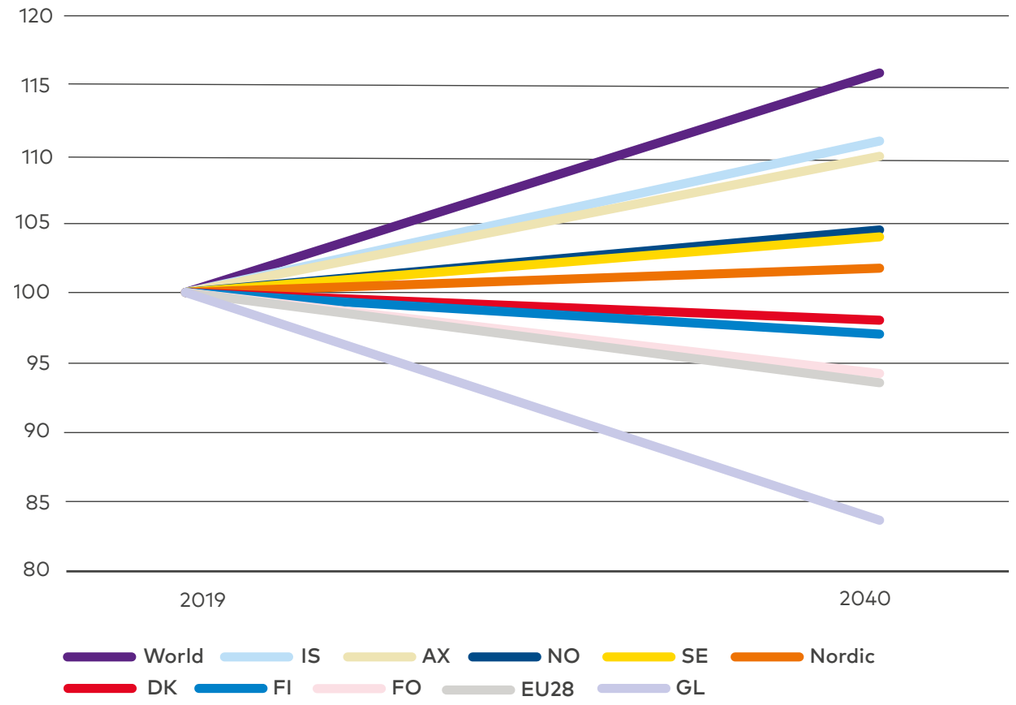
While the total population of the Nordic Region is projected to grow by 8% to 29.5 million by 2040 (Sánchez Gassen & Heleniak, 2019), the growth of the working age population (15–64 years) is expected to be more modest at 1.5%[12]. The working age population, also referred to as the potential labour supply, refers to all people in the population aged 15–64 years. It is a *potential* supply because it includes all those who fit the age requirement, despite some not actually being available for the labour market (e.g. full-time students, those with long-term illnesses or disabilities that affect their ability to work). The potential labour supply at the local level is constantly shifting due to trends such as ageing, migration and urbanisation. As Figure 6.1 demonstrates, even at the national level, growth of the working age population is by no means equally distributed, with declines projected in Greenland (-16.2%), the Faroe Islands (-6.6%), Finland (-3%) and Denmark (-2%), and increases projected in Sweden (4%), Norway (4.6%), Åland (9.1%) and Iceland (10.9%). It is worth noting that, even in the parts of the Nordic Region where the working age population is expected to shrink, the projections are less severe than the EU28 average (-6.5%). Greenland and Faroe Islands are the only exceptions.

At the municipal level, the variation is even more striking with the majority (72%) of Nordic municipalities projected to experience a decrease in the size of the working age population. As Figure 6.2 shows, this trend is most pronounced in Finland (decline of the working age population in 90% of the municipalities) and Denmark (81%) and less apparent in Sweden (67%), Iceland (64%) and Norway (61%). Most of the municipalities where a decrease in the working age population is projected are located in rural areas, with the largest declines evident in Salo, Imatra, Savonlinna and Kouvola in Finland and some smaller municipalities in mainly Norway, Finland and Iceland. Conversely, many urban areas are expected to see increases in the working age population, for example, all of the capital regions, Gothenburg and Umeå (Sweden); Aarhus and Ål-

Most of the municipalities where a decrease in the working age population is projected are located in rural areas

[12] The projections are taken from the national statistical offices. These might have different assumptions regarding fertility, mortality and migration. For further information about how the projections are made see Sánchez Gassen & Heleniak (2019).

Figure 6.1 Projected working age population change 2019–2040.



Data sources: NSIs, Tillväxtanalys and OECD. Note: Index, population 2019=100.For Sweden and Iceland regional projections are not provided by the NSIs. These projections, therefore, differ slightly from the national projections available at the NSIs.

borg (Denmark); and Turku, Oulu and Tampere (Finland). Interestingly, the working age population is anticipated to grow in most municipalities in Skåne, regardless of municipality type, as well as along the west coast of Sweden. In Norway, the working age population is predicted to grow in most municipalities along the coast, especially in the south.

As demonstrated in Chapter 4, the decrease in the size of the working age population is largely the result of an ageing population. Population ageing is associated with a slowdown in labour force growth, but also with changing economic patterns of savings and consumption as well as increased pressures on public social expenditures and increased demand for labour in the welfare sector (ILO, 2018). This trend can already be observed in many rural municipalities, which are experiencing difficulties in finding the right competences in the welfare sector (Löfving, Norlén & Heleniak, 2019). An ageing workforce might also make it more difficult to maintain a productive and competitive workforce in the event that the skills of a significant portion of the workforce become outdated (ILO, 2018).

As noted in the introduction to the labour market section, the Nordic Region has a high employment rate in a European context. Labour market participation is already high among women and older workers (55–64 years)[13] (Norlén, 2018). This indicates that there are limited underutilised resources for the labour market to draw on. Opportunities to import labour from other parts of Europe may also be more limited in the future as the challenge of population ageing is by no means exclusively Nordic. It is predicted to be even more keenly felt in other parts of Europe (e.g. Germany, the Baltic States), increasing the competition for workers across the continent (Dølvik & Steen, 2018). As such, migration from a broader range of countries has been highlighted as a solution to the diminishing labour supply and regional economic base. In recent years migration has indeed contributed to population growth in many municipalities. As demonstrated by Sánchez Gassen & Heleniak (2016), however, because the migrants themselves age, it would require vast numbers of migrants to counter the ageing in the long run.

Opportunities to import labour from other parts of Europe may also be more limited in the future as the challenge of population ageing is by no means exclusively Nordic

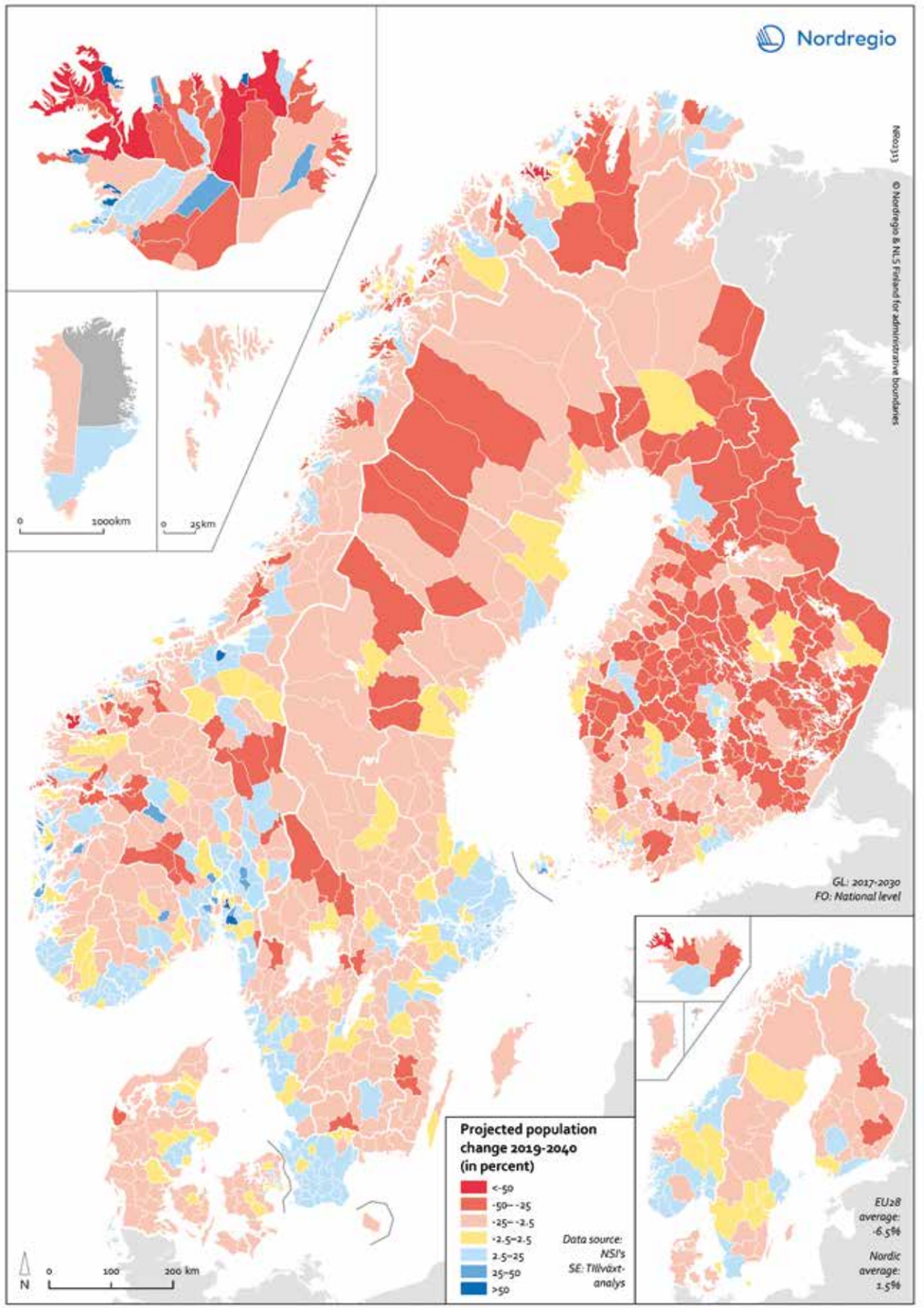
Automation and Nordic labour markets

Alongside changes on the supply side, the demand for labour is also undergoing considerable transformation. This is occurring largely in the context of what is commonly referred to as the fourth industrial revolution – a process through which developments in information technologies are combined with robotisation and artificial intelligence, allowing for the automation of tasks previously only manageable through human endeavour (Degryse, 2016). This substitution of mechanical power for human labour is by no means a new phenomenon and, although it has historically resulted in the obsolescence of many jobs, the overall amount of labour required in the economy has remained fairly stable (Autor, 2015). Though automation may result in the displacement of workers in particular industries in the short-term, the jobs it creates have more than made up for the losses in the longer term (McKinsey & Company, 2017). Workers also adapt, utilising the time saved through the automation of routine tasks to invest in activities that lead to higher productivity (Autor, 2015).

Despite this precedent, there are many who argue that the present moment is different, largely due to the potential of artificial intelligence to automate many non-manual tasks associated with middle and even high-skilled professions (Frank et al., 2019). Various attempts to quantify the impact of this have been made, with estimates of the number of jobs at risk of automation in the short- to medium-term future ranging from 9% (Arntz, Gregory & Zierahn, 2016) to 57% (Citi GPS, 2016) for

[13] Employment rate for people aged 55–65: Iceland (80.7%), Sweden (77.9%), Norway (72%), Denmark (70.7%); Finland (65.4%), EU average (58.7%) (Eurostat, 2019a).

Figure 6.2 Change in working age population 2019-2040.



Measuring the impact of automation on the labour market

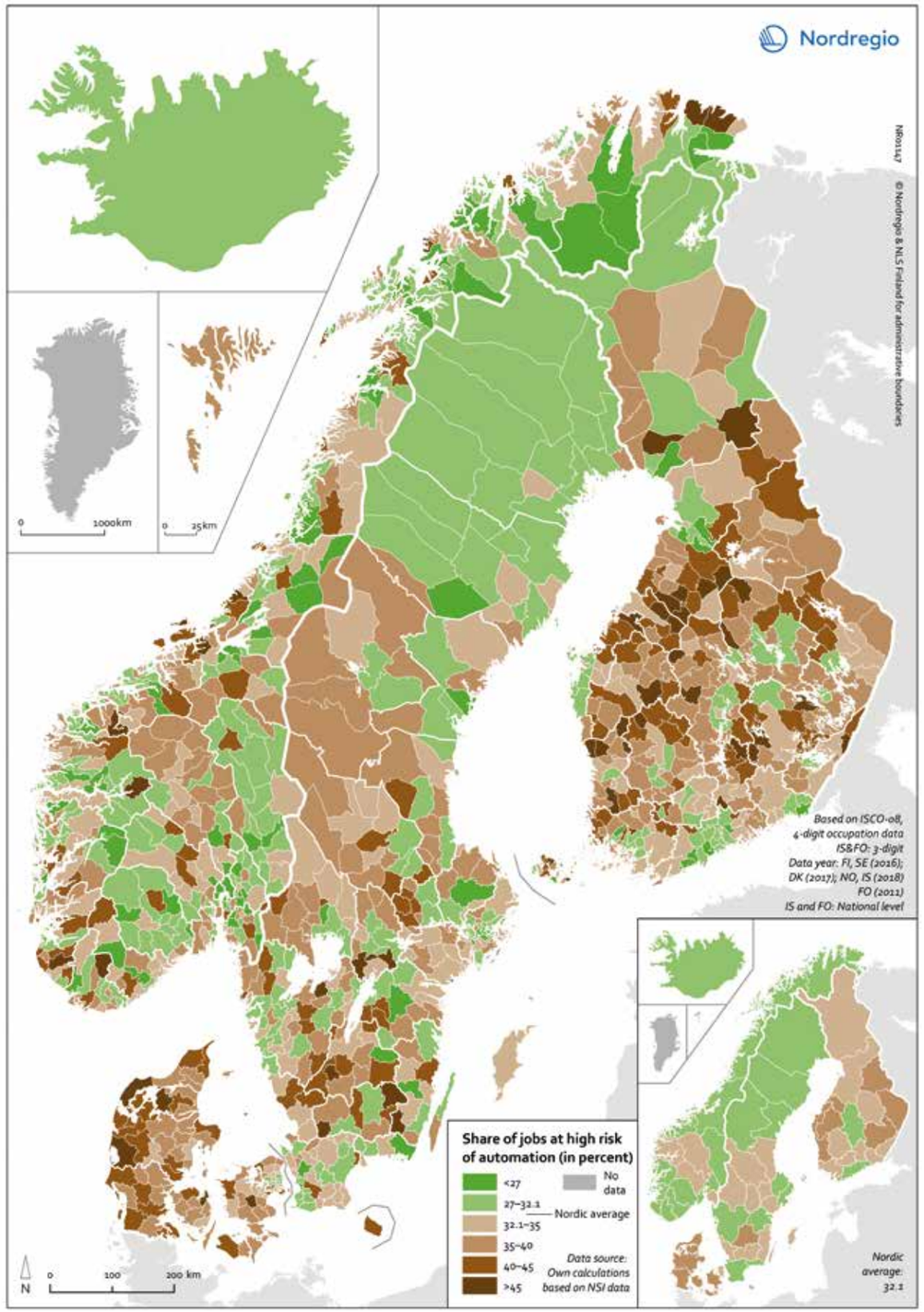
There have been several attempts to quantify the risks to the labour market from automation, with three approaches evident. The first approach was developed by Oxford economists Frey and Osborne and is described in the widely cited paper, "The future of employment: How susceptible are jobs to computerisation?" (2017). This method calculates the automation potential of work tasks within specific professions, resulting in a classification of jobs as having high, medium or low risk of automation. The second approach is based on the first but incorporates information from the OECD's Programme for the International Assessment of Adult Competencies (PIAAC) database in order to account for the characteristics of individual jobs within specific professions (Arntz, Gregory & Zierahn, 2017). This method calculates the automation potential of work tasks within specific jobs, again resulting in a classification of jobs as having high, medium or low risk of automation. The third approach calculates the automation potential of work tasks in general and results in an estimation of the percentage of total labour that can be automated (McKinsey & Company, 2017). The map in Figure 6.3 is based on the first methodology. This method was chosen as it is the most established, allowing comparisons to be made with previous studies in other contexts. This method was also considered to be the most robust when it comes to making comparisons at municipal level.

The first step in Frey and Osborne's methodology was to link the O*NET – a database containing detailed information about the tasks of 903 occupations in the United States – with the US Labour Department's Standard Occupational Classification (SOC), to come up with a detailed description of 702 occupations. Following this, they drew on the literature on offshoring to come up with a method of assessing the automation potential for each occupation. The method was both subjective and objective. Together with experts, Frey and Osborne subjectively assessed all 702 occupations, asking, "Can the tasks of this job be sufficiently specified, conditional on the availability of big data, to be performed by state-of-the-art computer-controlled equipment?" and giving them 1 if they were automatable and 0 if they were not (p. 263). The number 1 was only assigned if all tasks in the occupation were automatable. The automatability of the remaining occupations was assessed using an algorithm.

The result is an automation potential coefficient for all 702 occupations (where 1 is full automation potential and 0 no automation potential), which are grouped into three categories: low, medium and high probability of automation (with the thresholds 0.3 and 0.7). Regarding the time frame, Frey and Osborne describe occupations in the high-risk category as "potentially automatable over some unspecified number of years, perhaps a decade or two. It shall be noted that the probability axis can be seen as a rough timeline, where high probability occupations are likely to be substituted by computer capital relatively soon" (ibid: 265).

Applying Frey and Osborne's methodology in the European context requires translation of the occupations from the American Standard Occupational Classification (SOC) to the International Standard Classification of Occupations (ISCO) (4-digit). There have been several attempts to translate Frey & Osborne's method to other contexts (e.g. Knowles-Cutler, Frey & Osborne, 2014; Citi GPS, 2016), including Finland and Norway (Pajarinen et al., 2015), Sweden (SSF, 2014) and Germany (Bonin, Gregory & Zierahn, 2015). These attempts have all focused on the national level. To our knowledge, this is the first attempt to generate comparable cross-country data on automation potential at the municipal level.

Figure 6.3 Share of jobs at "high risk" of automation.



Approximately one third (32.1%) of Nordic jobs are considered at "high risk" of automation in the next one to two decades

OECD countries depending on the method used. Studies in the Nordic context have estimated the share of jobs at high risk of automation to be 35% in Finland and 33% in Norway (Pajarinen, Rouvinen & Ekeland, 2015). In Denmark, the researchers instead focused on the percentage of total labour that could be automated and arrived at a figure of 40% (McKinsey & Company, 2017).

To date, the majority of research in this area has focused on the national level, with comparisons made between countries, if at all. From a regional development perspective, it is also important to understand the spatial distribution of these changes within countries. If, as predicted by some, automation will result in a net loss of employment opportunities, it will be important to understand which regions and municipalities may be most harshly affected. Even if, as in the past, the process of automation results in a simple reconfiguration of available jobs (Autor, 2015), it is necessary to consider the capacity of different types of regions and municipalities to accommodate new labour market structures. Figure 6.3 shows the share of jobs at "high risk" of automation based on the methodology of Frey and Osborne (2013, 2017)[14] (see box: Measuring the impact of automation on the labour market).

Based on Frey and Osborne's methodology, approximately one third (32.1%) of Nordic jobs are considered at "high risk" of automation in the next one to two decades. This means that 32.1% of jobs in the Nordic Region fall above the 0.7 threshold identified by Frey and Osborne (with 0 meaning no automation potential and 1 meaning complete automation potential). Although this is significantly lower than the figure revealed by Frey and Osborne in the US context (47%) it still raises cause for concern. Faroe Islands has the highest portion of jobs at risk (38.7%) followed by Denmark (36.7%), Åland (36.3%), Iceland (32%) and Finland (31.9%). Norway (29.9%) and Sweden (30.9%) have the lowest number of jobs in the high-risk category.

At the municipal level, the municipalities with the highest share of jobs at high risk of automation are Pyhäntä (58%), Kyyjärvi (58.1%) and Lestijärvi (56.9%) in Finland; Gnosjö (51%) and Hallsberg (50%) in Sweden; and Snillfjord (49%) in Norway. In these municipalities, a large proportion of workforce are employed in a specific occupation, for example, carpenters and joiners in Pyhäntä, machine operators in Kyyjärvi and Gnosjö, and livestock and dairy producers in Lestijärvi. Another thing that these municipalities have in common is that they are all rural.

The relationship between rurality and risk of automation is further demonstrated in Figure 6.4. Here we see that a large proportion of rural and intermediate municipalities have shares of jobs at high risk of automation that are above the national average in their respective country. Conversely, in the majority of urban municipalities the share of jobs at high risk of automation is below the national average. This trend is most pronounced in Finland, where only 10% of urban municipalities have a share of jobs at high risk of automation above the national average compared with over 80% in both intermediate and rural municipalities. The share of jobs at high risk of automation is comparatively high in rural regions in Sweden and Denmark however the difference between urban and rural regions is not as pronounced. The situation in Norway appears slightly more balanced however the risk of automation still appears to be less pronounced in urban municipalities.

The municipalities with the lowest share of jobs at high risk of automation are Rælingen (15.0%), Utsira (15.2%), Kvæfjord (17.2%) and Kárášjohka – Karasjok (17.9%) in Norway, and Vårdö (16.8%) on Åland. Based on occupational data from the national statistics institutes, it appears that these municipalities all have a higher than average proportion of jobs in sectors such as health care, childcare and education – all professions with relatively low automation potential (Pajarinen et al., 2015). This is consistent with similar research into automation potential in Finland and Norway, which found that public sector jobs were significantly less susceptible to automation than private sector jobs (ibid.). Interestingly, with the exception of Rælingen, these are also all rural municipalities. This suggests a need for caution when considering the urban/rural distinction with respect to digitalisation. While there appears to be a general trend towards a so called "digital divide" there may also be rural municipalities that exhibit greater resilience to the negative impacts of digitalisation, or perhaps even have greater capacity to harness its potentials. Further, more detailed, research into the labour market structures of municipalities and regions with high and low shares of jobs in the high-risk category would be useful in shedding further light on the urban/rural dimension of automation potential. It is possible that the lower share of jobs at high risk of automation in urban areas is simply a reflection of their more diverse labour market structures.

It is important to acknowledge that, just because a task can be automated, it doesn't necessary mean that it will be automated in the immediate future. The "human element" plays a vital role in any type of societal change (Randall & Berlina, 2019) and, as such, the adoption of new technologies is likely to be a slow process meeting many legal, ethical and practical hurdles along the way (Arntz et al., 2016). In many professions, the automation of work tasks is likely to happen in steps, allowing workers to take on new tasks and providing an avenue to more pro-

Figure 6.4 Proportion of municipalities with shares of jobs at high risk of automation above the national average.

Data source: Nordregio's calculation based on NSIs. Note: FI, SE (2016); DK (2017); NO, IS (2018); FO (2011).

While there appears to be a general trend towards a so called "digital divide" there may also be rural municipalities that exhibit greater resilience to the negative impacts of digitalisation

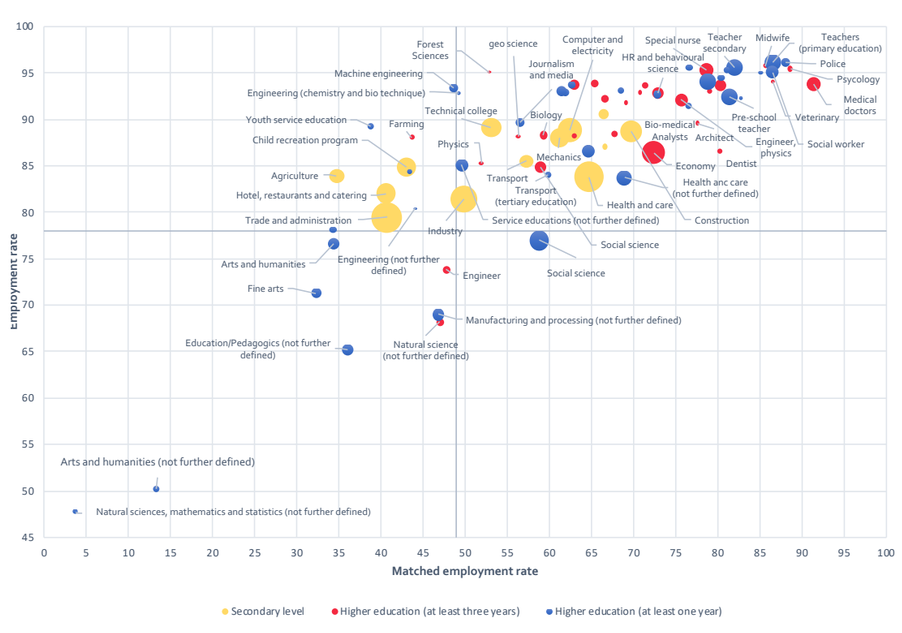
[14] The paper was first published as a working paper in 2013. From this point on we refer to the peer-reviewed paper that was published in 2017.

Human capital and the future of work

The EU2020 strategy sets the goal of tertiary education rates of 40% among 30–34 year olds. All Nordic countries have surpassed this goal, with a Nordic average in 2018 of almost 50% and rates of 52% in Sweden and Iceland, 51% in Norway, 49% in Denmark and 44% in Finland (Eurostat, 2019b). While this is encouraging, there is a question mark around whether simple measures of educational attainment are sufficient when it comes to determining the preparedness of the labour market to meet future challenges. One way of understanding the relationship between human capital and labour market need is to look at the proportion of the population who are employed in the occupation for which they studied – also referred to as the matched employment rate. Figure 6.5 shows the relationship between the employment rate and the matched employment rate by educational group for all people aged 20–64 years in Sweden.

Overall, there appears to be a positive correlation between the employment rate and the matched employment rate. That is, those educated in fields where the congruence between the type of education and the work carried out are highest are more likely to be employed in general. Interestingly, this appears to be the case regardless of educational level. These results are interesting in the context of discussions about skills needs in the face of the digital transformation, which often highlight the importance of both higher levels of skill and more transferrable skills in a rapidly changing labour market (Berger & Frey, 2016). The high correlation between the employment rate and the matched employment rate shown below suggests that there is also ongoing value for occupation-specific knowledge. The challenge perhaps is combining the two in a way that is compatible with a new world of work that assumes the increasing fluidity of career paths.

Figure 6.5 Correlation between employment rate and matched employment rate by education group in Sweden 2017.



Data source: SCB/Swedish Agency for Economic and Regional Growth. Note: The size of the circles represents the number of educated people in each group. The cross represents the average employment rate for the population 20–64 years (y-axis) and the average for the matched employment rate for the population 20-64 (x-axis).

ductive jobs with higher salaries (Arntz et al., 2016; Degryse, 2016; Dølvik & Steen, 2018). The digital transformation will also necessitate many new economic opportunities in emerging sectors. Ensuring that the existing labour force is prepared to take on these opportunities will require adaptability and a strong commitment to lifelong learning. It also means considering what types of skills will be required as different sectors evolve in response to demographic and technological change (see box: Human capital and the future of work).

Concluding remarks

Based on the projections made in this chapter, Nordic labour markets stand to look quite different by 2040. The working age population will have grown overall but, if current trends towards urbanisation continue, it will be smaller in some, primarily rural, municipalities and larger in many urban areas. A smaller proportion of the total population will be in the workforce and those who are will be older, on average, than the workers of today. The configuration of the labour market is also likely to change quite substantially, with almost one third of jobs replaced or substantially transformed by automation and new economic opportunities ready to take their place. The Nordic countries are well placed to take advantage of these new opportunities, both due to their strong tradition of embracing technological change (Dølvik & Steen, 2018) and as a result of being relatively advanced when it comes to digitalisation in a European context (Alm et al., 2016). At the same time, these changes will require different approaches to understanding and responding to skills needs at the regional and local level. As such, the data presented in this chapter is designed to provide a starting point for a discussion about the geographic dimension of the future of work. It also hopes to inspire further research into the factors that promote resilience in local labour markets in the context of digitalisation and demographic change.

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THEME 3

ECONOMY

A smart, sustainable and inclusive Nordic Region - an insight into income inequalities, innovation performance and the role of the bioeconomy

The Nordic countries have relatively small wage gaps, high employment and high taxation, combined with good quality education and social security, all of which contribute to relatively low income inequality, below the OECD average. However, as in most countries, the income gap is undeniably growing in the Nordic Region. It increased at a faster pace than the OECD average in Denmark and Sweden between 2000 and 2017 but remained at similar levels in Finland and Norway and narrowed in Iceland (mainly due to the 2008–2011 financial crisis). At a more local level, income and income inequalities tend to be higher for households in capital city regions than in other parts of the Nordic Region.

The Nordic Region is often seen as playing a unique, innovative role as a frontrunner and a testbed for the industries and circular economy clusters of the future. The most recent edition of the Regional Innovation Scoreboard, which indicates regional performance and growth, confirms this claim; compared to other parts of Europe, Nordic regions show a strong overall performance and lead in terms of innovation. The EU has introduced a regional innovation strategy concept called smart specialisation, in a drive to innovate and compete in global development and the global economy. Some Nordic regions, such as Värmland in Sweden and Lappi in Finland, have actively used smart specialisation as a new strategy tool to complement their regional development toolbox. Even non-EU member state Norway has adopted the smart specialisation concept, despite the lack of financial incentive from EU structural funds.

The new, more refined and extended bioeconomy covers several sectors, with positive effects on regional development and economies, job creation, innovation, capacity building and knowledge. The impact and potential of this for the Nordic economy is significant; the number of jobs in the newly developed bio- and circular economy has risen by 15% in the last decade, mainly in Swedish, Danish, and mid- and northern Norwegian regions. Examples of the circular economy from Denmark and Iceland, for example, show how the new bioeconomy can contribute to more environmentally and socially acceptable economic growth. These cases also show the importance of regional and local levels in creating new institutional structures for cooperation between the private and public sectors, which paves the way for successful synergistic clusters.

INTRODUCTION

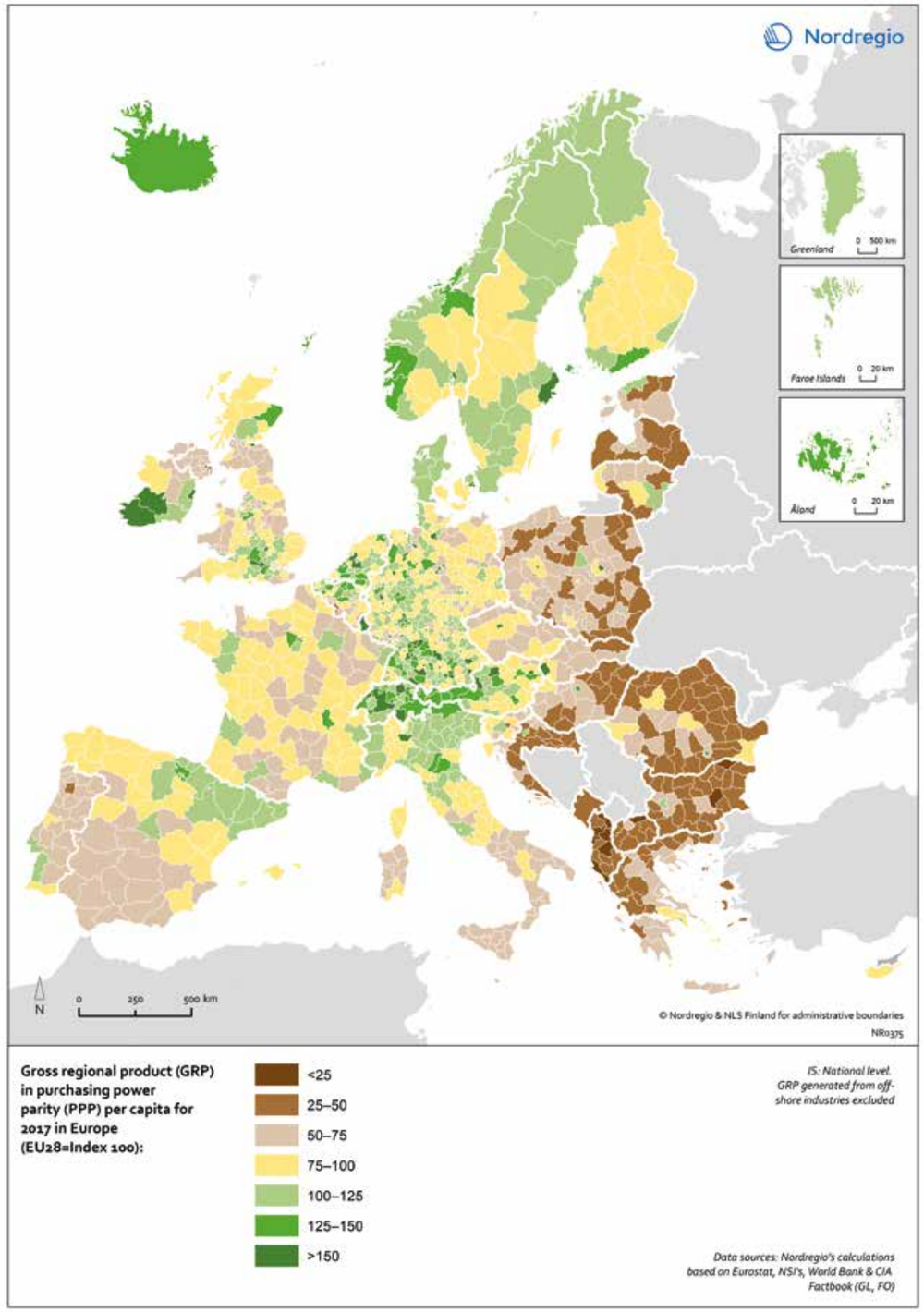
Gross domestic product (GDP) measures the total value of final goods and services produced in a country. It is the most stable and commonly used indicator for measuring and comparing the size of economies. Although GDP does not take economic sustainability into account, it does highlight economic cycles such as recessions, recoveries and booms, and it provides an overview of the state of an economy.

The combined GDP of the Nordic Region in 2018 was $1.64 trillion[15], corresponding to the 12th largest economy in the world, up from $1.44 trillion in 2015, the lowest figure during the reference period (2011–2017). Sweden has the largest economy in the Nordic Region. It accounted for a third of Nordic GDP in 2017, a similar proportion to 2011. Norway is the second largest, with around 25.8% of Nordic GDP in 2017, down from 29.3% in 2011. The corresponding figure for Denmark is 21.3%, and 16.3% for Finland (including Åland), with both countries accounting for a relatively stable proportion since 2011. Icelandic GDP rose significantly between 2011 and 2017, by which time it accounted for 1.6% of Nordic GDP. The GDP of the Faroe Islands and Greenland also increased during that period and was around 0.16% of Nordic GDP for each. GDP per capita (measured in terms of purchasing power parity) is above the European average in all of the Nordic countries. Norway has the highest GDP per capita, followed by Iceland, Denmark, Sweden and Finland. Recent trends (2011–2017) indicate that Iceland and Denmark are the only Nordic countries where GDP per capita is growing faster than the European average and that Norway is the only one where it has fallen.

The corresponding indicator to GDP at the regional level is gross regional product (GRP), which is one of the indicators included in the regional potential index (RPI, Chapter 12). Figure 7.0 shows GRP per capita in 2017. The average GRP per capita in the Nordic Region is higher than the European average. The capital city regions have the highest GRP per capita in the Nordic Region, mirroring the pattern elsewhere in Europe. The main reasons for this are the diverse range of economic activities in the big cities along with urban growth. As it has been the case for many years, Oslo had the highest GRP per capita in the Nordic Region in 2017, with a figure similar to that of the Bonn and Mannheim regions in Germany. The lowest GRP per capita is found in rural parts of Denmark, Finland, Norway and Sweden. Kainuu (Finland) has the lowest figure and is on a par with many regions in France, eastern Germany and north-western Spain.

[15] At current market prices.

Figure 7.0 Gross regional product per capita in European regions 2017.



Chapter 7

INCREASING INCOME INEQUALITY

Author: Julien Grunfelder
Maps and data: Julien Grunfelder and Eeva Turunen

Rising income inequality is a "defining challenge of our time" (Obama, 2013). However, the gap between the poor and the rich within OECD countries has been increasing continuously since the late 1970s. Hence the considerable attention this topic receives from the media, policy makers and experts, as well as the general public. Income inequality is indeed often perceived as an indicator of a lack of income mobility and opportunity, which can entail large social costs, including loss of confidence in institutions and deteriorate social cohesion (Dabla-Norris, Kochhar, Suphaphiphat, Ricka & Tsounta, 2015). The analysis of income inequality thus provides an insight into the existing welfare system, living standards and social cohesion within the Nordic Region.

The Nordic countries have relatively small wage gaps, high employment and high taxation, combined with good quality education and social security, all of which results in relatively low income inequality (Pareliussen, Herman, André & Causa, 2018). The Nordic Economic Policy Review 2018 (Nordic Council of Ministers, 2018) highlighted that developments in inequality in the Nordic countries started in the 1980s and early 1990s, later than in the other OECD countries. As Figure 7.1 demonstrates, income inequality in the Nordic countries remains below the OECD average even today. Income inequality increased at a faster pace in Denmark and Sweden than the OECD-average between 2000 and 2015 whereas it remained at similar levels in Finland and Norway. Inequality was reduced in Iceland in the during this period, mostly due to the 2008 financial crisis.

The Nordic countries have relatively small wage gaps

A closer look at the picture at local level highlights differences within countries. Despite relatively low levels of inequality at national levels, differences are found between municipalities and regions; incomes and income inequalities are usually higher for households in capital city regions than in other parts of a country. This is true for both Nordic countries and the majority of European countries, except ones where the financial capital is not the same as the national capital region (e.g. Germany and Italy) (Eurostat, 2019). Differences are found within municipalities and regions as well as between them. This chapter therefore highlights household incomes in the Nordic Region by looking at differences both between and within administrative units.

Are productive regions synonymous with high income households?

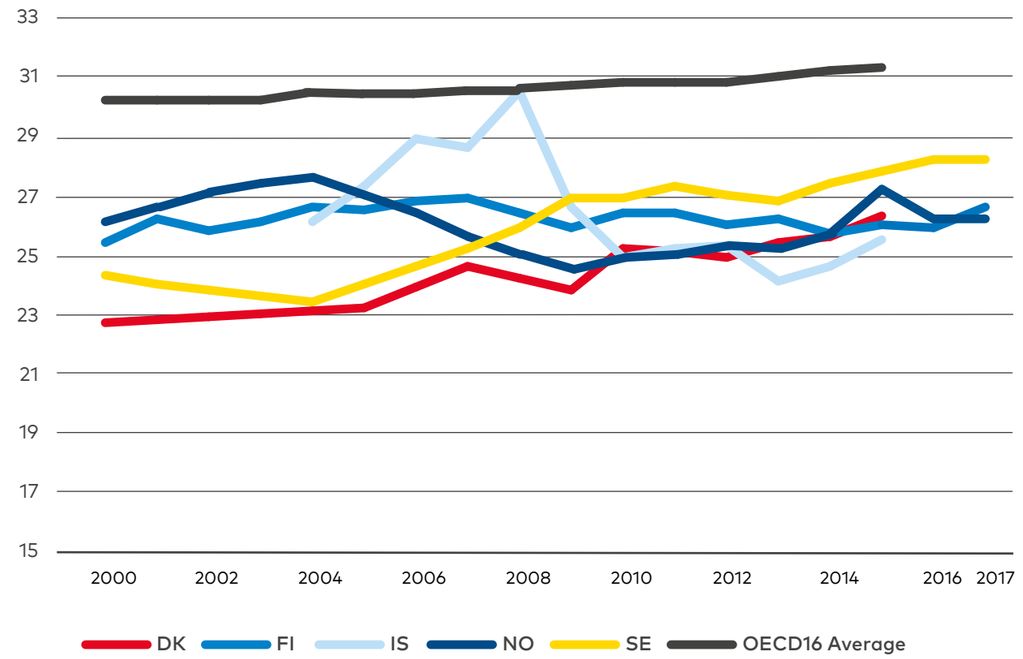
Gross regional product (GRP) per capita measures the level of production of goods and services in a region (see Figure 7.0). This indicator is sometimes used to highlight the average economic situation of the population in a region. However, high GRP does not necessarily translate to high household income as not all income generated by regional economic activity goes directly to households. A portion of revenue goes to local or national governments in the form of taxes and some profits may even go to a parent company located in a foreign country (OECD Insights, 2016). As such, GRP per capita is often higher than household disposable income (HDI) – defined as the sum of the income of a household (i.e. income from employment, net property income, social transfers and social benefits) minus direct taxes and social contributions, with dividends and net interest taken into consideration (OECD, 2016). The difference between the two indicators has been found to be increasing over time with a different intensity among OECD countries (Nolan, Roser & Thewissen, 2016). This trend suggests that GRP per capita is no longer an accurate indicator of living standards in a region. Looking at the difference between the two may be useful, however, in understanding the relationship between regional productivity and household income.

One way to highlight the differences is to map the ratio between HDI and GRP at regional level across Europe (Figure 7.2). A ratio of around 1 indicates that HDI and GRP are at a similar level, in which case GRP could be an accurate measure of individual material wellbeing. A lower value indicates a greater difference between the two values, meaning that GRP cannot be used as a proxy for highlighting the economic situation of the population in a region.

The ratio between HDI and GRP for European regions in 2016 ranges from 0.24 to 0.92, with an average of 0.60. Regions with the lowest ratio are mostly capital city regions, although regions of Ireland also have a low ratio. This is partly due to the presence of large companies transferring some of the generated income to foreign countries (e.g. the country where the company's headquarter is located). Regions where HDI is similar to GRP are mostly peripheral regions in countries such as France, Hungary, Poland and the United Kingdom, for instance in Southern Scotland (0.91).

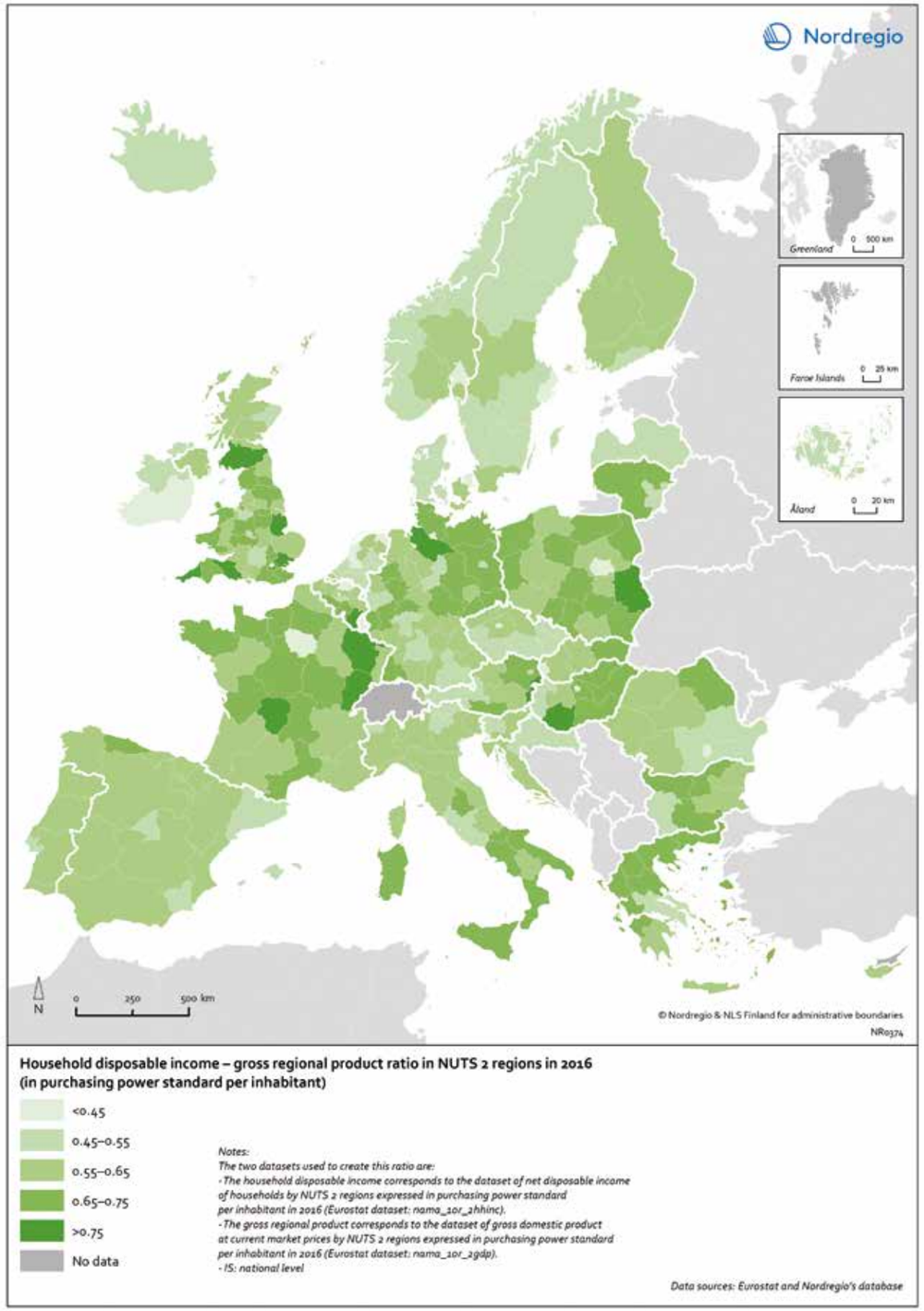
In the Nordic regions (NUTS 2 level), the value of HDI is on average half the value of GRP, meaning that GRP cannot be used as a good proxy for high-

Figure 7.1 Income inequality in the Nordic countries from 2000 onwards.



Data source: OECD (Dataset on Gini coefficient for household disposable incomes).

Figure 7.2 Household disposable income – gross regional product ratio 2016.



lighting the economic situation of the population in these regions. Many regions in Norway and Sweden, as well as Iceland, are close to this Nordic average value of 0.52, which is lower than the European average. The largest difference is found in the capital region of Denmark, where HDI is three times lower than GRP. Contributing factors that might explain the significant difference between HDI and GRP in the capital region of Denmark include: cross-border commuters; large foreign companies transferring parts of the income abroad; and the inclusion of Bornholm, the Danish territory with the lowest income, which is part of the capital region of Denmark.

Lower incomes in parts of Finland

Income is one of the concepts used in the study of the economic wellbeing of population groups in a given geographical area. The analysis of household income provides a good overview of the material living standards of households, such as their ability to pay for goods and services. There are different ways to analyse income inequality between different geographical areas. There is no consensus on which measure better describes inequality since each measure shows a different element of inequality. It is therefore advisable to combine different measures in order to build up a clearer picture of income inequality. As described above, household disposable income (HDI) is one such measure. This indicator has the advantage of allowing comparison of income levels between municipalities, and the changes in these over time.

Figure 7.3 shows the change in household disposable income at the municipal level. The map shows a striking difference between the trends in Finland and Åland and those in the rest of the Nordic Region. The average household disposable income has fallen in almost half of the municipalities in Finland and Åland, but increased in all municipalities in Denmark, Greenland, Iceland, Norway and Sweden. Vimpeli, Rautjärvi and Pukkila, all in Finland, are the municipalities which experienced the largest drop in average household income between 2011 and 2017. This negative trend in municipalities in Finland was largely the consequence of a prolonged recession in the early 2010s, when the manufacturing sector was hit by a structural crisis. The situation was exacerbated by out-migration to urban areas and a

The average household disposable income has fallen in almost half of the municipalities in Finland and Åland

rise in the unemployment rate in Finland, which peaked in 2015.

Figure 7.4 shows household disposable income as a municipal average in 2017 for the Nordic Region. The highest disposable income in the Nordic Region in 2017 was found in the capital city regions of Denmark and Sweden. The largest differences are between countries and between metropolitan and rural regions. The biggest difference is between Akershus, an urban region in Norway, and Norðurland vestra, a rural region in Iceland that had the lowest HDI in the Nordic Region. There was a difference of more than 2.5 times between the two regions in 2017. Figure 7.4 clearly highlights that the households with the lowest disposable income in the Nordic Region are in Iceland (note the absence of comparable data for both Greenland and the Faroe Islands). Also, the average amount did not vary much between municipalities in 2017. This is quite different from the situation in the municipalities of the capital city regions in Denmark, Norway and Sweden, where households had the highest incomes in 2017. Households in Danderyd, part of the Stockholm Region (Sweden), had the highest disposable income at the municipal level in the Nordic Region in 2017. The average HDI in this municipality is more than eight times higher than in Grundarfjarðarbær, a municipality in Vesturland (Iceland), which has the lowest average HDI in the Nordic Region.

Figure 7.4 also highlights that intra-regional differences in HDI are found in the capital city regions of Denmark, Finland, Norway, Sweden and Åland, as well as in a number of metropolitan areas. This is the case, for instance, around the cities of Aarhus (Denmark), Gothenburg (Sweden) and Stavanger (Norway). This has the potential to be problematic in the long-term as low-income inequality is one of the parameters for social cohesion. For instance, large differences in income may lead to segregated housing, concentrating poverty in some municipalities and wealth in others, and posing a serious threat to social cohesion.

Figure 7.3 Change in household disposable income 2011–2017.

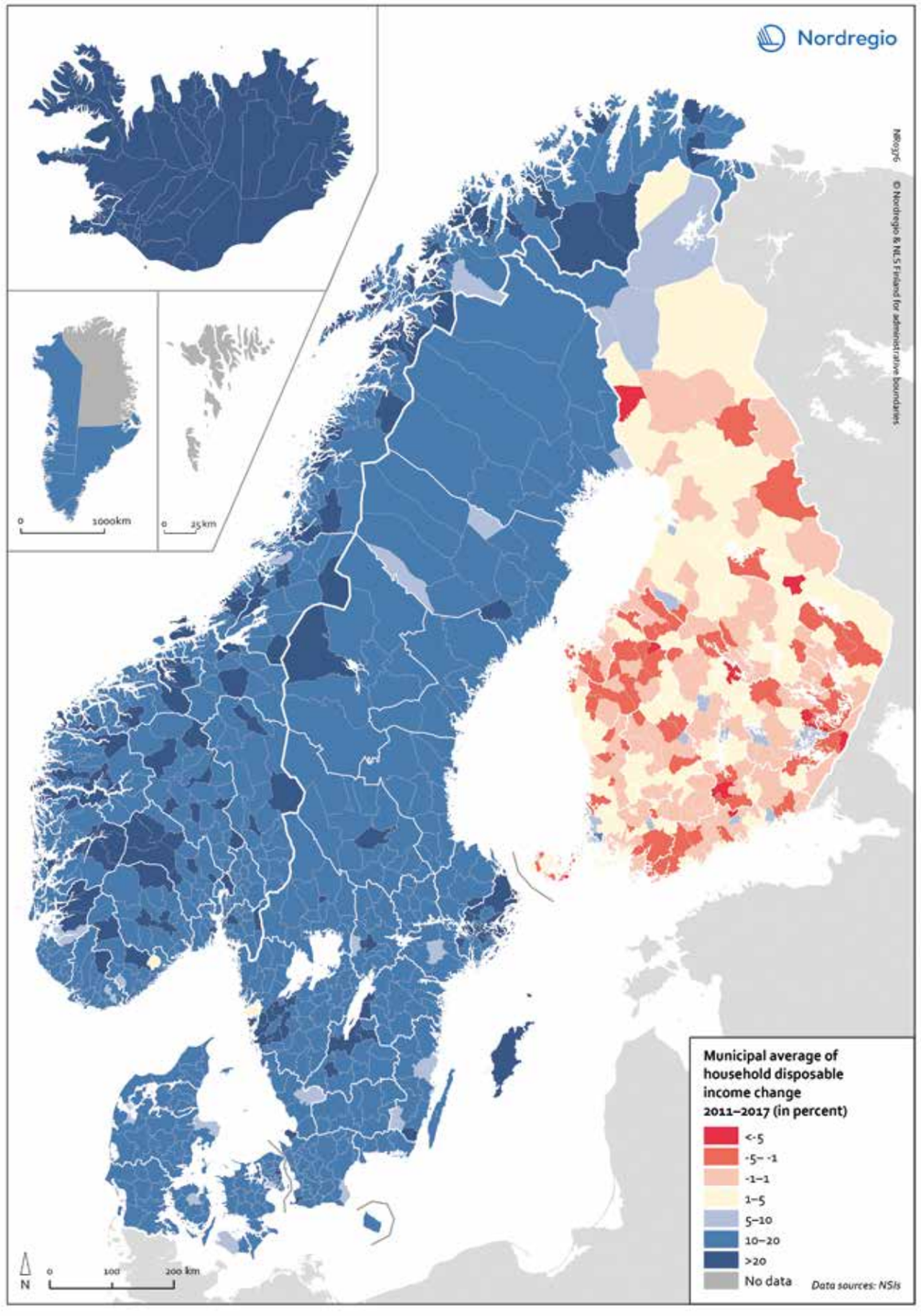
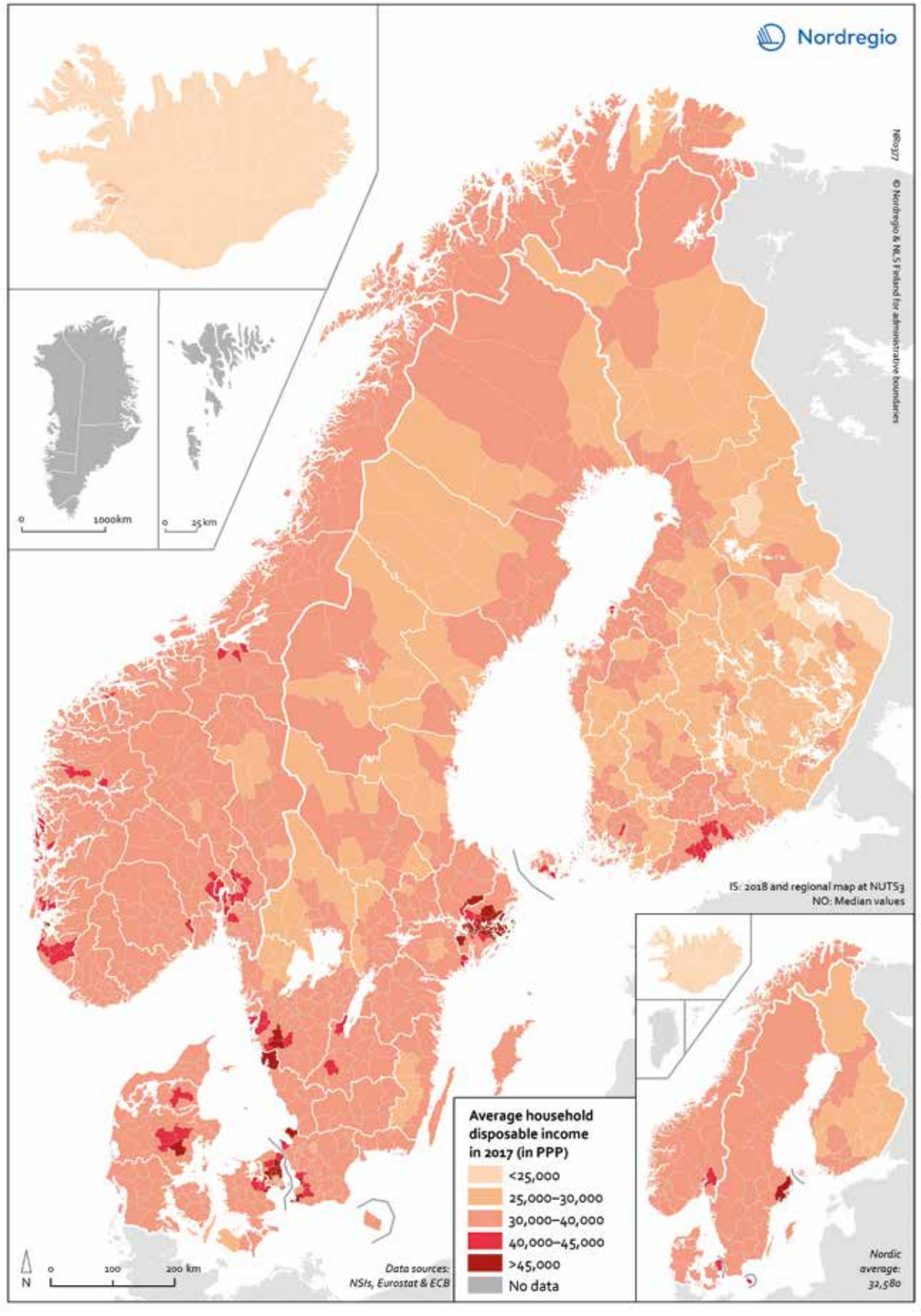


Figure 7.4 Household disposable income 2017.



Increasing income inequality within municipalities

This section aims to highlight differences in household income within both countries and municipalities, using the same reference period (2011–2017) as the previous section. The Gini coefficient is used for this purpose (see box on Gini coefficient). Income inequality is a clear indicator of differences in living standards within a municipality, which in OECD countries is often connected to high unemployment and a population trapped in low-paid jobs (OECD, 2016). However, these income inequalities can be mitigated by the implementation of policies such as those aimed at redistributing income through taxes and transfers, and those aimed at increasing employment rates. Indeed, employment and unemployment are the most significant factors behind household income inequalities (excluding capital gains).

As Figure 7.5 demonstrates, household income inequality within municipalities increased between 2011 and 2017 in the majority of the municipalities across the Nordic Region. The figure highlights the changes in income inequality between 2011 and 2017 for municipalities of the Nordic Region, with the blue shades indicating a decrease in income inequality and the red shades indicating an increase in income inequality. The figure reveals that the situation is very different across the municipalities and countries of the Nordic Region.

Income inequality increased between 2011 and 2017 in the vast majority of municipalities across the Nordic Region

Income inequality increased between 2011 and 2017 in the vast majority of municipalities across the Nordic Region. The greatest increases are found in rural areas in both Norway and Sweden. These increases are largely explained by an increase in income for households that already had a high income in 2011. For instance, this is the case in Søgne (Agder), where 19% of the households earned NOK

Gini coefficient

The most widely used measure of household income inequality within a specific geographical area is the Gini coefficient. This is an index that measures the extent to which the distribution of household incomes deviates from an equal distribution. The coefficient can be based on different population groups (e.g. total population, working-age population, the elderly). A value of zero corresponds to an equal distribution of income (e.g. every household receives the same income), whereas a value of 1 corresponds to the most unequal distribution of income (e.g. one household gathers all the income). The Gini coefficient is often expressed by multiplying the result by 100, hence it refers to an index ranging from 0 to 100. The coefficient can be calculated in two main ways:

- Before taxes and transfers. This is called the market income Gini index.
- After taxes and transfers. This is called the disposable income Gini index. It is the one used in this section.

It is worth mentioning that the datasets used in the chapter excludes capital gains. This is due to a need for comparable datasets between Nordic countries. However, it must be borne in mind that capital gains (i.e. the increase in value of a capital asset such as real estate or investments) are growing, and this contributes to larger inequalities between households.

Figure 7.5 Change in Gini coefficient 2011–2017.

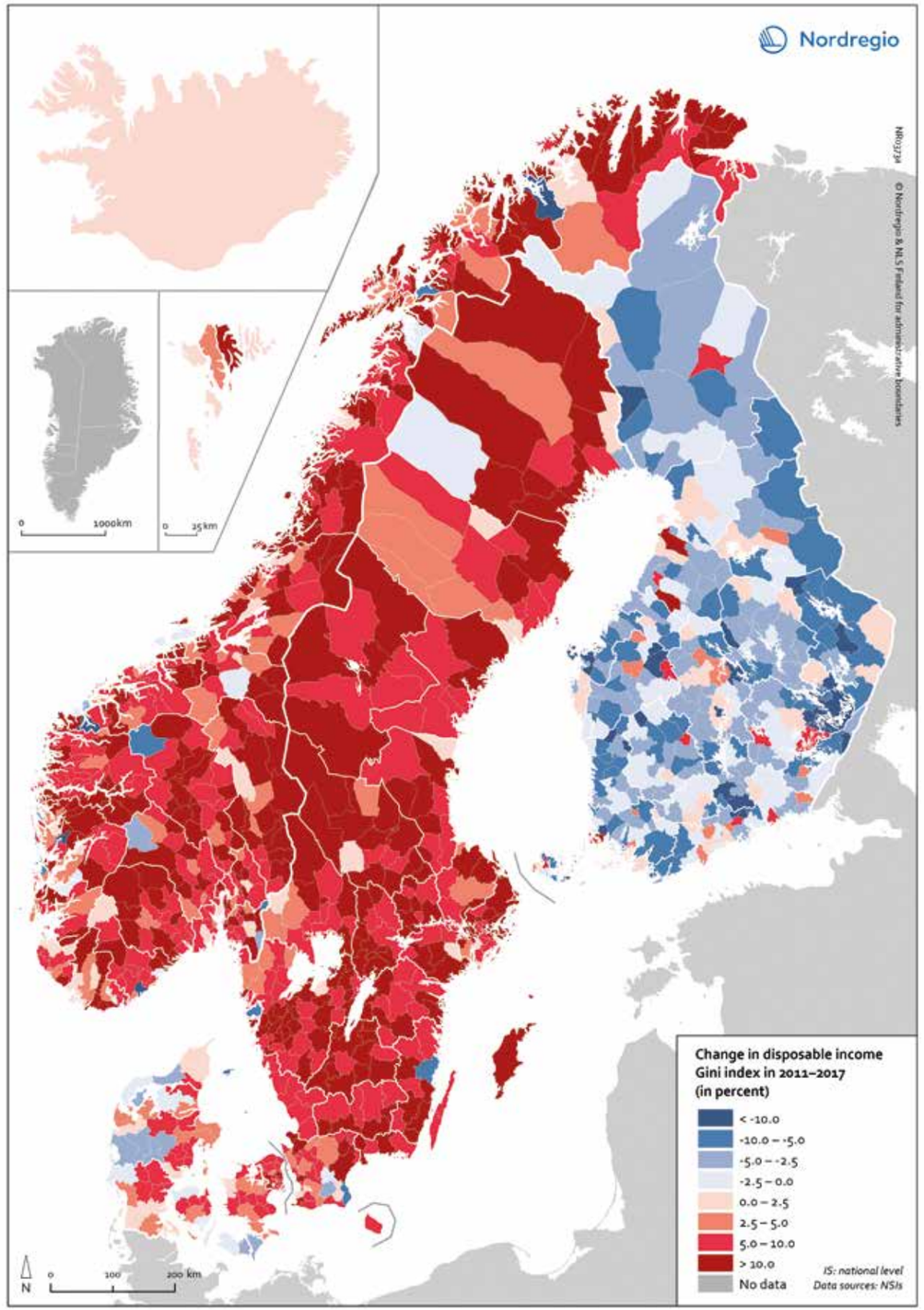
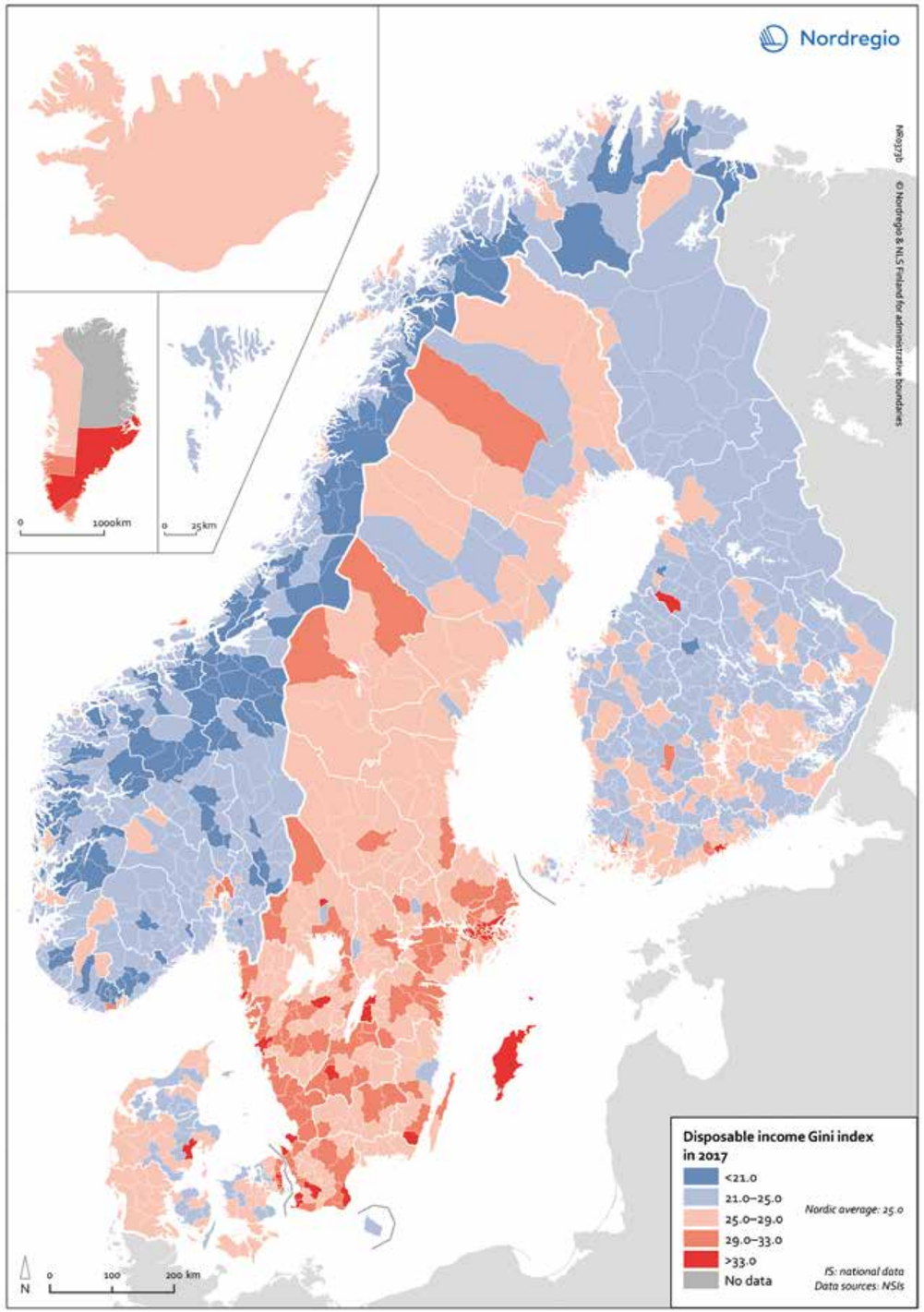


Figure 7.6 Gini coefficient 2017.



The highest intra-municipal inequalities were found in the capital city regions of Denmark, Finland and Sweden in 2017

750,000 or more in 2011. These households represented 30% of all households in the municipality in 2017. Similar trends are found in Andøy (Nordland) and Lebesby (Troms og Finnmark). However, income inequality decreased in almost a quarter of the municipalities in the Nordic Region during the same period. These municipalities are mainly located in Finland and Åland. The narrowing of the household income gap in many municipalities across Finland is mainly due to the prolonged economic recession in the early 2010s combined with demographic changes (e.g. out-migration and ageing).

Figure 7.6 shows income inequality between households in the same municipality in 2017 and reveals that inequalities are largest in Sweden and Greenland, whereas they are more contained in Norway and the Faroe Islands. Denmark, Finland and Åland are somewhere in-between. The absence of data for municipalities in Iceland makes comparison with the rest of the Nordic Region impossible. The highest intra-municipal inequalities were found in the capital city regions of Denmark, Finland and Sweden in 2017. Specifically, Danderyd (55.7), and Lidingö (46.4), both in the Stockholm Region, and Gentofte (45.4), in the capital region of Denmark, were the Nordic municipalities with the largest intra-municipal household income inequality in 2017. These values are far beyond the national average of 28.2 in Sweden and 26.3 in Denmark. In Danderyd, the considerable intra-municipality inequality is explained by the very large amount of disposable income (excluding capital) of the highest-earning households (both the top 10% and the top 1%). A similar situation is found in both Lidingö and Gentofte. Relatively high inequalities can also be found in Gotland (Sweden) and part of Greenland. It is in Norway that municipalities have the lowest intra-municipal income inequality, with values below 20. The low level of inequality is due to the relatively small number of households with very low income and households with very high disposable income. Most of these 48 municipalities are located in the new regions of Trøndelag, Vestland and Nordland.

A fair degree of income inequality does indeed contribute to make people "excel, compete, save and invest to move ahead in life" (Dablas et al., 2015). However, there is no scientific evidence on the ideal level of inequality or the most socially desirable mix of policies and institutions that would achieve this level (Alvaredo, Chancel, Piketty, Saez & Zucman, 2017). The Nordic Region is often mentioned as the part of the world that has the lowest level of income inequality among its households. However, the map showing the disposable income Gini coefficient in 2017 (Figure 7.6) highlights differences between countries, for example between Norway, which has relatively low levels of inequality within its municipalities, and Sweden, which has relatively high levels of inequality. Furthermore, as in other OECD countries, even though inequalities are rather contained, the increasing importance of the capital gains of the richest households hinders relative equality within the Nordic Region.

Although the Gini coefficient shows the different extent of intra-municipal household income inequality within municipalities of the Nordic Region, these disparities remain relatively limited when compared with Europe and the OECD countries. As mentioned earlier in this chapter, one of the reasons for this is the redistribution of income, which is characteristic of welfare states like those of the Nordic countries (see text box on the redistribution of income in the Nordic Region).

Concluding remarks

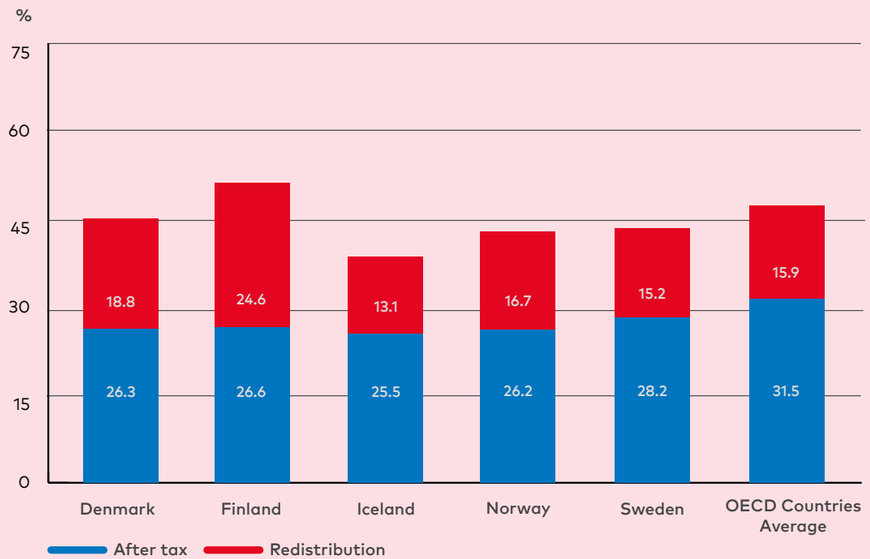
This chapter mapped household income inequalities at municipal, regional and national level in the Nordic Region. While the Nordic countries remain among the most equal of the OECD countries, these inequalities are increasing not only between municipalities, regions and countries in the Nordic Region, but also within these geographical areas. HDI is increasing at different speeds, with important increases occurred across the Nordic Region, except in Finland and Åland. The evolution of the Gini coefficient of HDI during the same reference period (2011–2017) highlights a somewhat similar trend, with the highest increases occurring in rural parts of Norway and Sweden and decreases in many municipalities in Finland and Åland.

The redistribution of income

As described above, there are two ways to measure income inequality using the Gini coefficient: the Gini coefficient of market income and the Gini coefficient of disposable income. As Figure 7.7 demonstrates, the difference between the two varies by different magnitudes in the Nordic countries. In 2017, redistribution of income ranged from 13.1 in Iceland to 24.6 in Finland. This variation may be due to factors such as changes in unemployment rates and ageing populations (Pareliussen et al., 2018; Pareliussen & Robling, 2018).

In 2017, Finland had the highest pre-tax income inequality (i.e. market income inequality), yet, following redistribution, income inequality is comparable to the other Nordic countries. In contrast, Iceland had the lowest pre-tax income equality in the Nordic Region, yet, following redistribution, income inequality is only slightly lower than the in the other Nordic countries. After-tax income inequality (i.e. disposable income inequality) was similar in all the Nordic countries in 2017. Iceland is one of the most equal countries in the OECD, with lower levels of income inequality found only in the Czech Republic (24.9 in 2016), Slovakia (23.8 in 2016) and Slovenia (24.3 in 2016).

Figure 7.7 Disposable income Gini index ("after taxes and transfers") and amount of redistribution (difference between the Gini coefficient of market income and the Gini coefficient of disposable income) for the entire population in the Nordic Region in 2017*.



Data source: OECD. *2015 values for Denmark, Iceland and OECD-countries average.

National fiscal policy (i.e. redistribution mechanisms) play an important role and continued attention to these will be crucial in shaping the development of income distribution in the Nordic Region into the future

While this mapping exercise highlighted differences using the total population as a base, it would be interesting to investigate differences in disposable income by sub-groups of the population as well (e.g. by age or gender). Insights on these indicators at national level can be found in the Nordic Economic Policy Review 2018 (Nordic Council of Ministers, 2018), which, for instance, highlights a decreasing difference between women's disposable income and men's disposable income in the period 1995–2015, which is partially due to the increasing numbers of women with full-time jobs (Boschini & Gunnarssson, 2018). Also, this chapter did not include income from capital gains when investigating household incomes, due to a lack of comparable data. If included, such an analysis would likely have shown a higher concentration of income for the top income earners.

Finally, it is worth noting that in the early 1900s, Sweden had large level of income inequality. Indeed, it was once one of the most unequal countries in the world, with the highest level of household income inequality in 1910 when measured against countries such as India, Kenya, Netherlands and the USA (van Zanden et al., 2014). Sweden is now one of the world's most equal countries (OECD, 2019). This change over time shows that low or high disparities in income are not a given, but the situation requires a constant effort from key stakeholders, for example by adjusting the redistribution mechanisms. As shown in this chapter, national fiscal policy (i.e. redistribution mechanisms) play an important role and continued attention to these will be crucial in shaping the development of income distribution in the Nordic Region into the future.

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Chapter 8

PROMOTING REGIONAL INNOVATION – the role of smart specialisation

Authors: Jukka Teräs and Mari Wøien Meijer
Maps and data: Johanna Carolina Jokinen

Innovation is one of the key factors influencing regional performance and growth. The term "innovation" comes from the Latin verb *innovare*, meaning "to do something new". Innovation differs significantly across regions. High levels of innovation have a positive influence on performance at company level and, as a result, on economic performance at regional and national level. Regional studies of innovation aim to understand and explain differences in economic performance, especially from the regional point of view. This chapter discusses smart specialisation as a new innovation policy concept. What is the role of smart specialisation in promoting regional innovation in the Nordic regions?

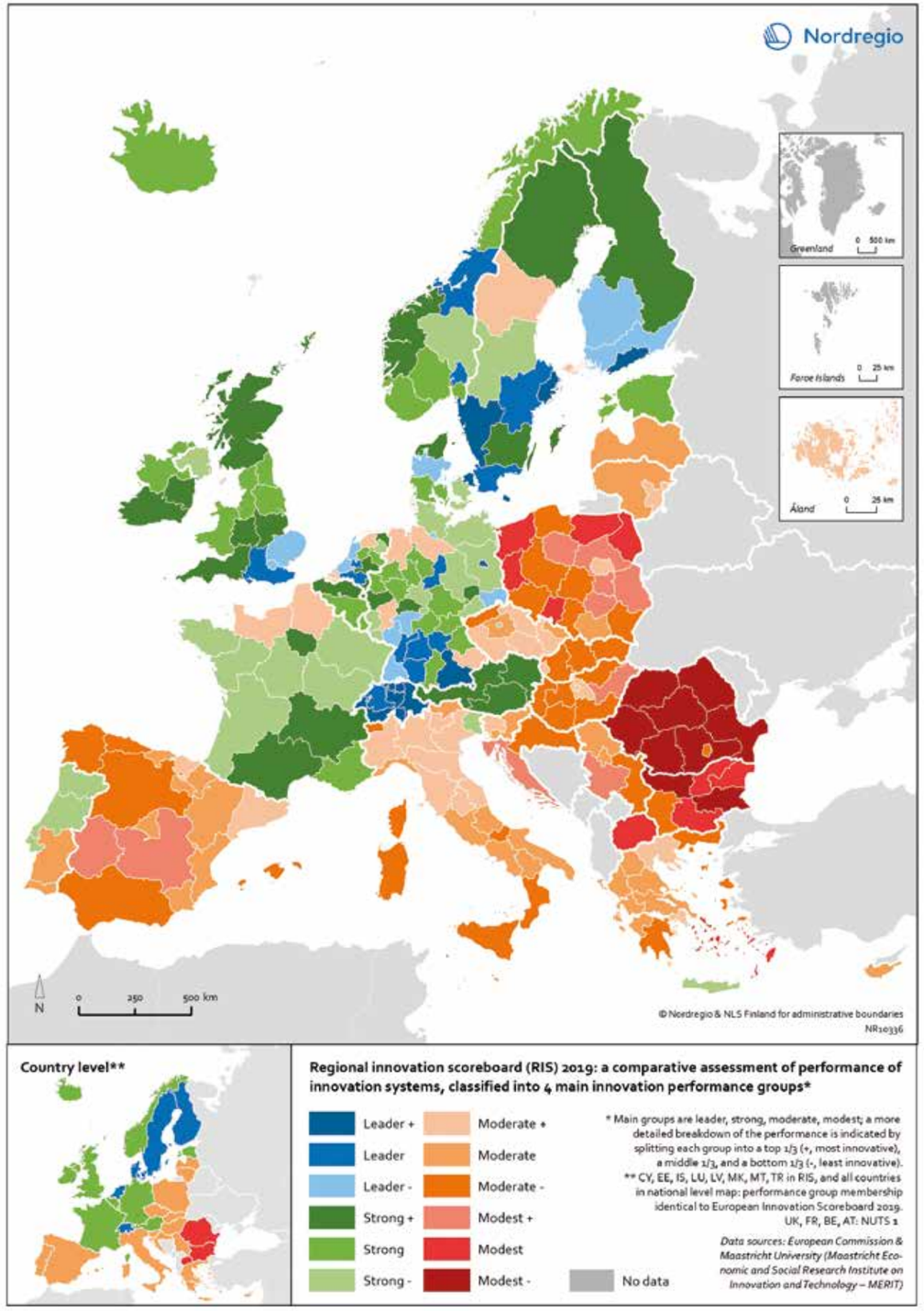
Regional innovation in Europe

The European innovation scoreboard provides a comparative assessment of the research and innovation performance in European countries. It assesses the relative strengths and weaknesses of national innovation systems and helps countries identify areas they need to address. The Regional innovation scoreboard (RIS), a regional extension of the European innovation scoreboard, assesses the innovation performance of European regions on a limited number of indicators (Regional innovation scoreboard 2019). The RIS 2019 covers 238 regions across 23 EU countries, as well as Norway, Serbia and Switzerland. Cyprus, Estonia, Latvia, Luxembourg and Malta are also included at country level. The RIS 2019 is a comparative assessment of regional innovation based on the European innovation scoreboard methodology, using 18 of the latter's 27 indicators (Figure 8.1). It provides a more detailed breakdown of the performance groups with contextual data that can be used to analyse and compare structural economic, business and socio-demographic differences between regions.

The Nordic regions are doing well in an overall Regional innovation scoreboard comparison regarding innovation performance

The Nordic regions are doing well in an overall RIS comparison regarding innovation performance. There are, however, considerable differences in innovation performance between the Nordic regions. For example, the capital regions have higher levels of innovation performance than more rural and peripheral regions, according to RIS 2019. This is often due to the critical mass of companies and the spatial significance of the proximity of firms and

Figure 8.1 Regional innovation scoreboard 2019



entrepreneurs, enabling knowledge-sharing and spill-over effects (Fratesi, 2017).

Smart specialisation as a new European innovation policy concept

Europe 2020 is the European Union's 10-year jobs and growth strategy. It was launched in 2010 to create the conditions for smart, sustainable and inclusive growth across Europe. The Europe 2020 strategy was established to focus on three interlocking and mutually reinforcing priority areas: smart growth, developing an economy based on knowledge and innovation; sustainable growth, promoting a low-carbon, resource-efficient and competitive economy; and inclusive growth, fostering a high-employment economy delivering social and territorial cohesion (European Commission, 2010). Regional policy plays an important role in the strategy. The current approach to regional innovation policy is based on a "new understanding of the role played by innovation in economic development and in particular its relationship with geography" (McCann & Ortega-Argilés, 2013, p.187). The basis of the new approach to regional innovation policy in the European Union (EU) is smart specialisation (S3).

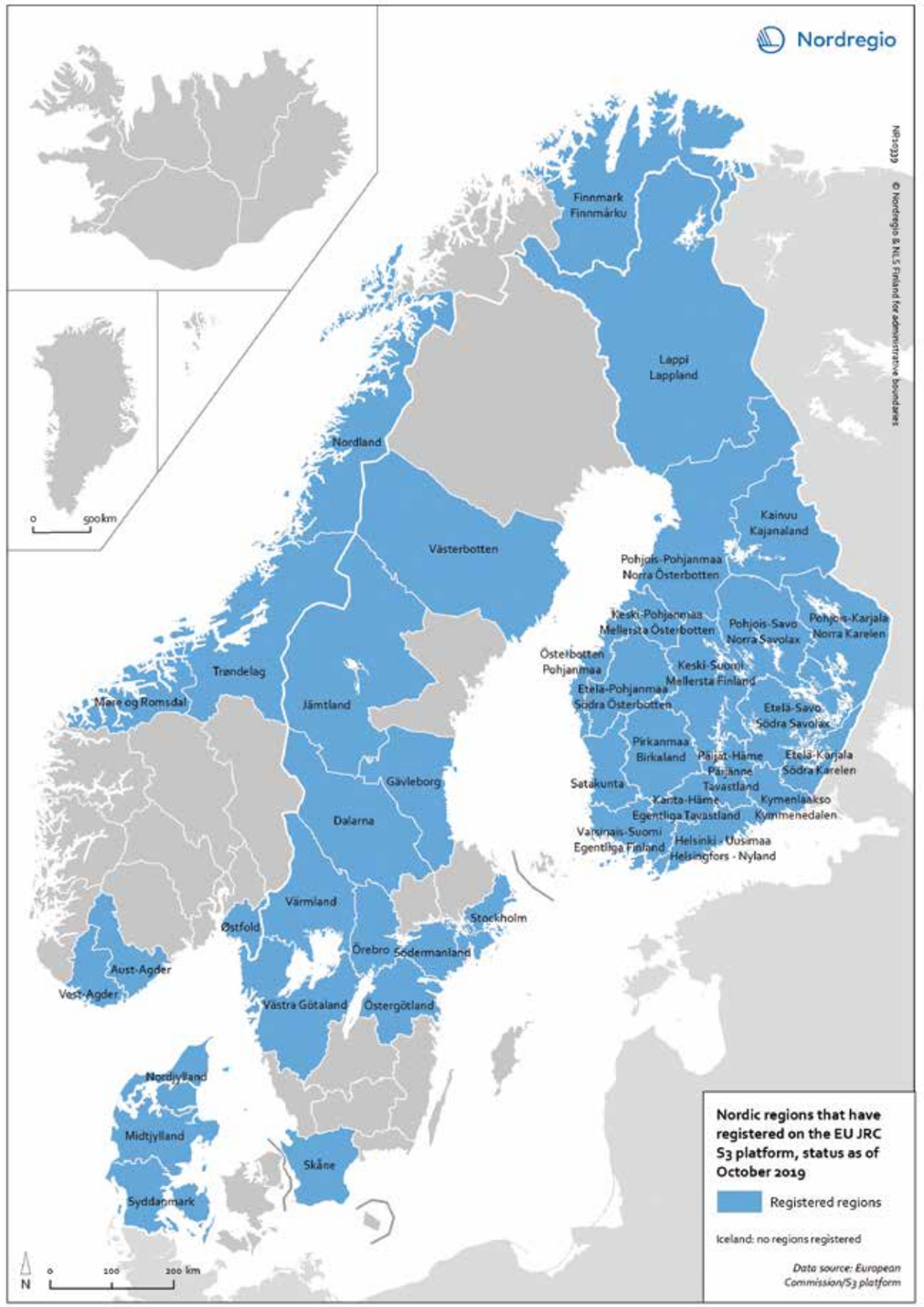
What, then, is smart specialisation? The concept was first developed to address the gap between Europe and other global competitors (namely USA and Japan) in R&D investment (Foray & Van Ark, 2007). Smart specialisation is a bottom-up policy approach to regional innovation and development. It aims to level the playing field between regions in Europe, supporting regions that are "lagging behind" on innovation (Figure 8.1) to catch up with their European counterparts. The smart specialisation approach is being promoted by the EU as the basis for the programming period 2014–2020 and, in order to receive EU Structural Funds, EU Member States and their regions must have developed a smart specialisation strategy (ex-ante condition). The smart specialisation process assists regions in unlocking regional-specific assets and competencies based on a region's unique economic structure and knowledge base.

At the core of the regional smart specialisation process is an *entrepreneurial discovery process* (EDP) in which a joint effort is made by entrepreneurs, companies and other relevant regional actors (e.g. universities, technology transfer offices and regional development agencies) to identify future opportunities. The EDP rests on the ability of different actors to work together and find new avenues for the deployment of existing knowledge in a region. This requires close collaboration between companies and entrepreneurs, regional higher education or research institutes, and regional authorities. This process leads towards the establishment of knowledge domains. Domains are identified areas of key strength in the region, which in turn challenge the existing economic structures by focusing on transformative activities.

The smart specialisation concept has been diffusing rapidly across Europe in the 2010s, as an increasing number of regions adopt it and design strategies departing from their own preconditions. The S3 platform in Seville, Spain, hosted by the Institute for Prospective Technological Studies (IPTS), was established in 2011 to assist EU countries and regions to develop, implement and review their smart specialisation strategies. The S3 platform provides information, methodologies, expertise and advice to national and regional policy makers, promotes mutual learning and transnational co-operation, and contributes to academic debates around the concept of smart specialisation (Smart Specialisation Platform, 2019). The regions that have registered on the S3 platform receive practical advice and broadened opportunities for international networking. In October 2019, there were 182 EU regions registered on the S3 platform, as well as 18 non-EU Member State regions. Of these regions, 38 are Nordic (ibid.) (see Figure 8.2). It is worth noting that, as a non-EU member state, Norway has seven registered regions on the platform. Registration on the S3 platform is by no means a guarantee of success of a regional smart specialisation process, but it indicates the willingness of the region to learn more about S3 and to participate in international and interregional S3 cooperation through the possibilities provided by the S3 platform.

Smart specialisation process assists regions in unlocking regional-specific assets and competencies

Figure 8.2 EU JRC S3 Platform 2019 in Nordic regions.



As EU member states, Sweden, Finland and Denmark are required to draw up smart specialisation strategies to access the EU Structural Funds. Norway and Iceland, which are outside the EU, do not face the same requirement

Smart specialisation in the Nordic Region

Smart specialisation has taken its place on the Nordic agenda, too. Despite the fact that the S3 concept was introduced only a few years ago, study reports are already available on the topic, with a focus on S3 in the Nordic context. Nordregio conducted an in-depth study in 2018–2019, called "The status, characteristics and potential of smart specialisation in Nordic regions" (Woien et al, 2018). It sought to create a better understanding of how the different Nordic countries and regions adapt to the S3 policy concept and to analyse the added value of S3 implementation in the Nordic context. The study investigated six Nordic regional approaches to S3: Kymenlaakso (Finland), Stockholm (Sweden), Midtjylland (Denmark), Nordland (Norway), Åland (Finland) and Iceland (country-based analysis). Together with the S3 platform, Nordregio has also delivered a recent report on S3 in the Nordic part of the Arctic (Teräs et al., 2018).

In the following, based on the Nordregio S3 studies, we give a summary of the main characteristics of the Nordic S3 approaches, followed by a presentation of two of the Nordic regional case studies, Kymenlaakso and Stockholm. The cases have been selected in order to illustrate the different regional structures, actors, attitudes, and strategy processes related to S3 in both metropolitan and non-metropolitan Nordic regions. Thereafter, we present the key findings of the Nordic Arctic S3 study.

As EU Member States, Sweden, Finland and Denmark are required to draw up smart specialisation strategies to access the EU Structural Funds. Norway and Iceland, which are outside the EU, do not face the same requirement.

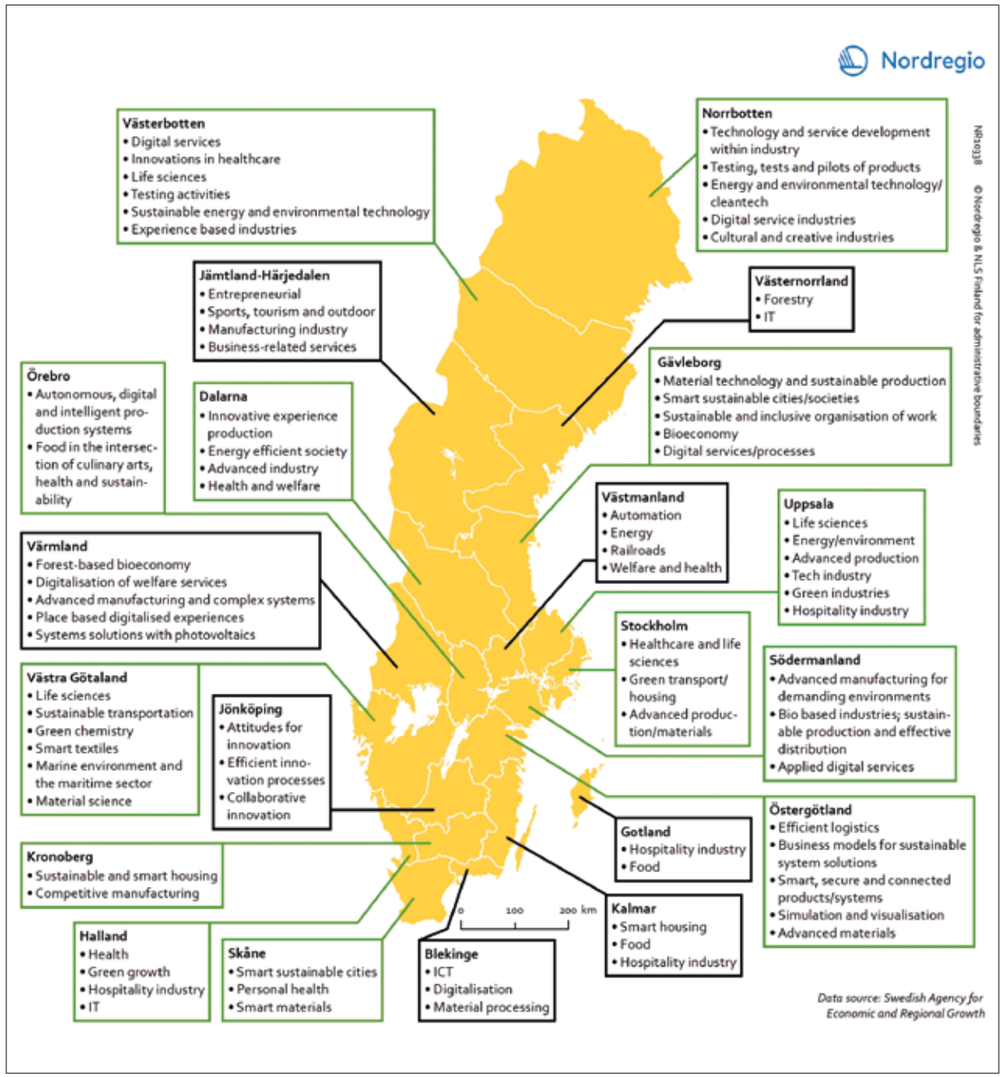
In Sweden, the Swedish Agency for Economic and Regional Growth (Tillväxtverket) is a central actor in assisting regions in their work with smart specialisation. Tillväxtverket promotes opportunities for cooperation between the Swedish regional S3 processes and provides relevant information and learning seminars related to S3. Figure 8.3 gives an overview of the S3 focus areas in the Swedish regions (Tillväxtverket, 2019). The major S3 domains in Sweden shown in Figure 8.3 provide a good overview of the key specialisation areas in Sweden (see below about the case of Stockholm Region for more details). It is possible, for example, to check which Swedish regions have "green", "sustainable", "environment" at their smart specialisation domains (marked in green in their respective info boxes for the domains in Figure 8.3). The information illustrated in Figure 8.3. can assist Swedish regions when they are considering opportunities for S3 synergy and co-operation with each other.

In Denmark, the Cluster Forum is responsible for "discussing and coordinating regional strategies for smart specialisation and ensuring cohesion with the general strategy for the cluster and network policy" (The Danish Ministry of Higher Education and Science & The Danish Agency for Science, Technology and Innovation, 2016). The Cluster Forum is an informal Danish body which enables ministries, regions, municipalities and the regional cluster forums to share knowledge and co-ordinate activities between clusters and networks.

Finland has decided not to develop a national smart specialisation strategy (Polverari, 2016), but S3 is supported at national level, with regional councils being the main authorities responsible for S3. Smart specialisation is an essential part of the national priorities for regional development in Finland (see e.g. TEM, 2016). Extensive regional S3 strategies have been prepared and implemented in the Finnish regions, as demonstrated below in the case of Kymenlaakso.

As a non-EU member state, Norway does not have a European Regional Development Fund (ERDF)-related incentive to adopt smart specialisation approaches. Despite the lack of an external incentive, S3 has been well received and is used in several Norwegian regions. The Norwegian Ministry of Local Government and Modernisation has taken a coordinating role, suggesting there is a growing

Figure 8.3 Smart specialisation domains in Swedish regions.



The analysis of S3 approaches in Nordic countries reveals that Sweden, Finland and Norway have adopted the S3 concept more actively than Denmark

overall interest in S3 in Norway. The Ministry of Local Government and Modernisation published a guide in 2018 titled Smart Specialisation as a *Method for Regional Business Development* (KMD, 2018).

As a non-EU member, Iceland is not required by the ERDF incentives to adopt a smart specialisation approach in its regional development policies. Although Iceland has not formally adopted the S3 concept, some of its frameworks and processes incorporate the general rationale and ideas behind S3.

The analysis of S3 approaches in Nordic countries reveals that Sweden, Finland and Norway have adopted the S3 concept more actively than Denmark. The high level of commitment in Norway to utilising the S3 is highlighted, especially regarding the status of Norway as a non-EU Member State. Iceland has regional development processes with "de-facto" S3 elements but the concept has not yet been launched in Iceland. The existence of a Nordic model of smart specialisation is not readily apparent, but the rapid adoption of the strategy tool in some Nordic regions may indicate the existence of a Nordic innovation environment that is highly compatible with the smart specialisation concept. It also seems that the low thresholds for establishing contact, the relatively high level of trust among actors and the closeness of regional actors across businesses, universities and regional authorities all play an important role in enabling smart specialisation in the Nordic Region. The success of S3 is less dependent on a Nordic country's membership of the EU and more on its willingness and ability to accommodate new or expanded innovation systems suggested by smart specialisation.

The case of Stockholm, Sweden

Stockholm is Sweden's foremost region in terms of research and development, and home to strong research institutions such as the Karolinska Institute, the Royal Institute of Technology (KTH) and Stockholm University. Stockholm also has a highly educated population and a broad business sector and is host to multinational companies. Stockholm is the country's beating heart, a centre for new ventures and development, and an engine for innovation.

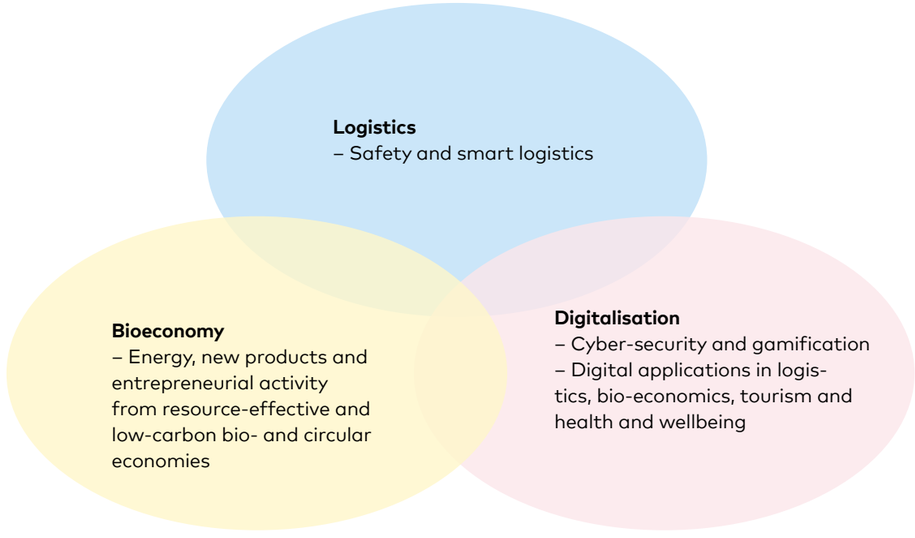
Formulated in 2012, the innovation strategy *Stockholm 2025* aimed to create an increasingly attractive region with strong collaborations and high levels of R&D output, in order to meet future global challenges (Länsstyrelsen Stockholm, 2015). Several key actors from industry, academia and the public sector took part in formulating and implementing Stockholm's innovation strategy through the former Innovation Stockholm structure. The strategy was formulated before the EU's *ex ante* conditionality came into effect, and its similarities to S3 meant that Stockholm 2025 acted as a substitute for an S3 strategy in the programme period 2014–2020.

Based on the Nordregio case study, the size of the Stockholm Region – in terms of the variety of actors available, size of companies, prevailing regional innovation strength and ability to attract investments – alongside the established and largely laissez-faire approach to innovation from a governance perspective, seems to make it harder to claim ownership of strategies and mobilise actors: "*It would be easier in a smaller town as it is easier to find the right partners to collaborate with, focus and mobilise for a common cause. This is what you usually would call the 'big city' problem. It is difficult.*"

In relation to S3, only a few projects have been funded but it is mentioned as part of the recent regional innovation strategy, RUFS 2050 (Stockholms Läns Landsting, 2018). The way S3 has been used as a guiding tool for regional development in Stockholm indicates that there is a tendency towards a de facto operationalisation of S3 at large. As one of the respondents in the Nordregio study put it: "*There isn't a formalised idea, though things happen. But it isn't called S3. And that is what I usually say: we work in line with S3 without a formal strategy.*" (Wøien et al., 2019, p. 50).

The Stockholm Region continues to outperform as an "innovation hub" despite the fact that the funding from EU structural funds and national level continues to be much lower than for many other Swedish areas. This limits the resources available for creating and implementing a smart specialisation strategy.

Figure 8.4 Kymenlaakso smart specialisation strategy domains.



Data source: adapted from Regional Council of Kymenlaakso 2016.

The case of Kymenlaakso, Finland

Kymenlaakso is situated in the south-east of Finland, between the Russian border and the Helsinki metropolitan area. Kymenlaakso is divided into two subregions: Kouvola to the north and Kotka–Hamina to the south. The region is particularly known for its favourable logistical possibilities and flourishing pulp and paper industry.

Kymenlaakso's S3 strategy was published in 2016. The initiative for the region's S3 strategy process originated in co-operation between the Kymenlaakso University of Applied Sciences (KyAMK), Aalto University and the European Committee of the Regions. The strategy process started in 2015, with the aim of identifying the region's key domains. The project aimed to engage all regional key actors through joint workshops and different expert working groups. The collective strategy work was a new opportunity to create an increasingly tight-knit regional vision, according to one of the interviewees: "*Selecting the domains was a chance to engage different actors working for a common regional vision.*" (Wøien et al., 2019, p. 38). The selected S3 domains in Kymenlaakso were digitalisation, bioeconomy and logistics (see Figure 8.4).

In Kymenlaakso there is a genuine willingness to enhance the support mechanisms for regional innovation and to reinforce promising S3 domains that are reflective of the long-term strengths of the region

In Kymenlaakso there is a genuine willingness to enhance the support mechanisms for regional inno-

Smart specialisation and the Nordic Arctic

In 2018, Nordregio prepared a report on the adoption of smart specialisation in the European Nordic Arctic on behalf of the EU JRC S3 platform (Teräs et al, 2018). The analysis explored how smart specialisation (S3) has been applied in the Nordic countries' more sparsely populated regions, with a focus on the northernmost regions of Finland (Lappi), Sweden (Norrbotten) and Norway (Nordland, Troms og Finnmark). The analysis included a number of transregional and transnational initiatives in the Nordic Arctic such as e.g. East & North of Finland project to act as a test area for the EU Pilot Action for Regions in Industrial Transition.

The results of the study reveal that the implementation and application of smart specialisation strategies varies between the European Arctic Regions. Some Nordic European regions initially took a cautious approach towards S3 due to the lack of incentives and requirements for implementing the tool. Nevertheless, some regions, such as Lappi and Nordland, saw S3 as a useful tool for finding new ways to promote regional growth in a cross-cutting strategic approach to discovering new paths and niches in order to reduce dependency on a few large firms.

vation and to reinforce promising S3 domains that are reflective of the long-term strengths of the region. The regional S3 strategy process has enabled the region and its actors to stand out in the search for additional regional funds. In smaller regions such as Kymenlaakso, a relatively small number of key actors have an essential role in driving the development of the region's innovation environment. The major benefit in a small region working with S3 and achieving a successful EDP is that the actors know each other well, which helps them forge new partnerships.

Concluding remarks

The main aim of this chapter is to introduce and discuss the smart specialisation concept as a complementary tool to promote regional innovation, especially in the Nordic regions.

The smart specialisation concept has so far only been applied for a few years, and its long-term impact on indicators measuring regional economic performance remains to be seen. However, there are already some important lessons to be taken from the introduction of the concept in the Nordic regions.

Firstly, there are significant variations regarding the adoption of the smart specialisation concept in the Nordic regions. Some regions (e.g. Värmland in Sweden and Lappi in Finland) have actively utilised smart specialisation to complement their regional development toolbox. For the Nordic S3 forerunner regions, S3 strategies form the basis of future regional development practices, in terms of process guidance and implementation of regional strategies. It is also interesting to note that many non-EU regions in Norway have adopted the smart specialisation concept despite the lack of financial incentive from EU Structural Funds. Secondly, the experience in several Nordic regions (e.g. Kymenlaakso and Stockholm) suggests that there seems to be an *optimal size* of regions adopting smart specialisation. A certain critical mass is needed, which may turn out to be a challenge for some regions. At the same time, regions with a broader spectrum of SMEs and large businesses may lack the institutional capacity and leadership to govern S3. This connects to the need to consider multilevel governance principles, as the operationalisation of S3 also depends on the harmonisation of funding opportunities across the national innovation system. This may incentivise research institutions, universities and businesses to cooperate to identify the key areas of strength, as it would mean greater access to funding options.

The key concepts of smart specialisation need to be more clearly opened up for decision-makers and practitioners

Smart specialisation focuses on innovation and competitiveness. There is, however, a growing interest in a broader view of innovation, including, for example, social innovation and public sector innovations (see e.g. Teräs et al., 2015). Moreover, a recent study is available that shows cross-Nordic comparisons of innovative Nordic public sectors (The Nordic Public Sector Innovation Hub 2019). It is important to consider both private and public sector innovations and to improve dialogue between the private and public sectors when further developing the Nordic model of smart specialisation. This is already on the horizon.

Smart specialisation in the Nordic regions deserves smart communication. The key concepts of smart specialisation need to be more clearly opened up for decision-makers and practitioners. The overall understanding and awareness of the key priorities of smart specialisation in Nordic regions needs to be raised. Regional cooperation and shared knowledge about good practice related to regional smart specialisation also need to be enhanced. As a concrete suggestion, the illustration by the Swedish Agency for Economic and Regional Growth of national smart specialisation priorities presented earlier in this chapter (see Figure 8.3) deserves to be expanded as an illustration of Nordic regions and their prioritised smart specialisation domains.

Finally, the international dimension of the smart specialisation concept is also worth further attention. The EU S3 platform provides excellent opportunities for the Nordic regions, including the possibility of International Peer Review processes to receive valuable feedback on smart specialisation plans from colleagues in other EU countries and regions, and for more possibilities on thematic networking at the international level.

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Chapter 9

THE BIOBASED CIRCULAR ECONOMY: employment and other outcomes

Authors: Karen Refsgaard, Michael Kull, Elin Slätmo, Bjørn Tore Erdal, Torfi Jóhannesson, Þór Sigfússon and Anna Lyng Thomsen

The bioeconomy is all-encompassing and comprises those parts of the economy that make responsible use of renewable biological resources from the land and water for the mutual benefit of business, society and nature (Nordic Council of Ministers, 2017). The bioeconomy is a central part of the circular economy, which aims to retain deployed resources in the economy for as long as possible, so reducing waste to a minimum and maximising local added value. It therefore offers the possibility of new and more environmentally friendly growth opportunities in all fields and requires the rethinking of value chains, ecosystems and business models (Annala & Teräs, 2017).

As the Nordic Region is very well endowed with bioresources relative to its population and future demand, the bioeconomy and the linked circular economy provide huge potential for future regional and local development

As the Nordic Region is very well endowed with bioresources relative to its population and future demand, the bioeconomy and the linked circular economy provide huge potential for future regional and local development. The transformation from a fossil fuel to bio-based and circular economy demands significant technical and institutional innovation (Bryden et al., 2017a; Bryden et al., 2017b). It promises reduced climate emissions, new jobs and skills, and economic growth in rural areas if the appropriate organisational structures are developed.

The transformation to a circular economy presents many and various institutional challenges, including those relating to property rights over resources and technologies, the focus of innovation, and the organisation of the necessarily cooperative flows and networks. There are implications for investments, for funding and pricing, for tracing and for statistics. While the "old" linear economy – also used in national statistics – defines supply and demand, the circular economy approach turns by-products into resources and requires the rethinking of value chains, ecosystems and business models.

In this chapter we focus on outcomes such as employment, added value and reductions in GHG-emissions, in order to understand how the bioeconomy contributes to economic and human progress across Nordic regions. Until now the dominant research and knowledge has focused on the resource approach – that is, the supply of different biomass products and services – while less emphasis has been put on the products and services produced from the bioresources and the difference in value these may have for the individual entrepreneur, for the circular economy cluster or for municipalities and regions. The attempt to combine data on employment from the different sectors included in the bioeconomy must nevertheless be regarded as a first step in building a more comprehensive overview of its regional impacts and potentials.

We have for the first time created pan-Nordic regional-level data on jobs in the bioeconomy, covering both traditional jobs within agriculture, forestry and fisheries and related processing activities, and new types of jobs, such as textiles, bioenergy and nature-based tourism

Measuring the bioeconomy

The bioeconomy is a complex mix of sectors and activities that are not at present easy to trace through standard statistical sources; compiling sectoral statistics will only provide a part of the data needed. Since our goal here is to understand the emerging role of the bioeconomy in regional and local economies, we are interested in interactions between the different elements (circularity and synergies). Such a need for more holistic monitoring and assessment frameworks is also expressed by the EU (European Commision, 2017). Several macro approaches may be taken to solving this problem, all of which are important:

- The resource approach: Where are the bio-resources produced, in what quantities, by whom?
- The value-added approach: Where does the addition of value take place, and by how much?
- The employment approach: Where are the jobs created, and how many are there?

For an overview of employment, we have for the first time created pan-Nordic regional-level data on jobs in the bioeconomy, covering both traditional jobs within agriculture, forestry and fisheries and related processing activities, and new types of jobs, such as textiles, bioenergy and nature-based tourism.[16] Further, we calculated employment changes in the bioeconomy between 2009 and 2017.

However, much more work is needed to understand and measure the complex interrelations as well as the environmental, social and economic impacts along the whole value chain in the circular bioeconomy. Case studies are very important in this work, and we present two examples of "local circular economies", each providing a variety of outcomes for the (local) economy, society and environment.

Employment in the bioeconomy sectors

For the purpose of this report the work with creating and harmonizing a common applied definition of the Nordic bioeconomy had its starting point and base material in the Norwegian definition of Bioeconomy in the report "*Value added in the Norwegian Bioeconomy*" (Norut, 2017). In several workshops a team of researchers and experts from mainly Nordregio and Nordic Council of Ministers compared the Norwegian definition to a Finnish definition developed by the Natural Resources Institute Finland (Luke, 2018) as well as to a Swedish definition made by Statistics Sweden (2018) in "*Bioekonomi – Utveckling av ny regional statistic*".

We know about most of the production and processing of primary products (from agriculture, fisheries, fish farming and forestry) and we also have knowledge about most waste materials, which can serve as a starting point. Regional data exist on related processing sectors like food manufacture, leather and leather products while beverages, textiles and services, buildings and landscape needed more investigation. Other sectors like tourism, R&D, public sector activities were also included fully or partially alongside with some ecosystem services.

Details of the methodology that was used to harmonise the data can be found in the online appendix. For Faroe Islands, Greenland and Iceland data is shown at national level, due to the absence of regional data.

[16] For a comprehensive overview and understanding of the definitions of all sectors included, see online appendix.

In the western regions of Denmark, the central and southern regions in Finland, Greenland and some mid and northern regions of Norway, over 22.5% of the working population is employed in the bioeconomy

In 2017, 2.4% of the working population was employed in the sectors of agriculture, forestry and fisheries (Figure 9.2) and 14.7% was employed in other bio-based jobs (Figure 9.3). Thus, 17.1% of the working population in the Nordic countries was employed in the bioeconomy (Figure 9.1). A report by Ronzon et al. (2017), concluded that 9.5% of the EU's working population in 2016 was employed in the bioeconomy. Comparing the EU to the Nordic situation, the definitions and assumptions differ (Ronzon et al., 2017 included fewer sectors in their quantification of jobs), especially when looking at the regional level. A comparison of figures 9.2 and 9.3 clearly shows that the majority of bio-based jobs were in sectors other than agriculture, forestry and fisheries.

Comparing regional-level data (Figure 9.1), we see that the share of jobs in the bioeconomy varies from below 15% to above 22.5%. For instance, in the western regions of Denmark, the central and southern regions in Finland, Greenland and some mid and northern regions of Norway, over 22.5% of the working population is employed in the bioeconomy. Looking at bioeconomy jobs, an overall higher proportion of jobs – up to 16% – are in new bioeconomy sectors outside the traditional sectors of agriculture, forestry and fisheries. The proportion is particularly high in mid-Norway, southern Finland, Denmark and the Faroe Islands. At the same time, most regions in mid-Norway, in all Finnish and some Danish regions witnessed negative development in jobs in the bioeconomy. In Greenland, Iceland, Faroe Islands, Sweden, Northern Norway and other parts of Denmark the situation is very different and the number of jobs in the bioeconomy has increased. These proportions should also be seen in relation to the increase in total total number of jobs[17] in most regions in the Nordic countries except for the Finnish regions and Åland where there is a decline in most regions.

Figure 9.2 shows employment in agriculture, forestry and fisheries. This ranges between below 2% to above 8%, with the highest proportion being in Greenland (23.5%). In the EU-28, the overall proportion of the total workforce with jobs in the NACE-A sectors is an average of 4.6% (Ronzon et al., 2017). Overall, the NACE-A sectors show a sharp decline in employment, particularly in Finland, Iceland and Norway (except northern Norway), where the decline was up to 20% between 2009 and 2017.

The non-NACE-A sectors have seen a more moderate decrease in Finland but a noticeable increase in most parts of Sweden, Denmark and the Faroe Islands and a remarkable increase in Iceland with more than 15% (Figure 9.3). The average increase in the Nordic Region is 4.3% in the non-NACE-A sectors. There are also notable differences within the countries, showing that regional differences matter. In Denmark, Greenland and the Faroe Islands there is a positive trend in most regions, but in Finland almost all regions are losing jobs in the primary industries. In Norway and Sweden some regions show positive development while others are in decline.

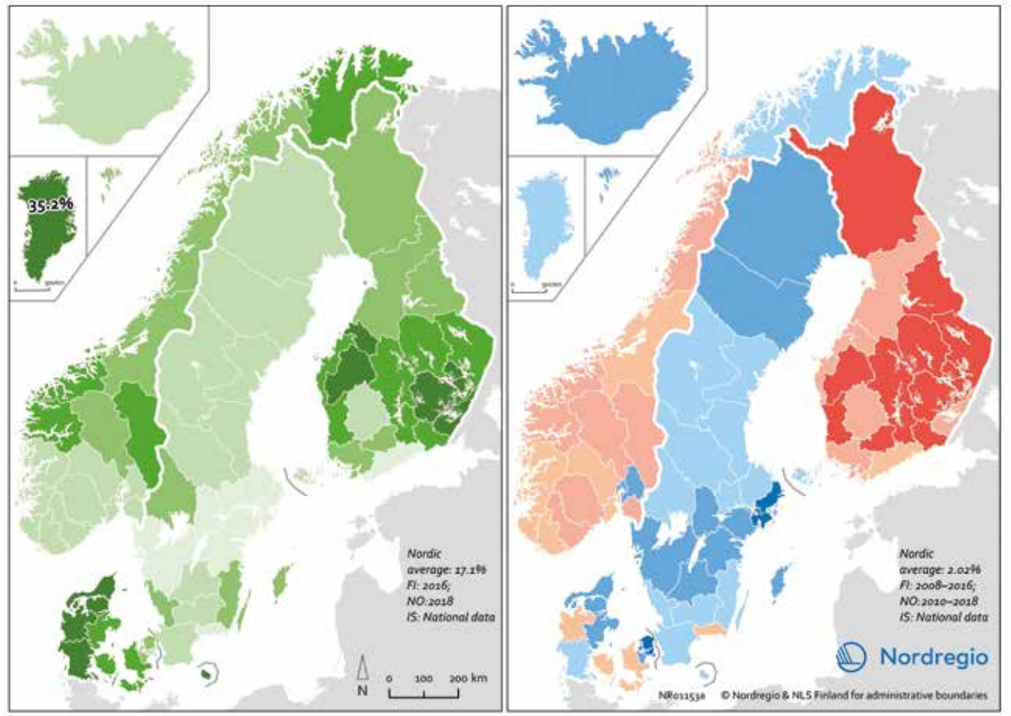
There are also notable gender differences between the two groups, at least in Denmark and Sweden, the only countries for which gender-specific data was available (see online appendix). In both countries the proportion of women in the NACE-A sectors is around 37–38% whereas the gender distribution in the non-NACE-A sectors is almost equal. There is no significant difference between regions or between 2009 and 2017, indicating that this is a systematic and stable distribution.

The contribution to the bioeconomy from biobased services

As indicated above, employment in the non-NACE-A sectors is increasing in the Nordic Region. Included in these sectors are service jobs that enable nature experiences and amenities in the Nordic forests, mountains and archipelagos. Over time, the value of these amenities has changed (Costanza et al., 2014). Traditionally, products and commodities from forestry, agriculture and fisheries were perceived as the main contributors to the economy. Although these are still important, both public demand for and political emphasis on natural and cultural heritage values and outdoor recreation in rural areas have increased (e.g. Brandt, 2003; Slätmo, 2019). There is potential to maintain and further develop such bio-based services, providing added value, jobs and other social outcomes for the regions providing them, as well as for those people enjoying them. This includes jobs related to hunting, and to hiking and skiing in national parks and other nature-based tourist destinations.

Currently, we do not have precise data of the value creation and jobs that stem from bio-based services in the Nordic countries. For example, hunting contributes to the sustainable management of wildlife resources and creates value through licences, hunting equipment and services to hunters, in addition to its historical and cultural aspects. Norway reports that gross income from the hunting sector is around NOK 2 billion but this could be increased to NOK 3 billion in 10 years, with the potential to increase gross income from hunting small wild animals

Figure 9.1 People employed in the bioeconomy including NACE sector A, 2017 and 2009-2017 change.



[17] For details see maps https://www.nordregio.org/wp-content/uploads/2018/03/Employment-rate-2009-2016.png and https://www.nordregio.org/maps/relative-local-employment-effect-2008-2016/

Figure 9.2 People employed in the agriculture, forestry and fisheries sector (NACE Sector A) 2017 and 2009-2017 change.

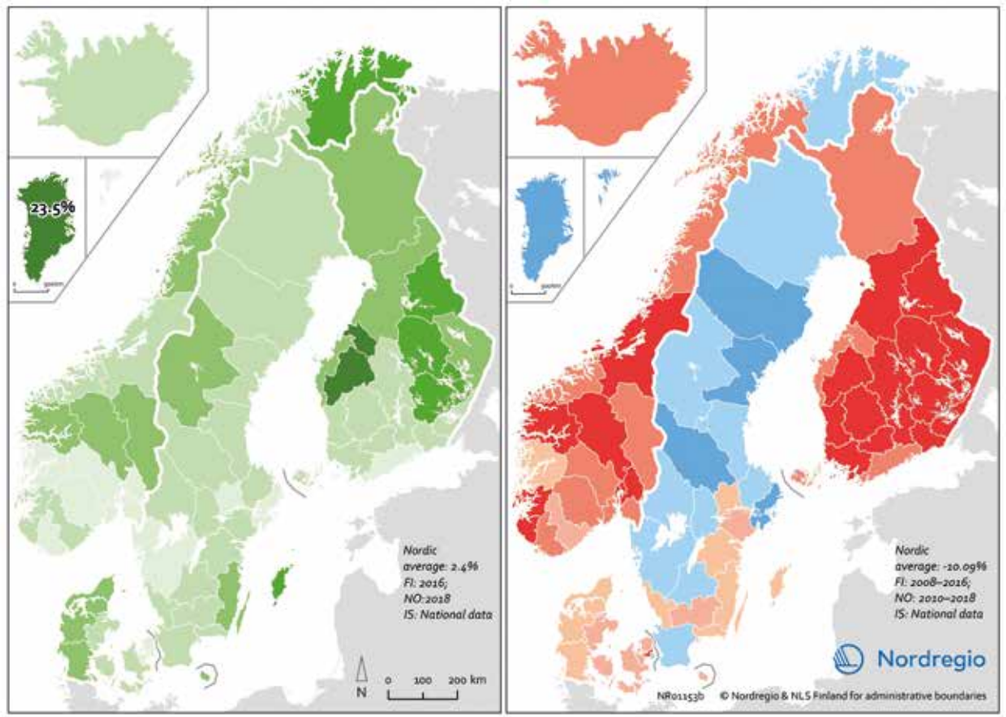
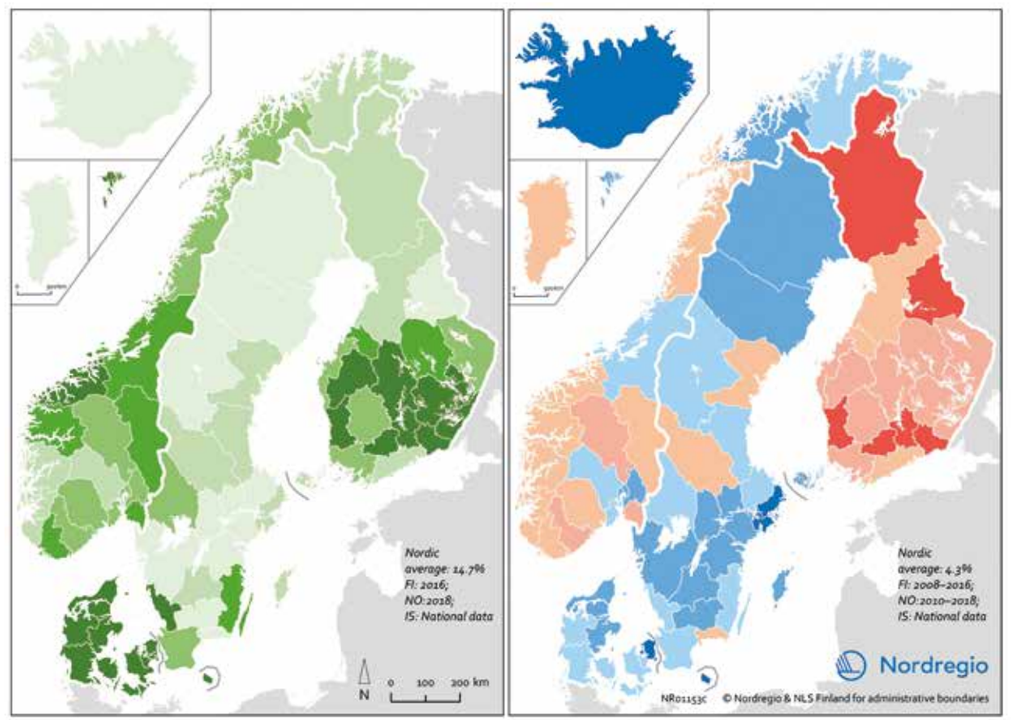


Figure 9.3 People employed in the bioeconomy, excluding NACE sector A 2017 and 2009-2017 change.



by 40% and from deer hunting by 100% (Andersen and Dervo, 2019).

Hunting is still dominated by men, although statistics reveal that interest among women is growing quickly in at least some of the Nordic countries.[18] This may indicate a further democratisation of hunting as well as an engagement with hunting as an extension of outdoor life and recreation.

Case studies of bioeconomy clusters

Individual sectoral statistics can only tell part of the story of the circular bioeconomy, which seems to be at its most effective in complex clusters of different firms and municipal services such as waste management and district heating. Essentially, these clusters sell and buy one another's by-products, including products formerly regarded as disposable waste. In this way, they all conserve raw material resource inputs, replace non-bio-based resource inputs, and develop new joint products including energy. Normal statistical sources do not capture such interactions, resource savings, CO_2 emission reductions and so on. For this reason, case studies of such emerging clusters are very important in elaborating our understanding of the "new" bioeconomy as it develops.

GreenLab Skive – A circular economy case

The story: GreenLab[19] Skive in Denmark, is an example of a circular economy cluster, with renewables and bioenergy being the common element for the businesses involved. It began as an initiative in the municipality of Skive, by a team dedicated to development around energy related themes. With an agreed vision, the development was moved to a local business foundation, which acted as the driver and facilitator of the development and formed partnerships around GreenLab. Finally, a business unit was created to drive GreenLab's further operations. The birth and development of GreenLab is a

[18] In fact, Norwegian figures show that the number of female hunters has increased significantly. From 2014/2015 to 2018/2019 the number of registered female hunters increased by 22.1% whereas for men the increase was only 5.6% (Statistics Norway, 2019). In Denmark, the year 2019 showed the largest proportion of female hunters ever recorded.

[19] http://www.greenlab.dk/

useful learning case for other initiatives: start small and quickly build strong partnerships between public and private entities. The aim of GreenLab is to reconstruct sustainable production for a greener future, requiring all levels of cooperation from local to EU levels and the private and the public sectors, with a belief in cohesive communities having a positive impact on society, community and human beings.

The grid: GreenLab is a full-scale, sustainable, industrial energy park where wind, solar and bio-gas energy are combined in an industrial mini-grid providing 80 MW of green energy direct to sustainable production, while the platform exchanges waste energy from one site to the next for optimum green energy use at the lowest possible cost. GreenLab is currently building a large-scale electrolysis production facility to provide green H_2 and O_2 for industrial processes and electrofuels. The focus is simultaneously on the bioeconomy as an essential part of the business model for GreenLab and the expansion of the biomass value chain, with input from land and sea, nutrients and protein extraction, and bio-gas production.

The loops and processes include blue biomass, where starfish, an invasive species in the Limfjord, are processed into organic feedstuff for pigs and poultry. High quality synthetic fuels and chemical products are also produced from non-recyclable waste – up to 60 metric tonnes of plastic waste per day – giving production a greener footprint, as well as converting plastic into 15 million litres of high-quality synthetic fuels annually while reducing carbon emissions by up to 66%, compared to conventional diesel production.

Stakeholders: The public-private consortium involves both local and global private companies such as Danish Marine Protein, Biomass Protein, Deif to E.ON and Siemens Gamesa. The public partners include Skive Water, Skive Municipality, Nomi4s (resource and waste handling) and the utility company Norlys. Academic partners include several Danish universities as well as global partners and other parks with a shared vision of sustainable production and energy exchange.

The strengths and vision include the partnership and cultural approach established in the consortium, and the combined focus on the bioeconomy and PtX,[20] which in combination enable the business model of GreenLab. The vision proves that green transition is not only a feasible but also a profitable solution.

The strengths and vision include the partnership and cultural approach established in the consortium, and the combined focus on the bioeconomy and PtX, which in combination enable the business model of GreenLab

Outcomes: The development has been rapid; real companies are in operation and a positive spiral has started, with an impact at all levels from local to global:

- Investments of approximately DKK 1.1 billion at the end of 2020.
- Job growth and development in the Skive region, with an estimated 70 permanent jobs in 2020 and added business tourism of about 2,000 business tourists.
- International attention from Mexico, China, Japan and Gabon, and interest in system exports.
- Indicated CO_2 reduction of 89,000 tons (new calculations in energy consumption).
- Accelerator for the commercialisation of new technologies.

Policy learnings: Being a first-mover brings several challenges, including a desire to change the system while working within it. This is solved through dialogue between all levels, the human approach to bringing a new paradigm into existence and having the courage to stand by it. Policy instruments are needed that allow for a more procedural approach, drawing on open innovation and entrepreneurial methodology even when working in a full-scale technical business environment. Building policy, including allowing rural and local entities to have equal influence and commitment in collaboration with the regional, national and EU levels. Creating cross-sectorial policies to transform into new sustainable business models.

[20] Power to X, covering the transmission to electricity of renewable energy (e.g. solar or wind) to X (a product which can be stored, e.g. hydrogen or ammonia).

The Iceland Ocean Cluster – seafood companies and communities joining the 100% utilisation movement

The story: The Icelandic Ocean Cluster originates from a research project at the University of Iceland which found that entrepreneurs in other industries formed diffuse networks with a larger number of contacts than those in the seafood sector (Sigfusson, 2019). A cluster was established in 2011 in order to give seafood entrepreneurs more opportunities to connect with a larger network with broad background. From 2012 the Icelandic Ocean Cluster House has become an important part of "the new seafood industry", and the cluster sees itself as a catalyst for change in the Icelandic seafood sector. Academics have emphasised the importance of better utilisation of fish since the 1990s. The goal of full utilisation came about through a grassroot movement led by cluster members and supported by the media and the general public.

The grid: The Iceland Ocean Cluster's 100 % Fish Project aims to inspire both industry and communities to make the most of each fish, cut waste, increase the value of each landed fish, and increase business opportunities and employment.[21] Through support to start-up companies, the cluster and its partners, is now witnessing a significant number of new startups and businesses underway within the seafood sector, from foodstuffs to fabrics and pharmaceuticals.

The processes: The organisation hosts specific industry groups but also brings in new services and entrepreneurs to strengthen the existing industry, e.g. from seafood industries connected with start-up companies within IT, social media marketing and product design. The office premises are used for creating networks, providing insight into dynamic start-ups and making it financially easier for start-ups to enter the cluster.

Stakeholders: Within the Ocean Cluster House in Reykjavik you will find individuals and companies with different resources linked to the ocean; fishermen, seafood processing technicians, marine biologists, marketing and sales people, product designers, inventors, social media specialists, biochemists, etc. Today the cluster house has 70 companies representing most parts of the ocean value chain in Iceland from fisheries to seafood biotech companies. In addition, the cluster has 65 member companies which do not have space in the cluster house.

According to the Icelandic Ocean Cluster, the main reason for success lies in "cross-pollination" where companies collaborate with another partner in the cluster

Outcomes: Today, the seafood sector in Iceland makes use of more than 80% of every fish, a higher percentage than most fisheries nations and over the past 25 years the use of by-products in the Icelandic seafood sector has increased by around 3,000%. This has resulted in an annual value of around US$ 500 million and around 600–700 direct jobs, many of them in rural communities and coastal towns.

Strengths, challenges and future vision: According to the Icelandic Ocean Cluster, the main reason for success lies in "cross-pollination" where companies collaborate with another partner in the cluster. Further technological innovations such as more energy efficient vessels, AI in food processing and blockchain in the whole seafood value line also contribute to a more competitive seafood industry in the future. Combined with increasing demand for more sustainable food, materials and other products a new era with development of new products and new and interesting jobs will be created for the next generation of seafood industry employees in rural and coastal communities.

Concluding remarks

This chapter represents the beginning of a more comprehensive assessment of the regional economy, and the social and environmental impact of the new, extended bioeconomy, which is seen as an important contributor to more environmentally and socially sustainable economic growth. The

[21] http://www.sjavarklasinn.is/en/wp-content/uploads/2018/05/100-percent-fish-utilization.pdf

case studies are very important in illuminating such wider impacts.

The newly developing bio- and circular economy has experienced growth in employment of 5-15% or more in many Nordic regions, especially in Iceland, Denmark and Sweden. It is not only products but also services that contribute to the quality of life of citizens. Some indicators of this include the reduction in CO_2 emissions, as shown in the case studies, and the re-use of former waste by-products, as well as the outdoor life aspects indicated by the increase in hunting and outdoor activities. The traditional agriculture, forestry and fisheries sectors are still very important for this development as they provide the key inputs to the new processes, products and services – although employment is still decreasing.

GreenLab, Denmark, is an example of a circular economy cluster with renewables and bioenergy being the basic common infrastructure of the businesses involved. The reason for its success is very much related to the human factor, the history of trust and entrepreneurial trial and error. The cluster focuses on dialogue between all levels, the human approach in bringing a new paradigm into existence and having the courage to stand by it. The Iceland Ocean Cluster is another example of a circular economy with "cross-pollination" where collaboration between companies in the cluster is seen as the main reason for success in improved utilsation of the whole value chain for fish.

The data and cases show the importance of the regional and local levels in creating the new institutional structures for cooperation between firms and public authorities that pave the way for successful synergistic clusters. Such clusters allow for a reduction in waste streams and the replacement of fossil fuels and other inputs, while also creating significant local added value and reducing climate emissions. National, regional and local policy instruments are needed, both to encourage such institutional structures and to ensure that the economic benefits of these developments are shared fairly.

The data and cases show the importance of the regional and local levels in creating the new institutional structures for cooperation between firms and public authorities that pave the way for successful synergistic clusters

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PHOTO: UNSPLASH.COM

THEME 4

BEYOND GDP

The Nordic Region beyond socio-economic indicators

As well as focusing on demography, the economy and the labour force, State of the Nordic Region also includes two focus chapters covering key themes on the Nordic agenda. This year, the report focuses on two main components of the "beyond GDP" concept: wellbeing and energy pathways toward carbon neutrality. Both of these components are in line with the Nordic Prime Ministers' new vision for Nordic cooperation: to make the Nordic Region the most sustainable and integrated region in the world by 2030. Despite a strong track record on sustainability and wellbeing, studies of the Nordic Region have highlighted certain issues. The next two chapters, therefore, focus on the significant challenges faced as well as the important opportunities presented.

The concept of "beyond GDP" has emerged as a critique of the traditional tendency to rely (solely) on economic indicators to measure national and regional development. In recent decades, several new indices have added environmental impact and wellbeing to economic performance indicators and started to quantify correlations between these three themes. In practice, this makes assessing the beyond GDP concept inherently complex. For example, the OECD Better Life Initiative looks at more than 50 indicators along with 11 dimensions of material living conditions and quality of life.

State of the Nordic Region report approaches wellbeing via education: a high level of education indicates longer life expectancy. Despite high and increasing life expectancy in the Nordic Region, there are important regional and gender differences that define wellbeing within the Nordic countries. There are also significant regional and gender differences in terms of education, and these may act as obstacles to the future wellbeing of citizens and regions.

The Nordic countries all have ambitious targets for cutting carbon emissions, but it is far from certain that they will be reached. Key areas that require attention include innovation-based interventions in the industry, transport and construction sectors. The countries also need to fully acknowledge the importance of total emissions, i.e. not only the amount of greenhouse gas emissions produced but also the amount consumed by imported goods and services. While green technology will be an important driver towards carbon neutrality, the Nordic Region is focusing more and more on consumption patterns, behavioural norms and the wider global impacts of growth.

Chapter 10

WELLBEING IN THE NORDIC REGION

Authors: Anna Lundgren and Alex Cuadrado
Maps and data: Eeva Turunen and Timothy Heleniak

In international rankings of human development, wellbeing and quality of life, the Nordic countries tend to score very well. The European Quality of Life Survey (2016), the OECD Better Life Index (2017) and OECD Health at Glance (2018) show that the Nordic countries are top performers in terms of wellbeing and quality of life, and the World Happiness Report[22] shows that the Nordic countries are performing at the top with Finland in first place, followed by Denmark in second, Norway in third, Iceland in fourth and Sweden in seventh (Helliwell, Layard & Sachs, 2019). In order to assess human progress and development, the UN Development Programme (UNDP) has been using the Human Development Index (HDI) since 1990 (Figure 10.1). This index focuses on three dimensions; life expectancy at birth; knowledge measured by years of schooling; and a decent standard of living measured by gross national income per capita.

To illustrate wellbeing in the Nordic Region, we have chosen two main indicators: life expectancy at birth and education. The economic performance and household economy are described in Chapter 7. Socio-economic factors, of which education is one, influence not only the inhabitants' possibilities to have long and healthy lives (Luy, Zannella, Wegner-Siegmundt, Minagawa, Lutz & Caselli, 2019; Östergren, Lundberg, Artnik, Bopp, Borrell, Kalediene, Leinsalu, Martikainen, Regidor, Rodríguez-Sanz, de Gelder & Mackenbach, 2017; OECD/EU, 2018) but also the potential to pursue and fulfil their dreams. This is in line with Stiglitz, Sen & Fitoussi, 2009, who distinguish between current wellbeing and sustainability, in other words whether the current situation will last over time. In this chapter we will illustrate these indicators from regional and gender perspectives and discuss how life expectancy and tertiary education relate to wellbeing and welfare in the Nordic Region.

Despite increasing life expectancy, there are still inequalities not only from a gender perspective but also from a regional perspective

Wellbeing and life expectancy

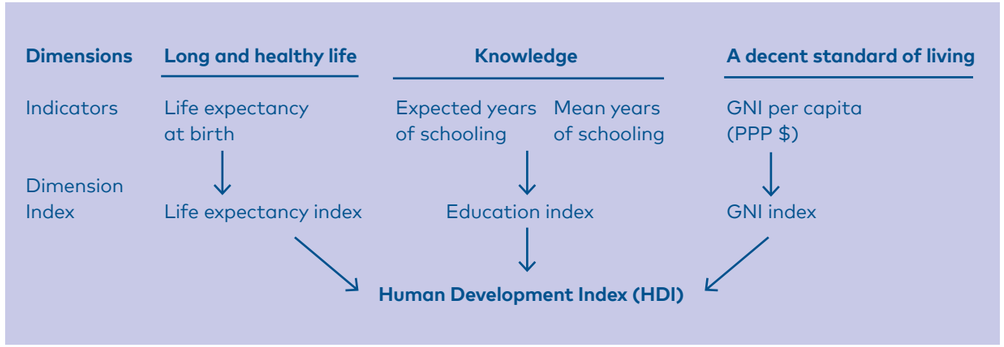
Over the past decades, life expectancy has steadily increased in the EU-countries and it now exceeds 80 years in two-thirds of EU countries (OECD/EU, 2018). Due to a slower rate in the reduction of deaths caused by circulatory systems diseases (e.g. stroke, coronary artery disease), however, the trend towards increasing life expectancy in many countries has slowed down. From a gender perspective, women in Europe live on average nearly 5½ years longer than men. The gender gap is narrowing, and the remaining gaps are mainly explained by unhealthy lifestyles that may result in circulatory systems diseases, cancer, diabetes etc (OECD/EU, 2018). Despite increasing life expectancy, there are still large inequalities not only from a gender perspective but also based on socio-economic status. For example, the life expectancy of a 30-year-old man with less than upper secondary education is eight years lower than that of those with tertiary education (university or equivalent) (OECD/EU, 2018).

Life expectancy at birth in the Nordic Region has increased for both women and men since 1990; however, it has increased more for men than women (Figures 10.2 and 10.3). In recent years the pace of increase has slowed, and the gender gap is narrowing. Åland and the Faroe Islands follow the Nordic pattern of high levels of life expectancy at birth. In Greenland life expectancy at birth is increasing from considerably lower level due to being less economically developed.

The maps in Figure 10.4 illustrate that life expectancy differences between men and women are found across the Nordic countries and regions. The highest life expectancy at birth for women, 85.2 years, is found in Österbotten (Finland) and in Sogn og Fjordane (Norway). For men it is 81.6 years, in Kronoberg (Sweden). The lowest average life expectancy is found in Greenland, 70.7 years, and in Finnmark (Norway), 79.8 years. Many of the predominantly urban regions, as well as the intermediate regions and university regions (see introduction chapter for urban-rural typology), have higher levels of life expectancy, but there are also several predominantly rural regions where people live long lives. Explanations for this are likely to be found in the complex interrelations between economic standards of living, health, education and other structural factors influencing wellbeing.

Good health is an important predictor of life expectancy and has strong implications for wellbeing. More than 80% of all deaths in the EU occur after age 65 and the main cause is circulatory diseases. Cancer is the main cause of death for those aged below 65 (OECD/EU, 2018). To measure the potential for living a long and healthy life, Healthy Life Years (HLY) measures the number of years spent free of long-term limitation on activity. The Nordic countries score slightly better at age 65 compared to the EU average (OECD/EU, 2018). When reporting perceived health status as "good" or "very good", all the Nordic countries perform better than the OECD average of 68.7%.[23] However, there are also important differences among the Nordic countries, ranging from Finland (69.8%) to Sweden (79.7%) and Denmark, Iceland and Norway coming in between (71.6%, 76.3% and 78.3% respectively) (OECD, 2017).

Figure 10.1 Human Development Index (HDI).

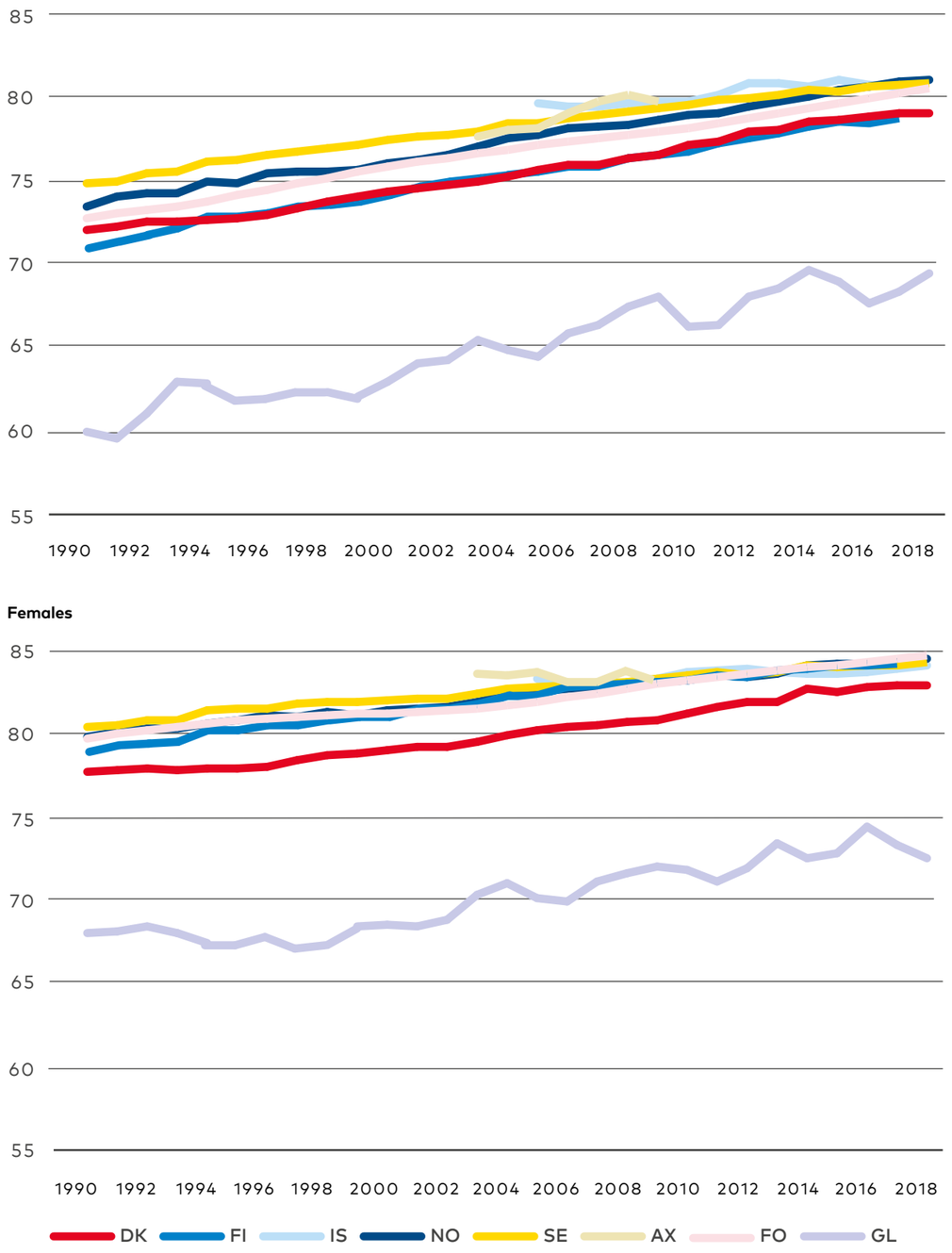


Source: http://hdr.undp.org/en/content/human-development-index-hdi

[22] World Happiness Report (Helliwell et al., 2019) is based on indicators such as GDP per capita and life expectancy at birth, but also on Gallup World poll questions about social support, freedom to make life choices, generosity, perceptions of corruption and dystopia.

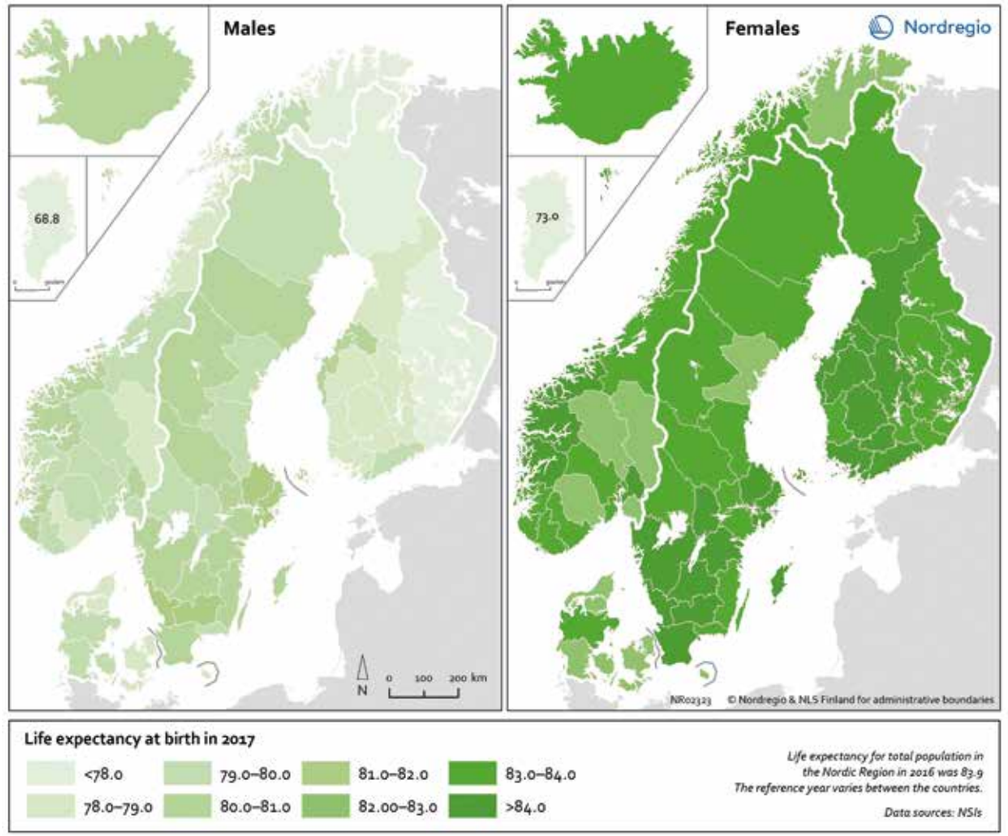
[23] Percentage of adults 2015 or latest available.

Figures 10.2 and 10.3 Life expectancy at birth for males and females 1990–2018.



Data sources: National statistical offices.

Figure 10.4 Life expectancy at birth for males and females 2017.



Good mental health[24] is a critical part of individual wellbeing and has received increased attention in recent years. Compared to the European average of 17.3% having mental health problems,[25] Denmark and Iceland report a lower percentage at 16.9% and 16.7% respectively, whereas Finland, Sweden and Norway report a higher rate than the EU average with 18.8%, 18.3% and 18.5% respectively. Although these figures should be interpreted carefully, they point to an important problem (OECD, 2017). Finally, socio-economic inequalities influence health and life expectancy; for example, people with lower secondary education are almost twice as likely to report chronic depression than people with higher education (OECD, 2017).

Wellbeing and education

Education is a frequently used indicator for socio-economic inequality (OECD, 2017) and is also related to and a driver of life expectancy (Luy et al., 2019; Östergren et al., 2017). When measuring the gap in life expectancy between people at age

[24] The definition of mental health draws on OECD/EU 2018 using the WHO definition of positive mental health, which states that "mental health is a state of wellbeing in which the individual realises his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community" (WHO, 2001).
[25] Anxiety disorders, bipolar disorders and schizophrenia, depressive disorders, alcohol and drug use disorders or others.

High female labour force participation, a large public sector and the public provision of childcare, are related to a higher probability of women holding a tertiary degree

30 with the lowest and highest levels of education,[26] the Nordic countries were performing slightly below the European average difference of 4.1 years for women and 7.7 years for men, with Sweden performing lowest at 2.9 years for women and 4.1 years for men (OECD/EU, 2018). Recent research in Sweden has found that, between 2010 and 2016, life expectancy increased for individuals with upper or post-secondary education while it remained unchanged for those with pre-upper secondary education (Makenzius, Skoog-Garås, Lindqvist, Forslund & Tegnell, 2019).

In Norway, a register-based study over the period 1961–2009 showed that the gap in life expectancy between primary, secondary and tertiary educated individuals had widened. For example, inequalities between the tertiary and primary educational categories increased, from 1.9 years for men and 1.5 years for women in 1961 to 6.2 years for men and 4.7 years from women in 2009 (Steingrímsdóttir, Næss, Moe, Grøholt, Thelle, Strand, & Bævre, 2012). Similar results using the same methods have been found in Denmark; during the period 1987–2011 life expectancy for men with secondary education at age 30 increased by 7.7%, whereas for men with tertiary education at age 30 it increased by 10.3% (Brønnum-Hansen & Baadsgaard, 2012). Although the increase in life expectancy for women was lower than for men, the unequal educational patterns were replicated (Brønnum-Hansen & Baadsgaard, 2012). Research in Finland points to similar results when using both education levels and income as independent variables (Tarkiainen, Martikainen, Laaksonen & Valkonen, 2012; Valkonen & Martikainen, 2006).

But how does education impact life expectancy? Swedish researchers acknowledge the mediating role of education in both employment outcomes and social capital, and advance a link with health behaviour (Brännlund, Hammarström, & Strandh, 2013). While higher levels of education are related to higher incomes, better working conditions or more labour market stability (factors contributing to improved health), higher levels of education are also related to higher feelings of being valued by an individual's networks, which also influences health in a positive manner (Brännlund et al., 2013). The relationship between education and health behaviour (e.g. consumption of alcohol, tobacco, snuff and physical activity) was found to be positive, i.e. higher levels of education were related to lower risks of unhealthy behaviour. This relation was found to be stronger among men than women (Brännlund et al., 2013). Research carried out in Denmark identified educational inequalities in smoking and alcohol consumption, which are the main reason for social inequalities in mortality and important factors in life expectancy (Koch, Diderichsen, Grønbæk, & Juel, 2015). Because lower educated people engage in unhealthy behaviour more often, Denmark "...would gain the largest reduction in life expectancy differences if the lowest educational group adopted the risk factor distribution of the highest educated..." (Koch et al. 2015, p. 8).

In the Nordic countries the educational level is high. Attainment of at least an upper secondary education for the adult population in all Nordic countries exceeds the average in OECD (Table 10.1) and in Finland it is as high as 87.9 %.

Tertiary education in the Nordic countries is also high and is well above the EU average. It has successively increased from around 33% in Finland, 25% in Norway and Denmark, and 20% in Sweden at the beginning of the 1990s, to 40–45% 20 years later (30-year-olds participating or completing higher education). Free tuition and generous financial support have had an impact, although policies to attract students from less privileged socio-economic backgrounds have been less successful in Denmark and Sweden than in Norway and Finland (Thomsen, Bertilsson, Dalberg, Hedman & Helland, 2017).

Despite overall high levels of tertiary education in the Nordic countries, the maps in Figures 10.5 and 10.6 show that individuals with higher education are unevenly dispersed across the Nordic countries, and that there is a large difference between men and women. The gender differences between the Nordic

[26] 2016 or nearest year.

Table 10.1 Educational attainment with at least an upper secondary education.

	Percentage of people aged 25–64 with at least an upper secondary education (2016 or later)
Iceland	78.0
Norway	82.2
Denmark	80.7
Finland	87.9
Sweden	82.7
OECD average	67.1

Data source: OECD Better Life Index (2017).

regions and municipalities is striking, and perhaps most striking is the overall picture of women being more educated than men. In most Western countries, enrolment in higher education has shifted; prior to the 1990s, men enrolled in higher education more often than women. This shift has been labelled as the reversal of gender inequalities in education (Borgonovi, Ferrara & Maghnouj, 2018; Van Bavel, Schwartz & Esteve, 2018; Vincent-Lancrin, 2008). Nordic characteristics, such as high female labour force participation, a large public sector and the public provision of childcare, are related to a higher probability of women holding a tertiary degree (Wise & Fulge, 2015). This has not yet resulted in equal pay, however, and gender pay gaps are diminishing only at a slow pace (Nordic Council of Ministers, 2018b). In addition, academic performance is negatively impacted by grade repetition and early school leaving, which is more common among boys (Cederberg & Hartsmar, 2013; Markussen, Frøseth & Sandberg, 2011).

Not surprisingly, most people with higher education live in predominantly urban and university regions. The explanations for this can be found in the economic geography of these regions, which are comprised of universities and knowledge-intensive companies attracting research and high skilled labour. But there are also predominantly rural regions that have a large proportion of highly educated people, especially women. This is most likely explained by a large public sector. Regional differences may also be explained by migration, whereby especially young people move to pursue higher education (Helland & Heggen, 2018; Pedersen & Gram, 2018). For example, in Denmark, academically successful young people in rural areas consider higher education as the main motive for migrating to the city (Pedersen et al., 2018). From a gender perspective, women are more prone than men to pursue tertiary education and move from peripheral areas (Faber, Nielsen & Bennike, 2015). This is also in line with literature suggesting that urban areas are more attractive to highly educated people because they offer better employment prospects and better services and amenities (Hanssen & Mathisen, 2017).

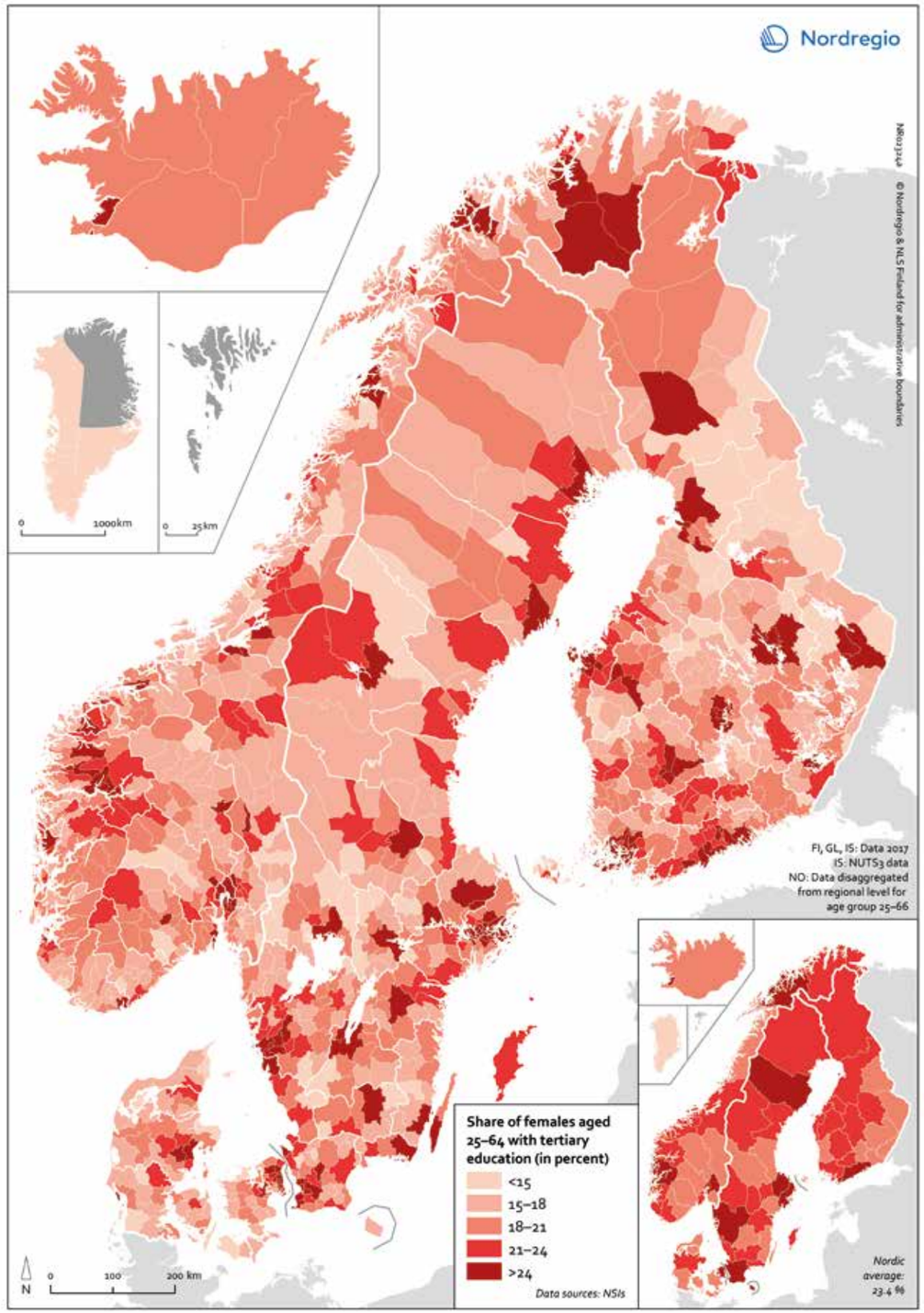
Education is a frequently used indicator for socio-economic inequality and is also related to and a driver of life expectancy

From a regional development perspective, it is important to note that Nordic regions that have a population with high education and skills contribute to a large extent to regional economic growth (GDP) and household income (see Chapter 7), as well as to innovation, smart specialisation and long-term economic performance (Chapter 8).

Concluding remarks

Despite happiness and high levels of life expectancy and education, this chapter shows important regional disparities, gender inequalities and socio-economic differences within the Nordic Region. As discussed, education has an important role not only for health and life expectancy, but also for individuals' opportunities and future wellbeing, and for the development of the regions in which they live.

Figures 10.5 Females with tertiary education 2018.



Figures 10.6 Males with tertiary education 2018.

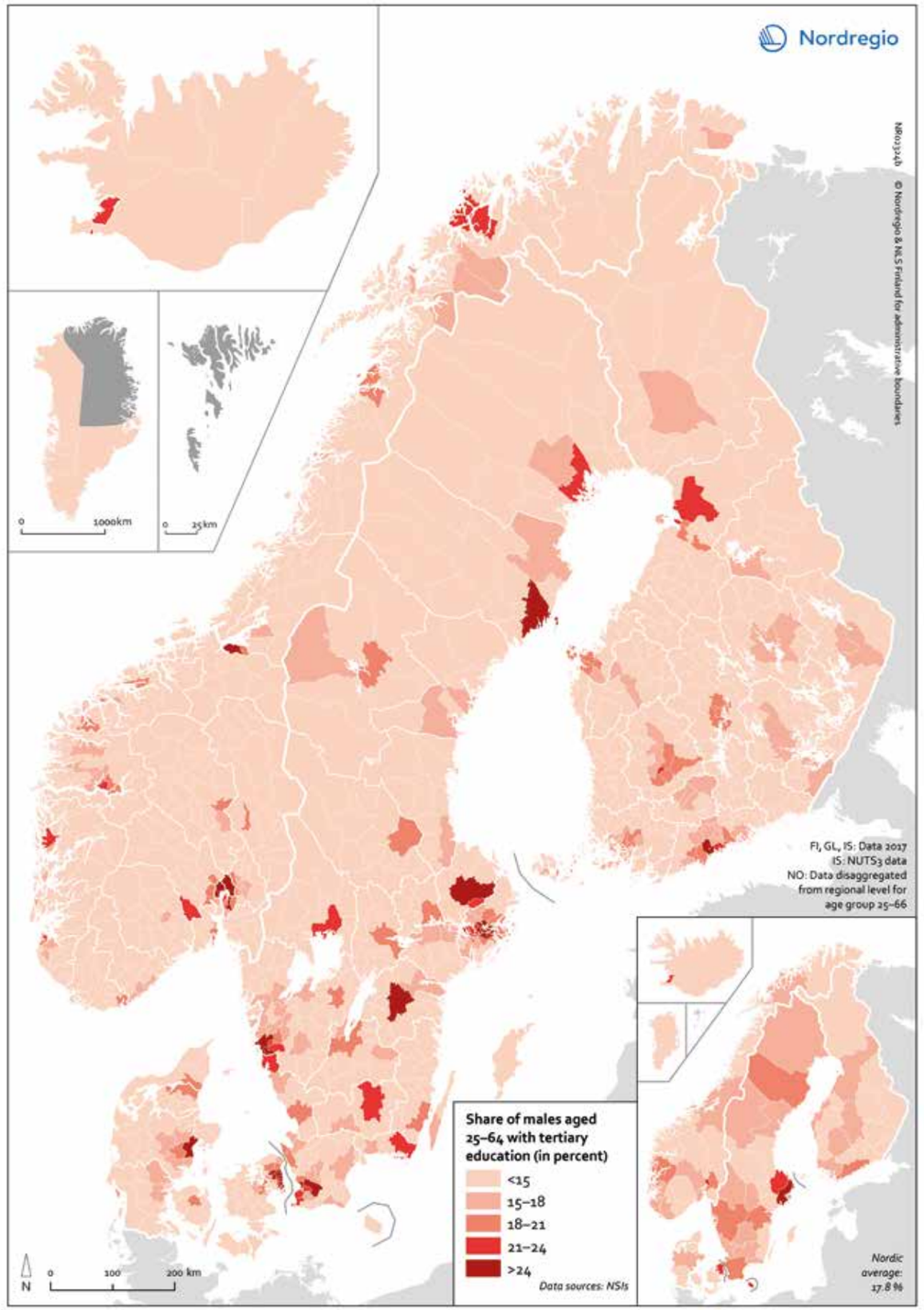


Table 10.2 Social capital in the Nordic Region.

	Voter turnout Percentage of votes cast among the population registered to vote*	**Social support** Percentage of people who have friends or relatives that they can turn to in times of trouble*	**Prosocial behaviour** Donating to charity within the last month**	**Prosocial behaviour** Volunteering within the last month**
Iceland	79.2	98.3	67.3	26.8
Norway	78.2	94.1	60.3	32.1
Denmark	85.9	95.3	60.3	22.4
Finland	68.9	94.6	43.3	28.7
Sweden	85.8	91.8	57.0	13.5
Average	68.6	88.6	29.2	19.7

* Data based on OECD Better Life initiative, 2017. Average reflect OECD average.
** Data based on World Happiness Report, 2019. Percentage of respondents (Gallup World Poll averaged across 2009-2017) within each country who reported donating to charity or volunteering within the last month. Average reflect average of 156 countries
Data sources: OECD Better Life initiative, 2017 and World Happiness Report, 2019.

The Nordic welfare model is envisaged as a strong contributor to wellbeing and "the good life" through institutions and the provision, for example, of social security and free education, along with welfare policies targeting equality, such as parental leave schemes and childcare services (Nordic Council of Ministers, 2018a). The principles of universality and inclusivity are frequently referred to as cornerstones of the Nordic welfare model and conducive to social cohesion in the Nordic countries. On indicators of social capital, such as voter turnout, social support and pro-social behaviour (Table 10.2), the Nordic countries perform well (OECD, 2017; Helliwell et al., 2019).

Also, the high level of social trust, which is a frequently used indicator for social capital on an aggregated level (Halpern, 2005), support wellbeing and social cohesion. This is an important element of wellbeing in the Nordic welfare societies (Nordic Council of Ministers, 2017).

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Chapter 11

ENERGY PATHWAYS TOWARDS A CARBON NEUTRAL NORDIC REGION

Authors: Ryan Weber and Svend Søyland
Maps and data: Eeva Turunen and Kevin Johnsen

This chapter has been written by Nordregio and Nordic Energy Research. Updated indicators from the 2016 Nordic Energy Technology Perspectives (NETP 2016) – a collaborative effort by Nordic Energy Research, the International Energy Agency and a consortium of leading Nordic research institutes – have been central to the content in the pages to follow. In addition, a new publication; Tracking Nordic Clean Energy Progress has informed this chapter. For further information, see https://www.nordicenergy.org

While global policy leadership is important, the ambitions of the Nordic countries need to be positioned in the context of current climate performance

In 2016, EU and Nordic climate leadership contributed to the Paris Agreement, which established a global long-term goal to significantly reduce the global risks and effects of climate change. However, current international pledges and climate targets are not sufficient to meet the 1.5 °C target set by the Paris Agreement. In response, the EU is working to ratify a long-term vision for a climate neutral economy by 2050. The Nordic Region is also seeking to maintain its global policy leadership, which is reflected in the new vision for the Nordic Council of Ministers as well as the Nordic Prime Ministers' Declaration on Carbon Neutrality, which was signed in January 2019. It serves to provide a unified Nordic position to the EU and global community, stating that the Nordic Region is prepared to immediately ramp-up its climate change ambitions (Nordic Prime Ministers, 2019).

While global policy leadership is important, the ambitions of the Nordic countries need to be positioned in the context of current climate performance. Through the clarity of statistical evidence, the next section sets the stage by presenting key greenhouse gas emissions and energy supply indicators. This precedes a presentation of the headline energy and climate policy targets in the Nordic Region, leading to an analytical discussion on the most crucial energy demand sectors requiring attention: transport, industry and buildings. The conclusion highlights the most important steps that will move the Nordic countries along the pathway to a carbon neutral future.

Nordic emissions and energy supply trends

Figure 11.1 shows annual territorial greenhouse gas (GHG) emissions[27] between 1990 and 2017. Emissions have increased in Norway and Iceland but the macro trend in Denmark, Finland and Sweden has been in the opposite direction, with the pace of the reductions increasing since 2007.

For Norway and Iceland, the results show the significant impact that transport and energy intensive industries (e.g. the oil and gas industry in Norway and the smelting industry in Iceland) continue to have on total GHG emissions. As such, balancing the goals of a competitive economy through natural resource extraction and industrial processes while also seeking to achieve carbon neutrality presents a significant challenge for the Nordic economy. At the same time, Iceland's GHG emissions profile highlights just one aspect of the inherent complexity of climate mitigation in a global perspective. In fact, a less negative view of higher Icelandic GHG emissions points out that low-carbon energy inputs serving Iceland's industry are offsetting carbon-intensive processes elsewhere in the world.

While the data above is typical of the figures used in climate accounting (e.g. by the UNFCCC), it is more interesting (from a global and long-term perspective) to consider what is missing from Figure 11.1. First, the Nordic GHG emissions footprint is considerably higher when including consumption emissions, which include embodied emissions in goods and services that have been produced internationally but are consumed domestically. For example, based on statistics provided by the Global Carbon Project (Updated from Peters et al., 2011), territorial CO_2 emissions only equate to 59% of the total CO_2 emissions consumed in Sweden in 2016. This compares to Denmark (66%), Finland (66%), Norway (90%) and the EU average (84%). While the relatively high ratio in Norway is the result of high process-related CO_2 emissions in the oil and gas sector, the results for each country highlights that the true carbon footprint of the Nordic Region is much higher than the figures that are often reported, including those which are often used to promote policy on carbon neutrality.

[27] Territorial GHG emissions are those emissions produced within a geographical area.

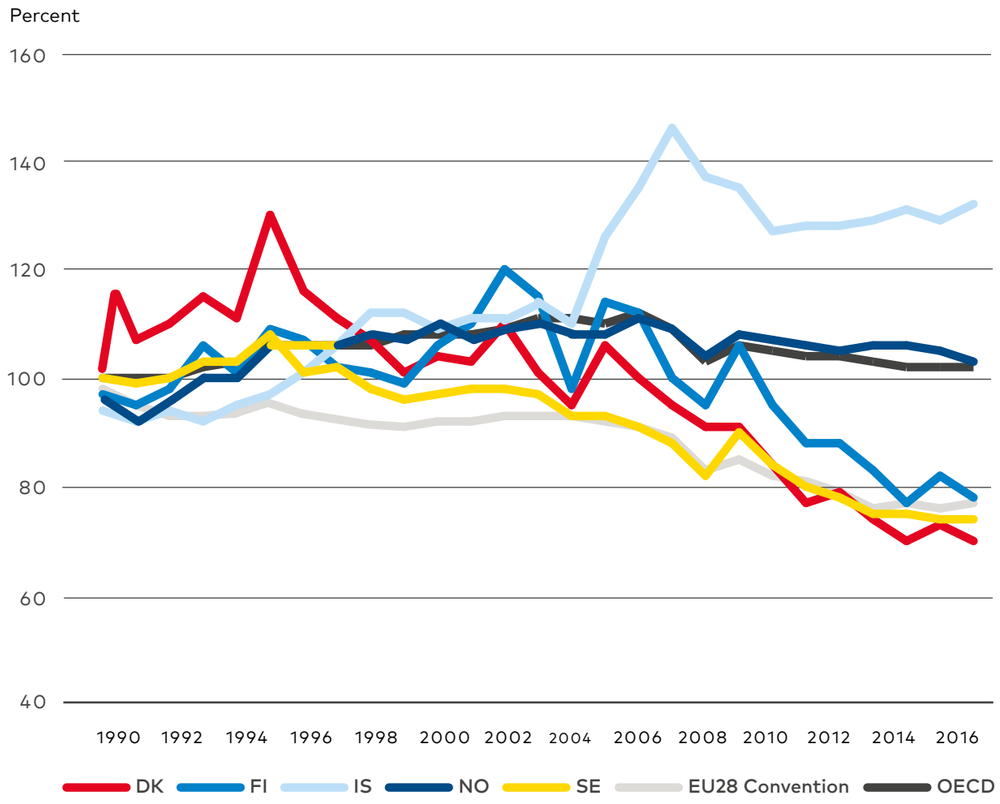
What is carbon neutrality?

Carbon neutrality is a broad concept, which allows it to be useful in a variety of organisational and institutional contexts. Yet this breadth creates uncertainty over what it refers to. Our point of departure is the 2050 'Carbon Neutral Scenario' (CNS), as presented in the Nordic Energy Technology Perspectives Report (NETP 2016). This refers to **a near-zero emission Nordic energy system, in direct response to the ambitious national climate targets across the Nordic Region.** The CNS achieves an 85% reduction in energy-related emissions *produced* in the Nordic Region, with a clarification that the remainder of reductions come via international carbon-offsets, including investments in domestic and international carbon reduction projects, such as the UN Clean Development Mechanism and trading within the European Emissions Trading Scheme (EU-ETS).

A second clarification is that carbon neutrality does not imply fossil-fuel-free. Rather, it describes a carbon neutral *system* where produced emissions are in balance with the territory's ability to absorb and/or sequester them. Absorption takes place via the natural environment, while sequestration refers to innovative solutions, such as carbon capture and storage (CCS), bio-energy CCS (BECCS) and direct air capture (DAC).

Finally, carbon neutrality is not synonymous with the emissions footprint of the Nordic countries. In contrast, it only considers the emissions *produced* within the Nordic Region and does not include emissions that are embodied within imported goods and services, including emissions from international shipping and aviation.

Figure 11.1 Territorial GHG emissions in the Nordic countries 1990–2017 (not including international transport and emissions from land use, land use change or forestry (LULUCF)).



Data sources: UNFCCC.

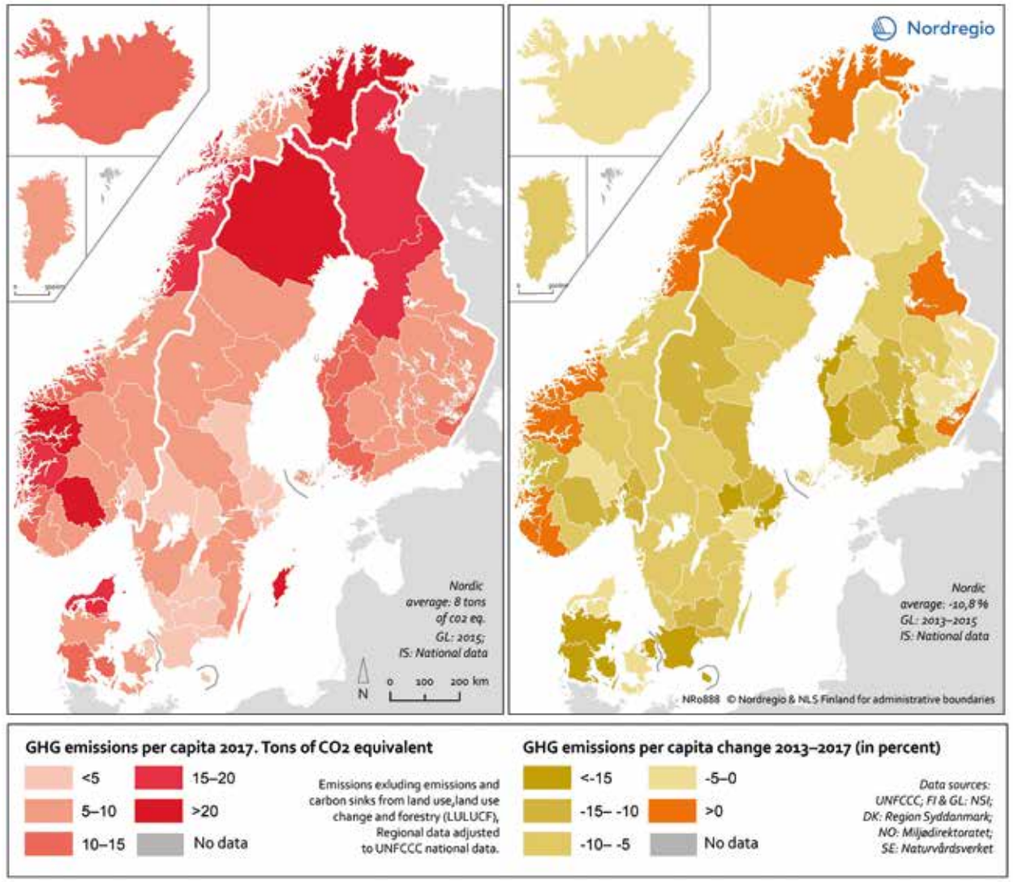
Second, Figure 11.1 excludes GHG emissions within key land use sectors including agriculture and forestry.[28] While these processes are largely beyond the energy focus of this chapter, the importance of sustainable agricultural and forestry management cannot be understated. For example, agricultural emissions represent 17% of annual GHG emissions produced in Denmark (UNFCCC, 2019). Additionally, Nordic sustainable forest management is vital for supporting production of biofuels, at the same time as maintaining the GHG-removal benefits from diverse forest landscapes. UNFCCC data (2019) shows that forest land in the Nordic countries remove 32% of the Nordic GHG output[29] annually. More insight on the Nordic bioeconomy is found in Chapter 9.

Regional accounts of GHG emissions can be misleading due to the transregional nature of energy processes, natural resource endowments and concentrations of industrial processes. Nevertheless, Figure 11.2 highlights three macro trends concerning regional GHG emissions:

1. Emissions have seen significant reductions in areas where heat and power have traditionally been fossil fuel dependent. This includes Denmark[30] as well as Southern Sweden and Southern Finland – relatively populous area where improvements in district heating coverage and carbon intensity reduction have been achieved.
2. Domestic transport emissions (excluding international aviation and maritime transport) have started to decrease, which has contributed to regional emissions reductions in those regions shown in light pink (see also Figure 11.5 below). This is predominantly due to the ongoing transition away from traditional petroleum and towards less carbon intensive fuels, including electricity.
3. Emissions are increasing in regions where energy intensive industry is present. Industrial processes currently make up approximately 34% of the total energy demand in the Nordic countries. While overall industrial related emissions are decreasing across the Nordic Region, this is not the case in Norwegian regions with intensive offshore oil and gas activity. For example, Finnmark, Nordland, Møre og Romsdal, Sogn og Fjordane, Rogaland, and Vest-Agder, had the highest per capita emissions in 2017, and the highest increases between 2013 and 2017. The same phenomenon is evident in Norrbotten, as a result of intensive industries, including the iron & steel sector.

[28] Emissions from land use, land use change and forestry (LULUCF) are excluded. These account for greenhouse gas emissions, as well as the removal of emissions, resulting from human-induced land use.
[29] Based on total GHG emissions without LULUCF.
[30] The de-carbonisation of Denmark's power supply is especially notable in Figure 11.5.

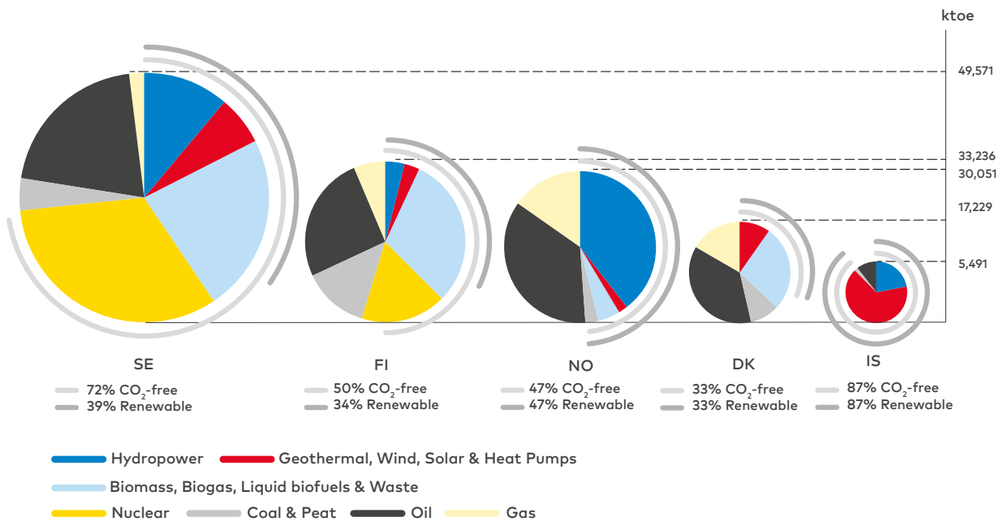
Figure 11.2 Nordic greenhouse gas emissions by region 2017 and 2013-2017 change.



Energy supply

Figure 11.3 shows the total primary energy supply (TPES) of each Nordic country. The share of nuclear power is due to three facilities in Finland and three

Figure 11.3 Total primary energy supply (TPES) mix for Nordic countries in 2017.[31]



Data source: Eurostat Energy Balances.

in Sweden. To reduce its dependence on electricity imports, Finland is currently building an additional reactor and has plans for one more. The role of nuclear power as a primary component of Sweden and Finland's carbon neutral energy profile is therefore clear, and any significant cuts to production could pose significant challenges to their ambitious climate targets.

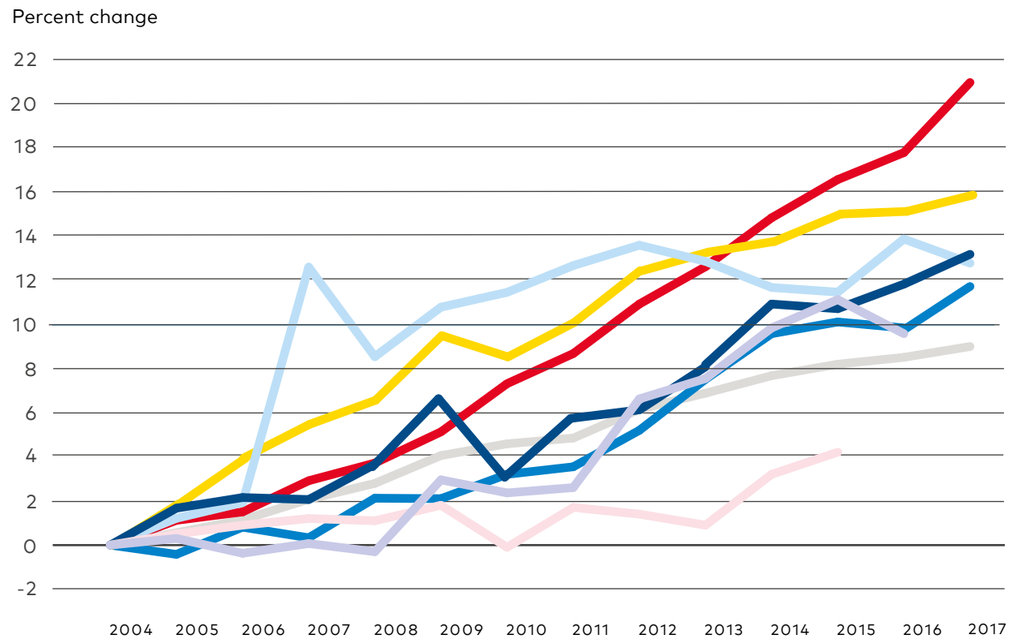
While CO_2 intensity has been falling for decades, Figure 11.3 shows that fossil fuels (coal and peat, oil and gas) still comprise 42% of the Nordic TPES. Achieving Nordic carbon neutrality will require a reduction to just 16% (IEA/NER, 2013), which will entail major reductions in the consumption of oil and coal in all Nordic countries. While replacing coal with renewables will be a relatively straightforward process, replacing oil consumption in the transport sector will be much more challenging.

All Nordic countries have increased their share of renewable energy in gross final consumption[32] between 2004 and 2017 (see Figure 11.4). The most notable increases have taken place in Denmark (21%), followed by Sweden (16%), Norway and Iceland (13%) and Finland (12%), all of which exceeded the EU average (9%). Renewables now account for 72% of Iceland's gross final energy consumption, followed by Norway (71%), Sweden (54%), Finland (41%), Denmark (36%), Greenland (19%) and the Faroe Islands (7.5%). Sweden, Finland and Denmark are three of the 11 EU countries that have already achieved their 2020 renewable energy targets. In total, 41% of the total energy supply in the Nordic countries comes from renewable energy sources and 57% of the total is carbon neutral (including nuclear energy). As shown in Figure 11.3, increased bioenergy output has been the main driver of renewables development. Biofuels now represent over 25% of the energy supply in Finland, Sweden and Denmark. Wind power production has been strengthened throughout much of Denmark and Sweden and, to a lesser extent, in Norway and Finland. However, Denmark currently has a moratorium

[31] TPES is the sum of production and imports subtracting exports and storage changes. As such, it is the net energy input to each country, including significant thermal energy losses during conversion processes. This means that thermal energy sources account for a larger share of primary energy relative to their share of gross final energy consumption.

[32] Gross final energy consumption is the total energy reaching the final consumer. It excludes energy consumed by the energy sector itself (e.g. conversion losses).

Figure 11.4. Trends in the share of renewable energy in final energy consumption, 2004–2017.



Data source: Eurostat.

on new land-based wind farms and its increased generation capacity is being produced by the further development of off-shore wind farms and the replacement of ageing turbines with bigger and more powerful turbines.

The limited potential for the further development of hydropower means that other renewable energy sources are in the spotlight. Growth in variable renewables (solar and wind) will require increased energy supply flexibility. For example, flexibility from Norwegian and Swedish hydropower has been a key factor in facilitating Denmark's high share of wind power and can contribute to balancing variable renewables in Europe through an expansion of undersea cables. This same principle holds true in Nordic island regions, such as Gotland, where further development of local wind energy potentials is handcuffed by insufficient grid connections to the mainland. As such, the increased integration of the Nordic electricity network is a key mechanism for supporting further development of renewable energy.

State of policy towards carbon neutrality

Nordic climate policy has accelerated as a direct response to the 2016 UN Paris Agreement. However, efforts by the EU to establish a formal target and policy pathway for carbon neutrality in 2050 are facing uncertainty due to opposition from selected countries that believe their dependence on coal power will prove a disproportionate burden to their competitiveness and social cohesion. Despite the opposition in some EU-countries, the Nordic Prime Ministers' Declaration on Carbon Neutrality reiterates that Nordic leaders fully support a European

An opportunity therefore exists for national goal-alignment at the Nordic level, which would benefit from a consistent reference framework for what carbon neutrality means in a Nordic context

Carbon Neutrality target for 2050, and that the Nordic countries will ramp up their climate change ambitions by 2020 (Nordic Prime Ministers, 2019).

The Carbon Neutrality Declaration prioritises collaboration, especially regarding innovations that can be scaled up to have a global impact. This was highlighted in the Ollila report (2017), which called for a DKK 500m joint Nordic research programme, as well as the joint statement of the Nordic Prime Ministers and CEOs for a Sustainable Future in August 2019 (Norden, 2019a), which calls for more intense collaboration between the public and private sectors.

Figure 11.5 highlights that the climate target of each country is unique to each country's level of ambition, territorial context and path dependency. Furthermore, not all countries have developed a target that explicitly relates to carbon neutrality. Denmark and Norway's targets are positioned in relation to GHG emissions, while Iceland, Finland and Sweden directly acknowledge carbon neutrality by referencing the important role of the natural ecosystem as a carbon sink. In terms of emissions, Sweden and Norway emphasise a common goal for 2050 territorial emissions that are 80-95% lower than 1990. However, Norway's interim target of a 40% emissions reduction by 2030 is less ambitious than similar targets for Denmark and Finland. Even more concerning, current projections only indicate a modest, 7%, decrease of Norway's GHG emissions by 2030 (Climate Action Tracker, 2019).

While the Nordic Prime Ministers' Declaration puts forth a uniform target toward Nordic carbon neutrality, a more detailed review of the national climate targets shows that consistent Nordic policy has yet to be developed. An opportunity therefore exists for national goal-alignment at the Nordic level, which would benefit from a consistent reference framework for what carbon neutrality means in a Nordic context. This common reference could then be used to increase Nordic collaboration on sector-based interventions, particularly in those areas which could benefit from Nordic co-operation.

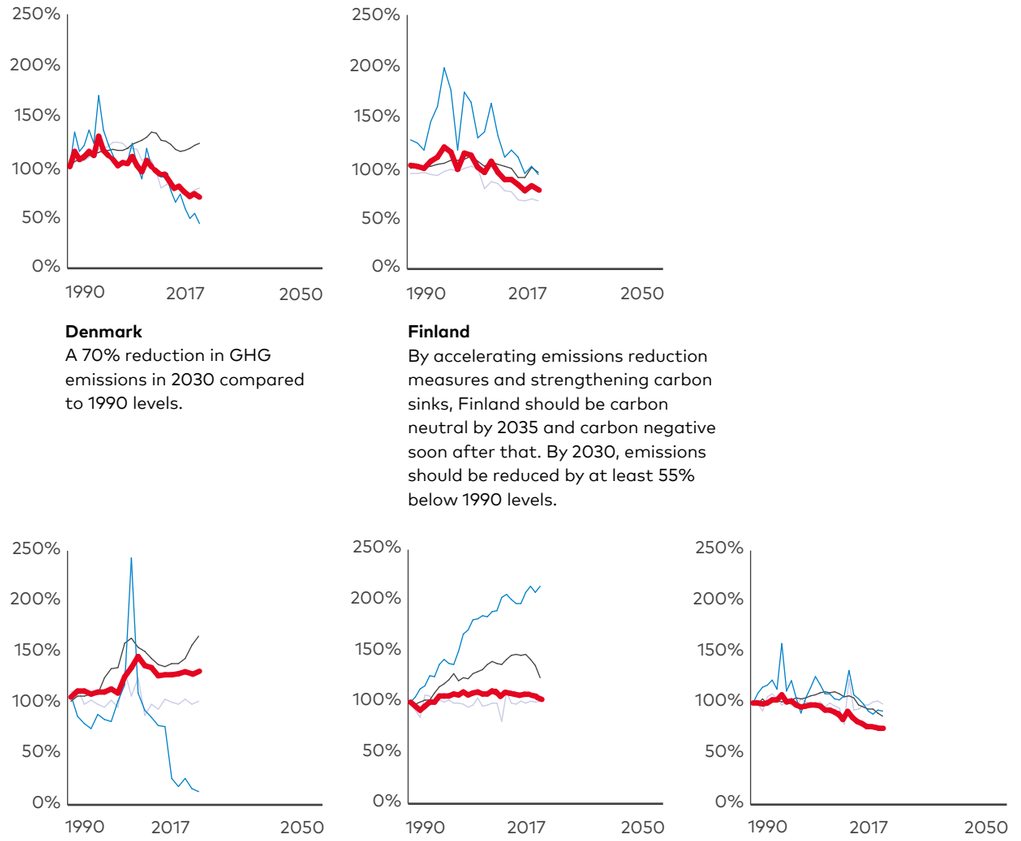
The 2019 Nordic Economic Policy Review (NEPR) (Norden, 2019b) focused exclusively on the climate policies of the Nordic countries and concluded that the Nordic countries should consider opportunities to coordinate their climate policies better in order to achieve maximum global impact. For example, the variety of individual policy instruments in the transport sector is far from uniform across the Nordic countries. As such, solutions such as "climate clubs" are proposed, which would gather like-minded and enthusiastic countries that commit to ambitious climate policies, and even devise specific targets and actions that represent the unique territorial context of each member. Thus, more intensive Nordic collaboration in areas where Nordic countries have special expertise - green technologies such as offshore wind and carbon capture and storage for example - could not only support the Nordic Region in meeting its own climate targets but can also support global climate mitigation.

Current trends and future pathways in key demand sectors

Figure 11.6 presents per capita final energy demand in the industrial, transport and building sectors of the Nordic countries between 1990 and 2017. For industry, decreasing per capita consumption is caused by increased energy efficiency and an overall decline in energy intensive industries in all Nordic countries except Iceland, which is capitalising on its immense territorial assets of carbon neutral geothermal and hydro energy.

For buildings, the similar levels of per capita energy consumption in Denmark, Norway and Sweden (compared to Iceland and Finland) are primarily explained by the impact of climatic conditions. At the same time, relatively large increases between 2000 and 2017 in Finland (6%) and Iceland (22%) are noteworthy. In contrast, Sweden has seen a 12% reduction in per capita building energy consumption, while levels in Denmark and Norway are unchanged. Increasing floorspace per person likely has a role to play, but the overall patterns suggest that

Figure 11.5 Nordic climate targets in relation to current domestic greenhouse gas emissions, indexed to 1990.



Denmark
A 70% reduction in GHG emissions in 2030 compared to 1990 levels.

Finland
By accelerating emissions reduction measures and strengthening carbon sinks, Finland should be carbon neutral by 2035 and carbon negative soon after that. By 2030, emissions should be reduced by at least 55% below 1990 levels.

Iceland
Carbon neutrality by 2040. Among 34 government measures, the main focus will be: 1) phasing out fossil fuels in transport, and 2) increasing carbon sequestration through restoration of woodlands and wetlands, revegetation and afforestation.

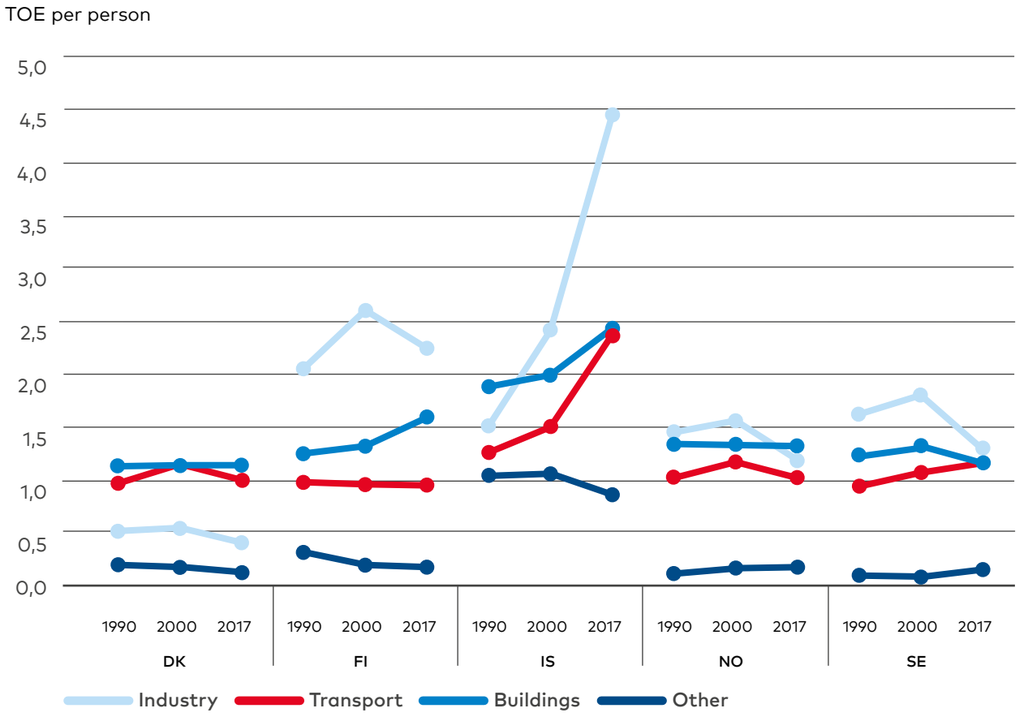
Norway
Become a low emission society by reducing emissions by 80-95% in Norway, as in the rest of Europe. Norway's 2030 target of a 40% emissions reduction by 2030 is seen as a pathway to 2050.

Sweden
Net Zero emissions by 2045. That is, the amount of GHG emitted by Sweden is less than the amount of GHG reduced through the natural ecocycle, or through climate projects pursued by Sweden abroad. However, emissions from activities in Sweden must be at least 85% lower than in 1990.

Total GHG emissions (excl. LULUCF)
Energy supply (incl. electricity, heat, fuel extraction & refining)
Domestic transport
Industry (incl. process emissions)

Data sources: UNFCCC (data), national governments (targets).

Figure 11.6 Per capita final energy demand by sector in the Nordic countries, 1990–2017.



Data sources: Eurostat Energy Balances.

widespread and readily available energy efficiency measures for buildings are not yet having a significant impact on overall energy consumption.

For transport, a return to 1990 levels is evident for Denmark and Norway, while Sweden's per capita consumption has increased 7% between 2000 and 2017. Most notably, however, Iceland's consumption increased 57% between 2000 and 2017. As such, economic development attributed to its expanding tourism sector presents challenges that require effective low-carbon policies, innovation and solutions.

The decoupling of economic growth from carbon emissions (and total energy demand) is at the heart of the beyond GDP concept. As such, Figure 11.7 charts Nordic GDP, energy-related CO_2 emissions and energy demand since 1990 and looks forward to 2050 under a "Carbon-Neutral Scenario" (CNS) where Nordic energy-related emissions are cut by 85% in 2050.[33]

The Nordic Region has achieved a continued decoupling of GDP from energy-related CO_2 emissions and energy demand in recent decades. However, Figure 11.7 highlights that while GDP has increased more than the scenario projections, both energy demand and CO_2 emissions have not yet established a convincing trajectory in order to meet Nordic climate targets. Increased energy efficiency and decarbonisation of demand sectors need to play a prominent role, with a focus on transport, industry, and power and heat in buildings.

Pursuing carbon neutrality in transport

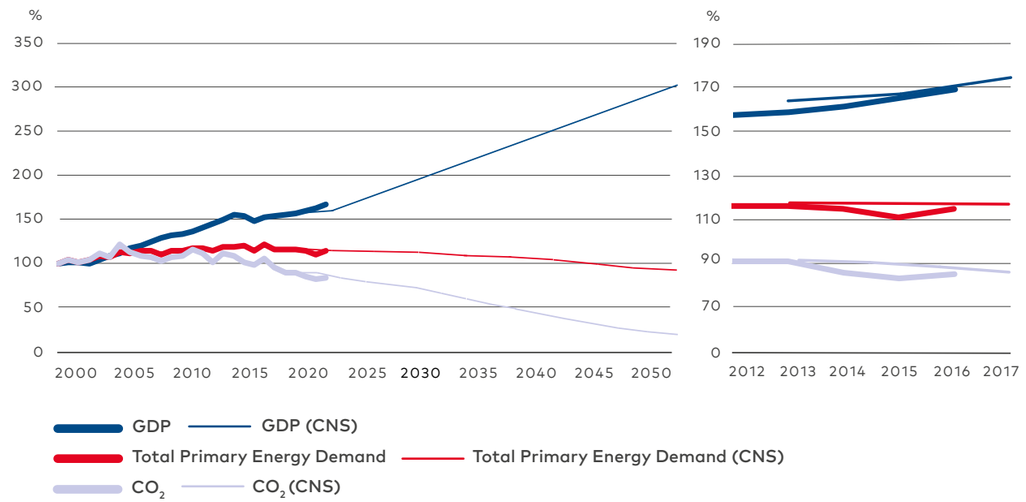
Land-based transport CO_2 emissions are increasing despite increased use of biofuels and electrification of personal vehicles in the Nordic Region. Furthermore, replacing fossil fuels remains challenging in the transport sector and current research suggests that existing and planned policies do not result in enough CO_2 emissions reductions in light of 2030 climate objectives (Norden, 2019a). Increased joint Nordic efforts are therefore needed in a number of areas simultaneously if 2030 objectives are to be achieved. Freight transport demand needs to be reduced, energy efficiency among all transport modes needs to be improved and shifts toward public transport need to increasingly displace private car use and aviation. This will require improved public transport infrastructure both within cities and between them.

Primarily through the growth of biodiesel, renewable energy consumption within the transport sector has more than doubled between 2011 and 2016 (see Figure 11.8). However, despite their extensive forestry resources, if the Nordic countries are to live up to the carbon neutral scenario they will have to become net importers of biomass. This represents an important policy and strategic trade-off in the push to a carbon neutral Nordic Region. First, the social acceptance of intensive forestry differs considerably among the Nordic countries, and the regions and communities within them. Also, the recent "Special Report on Climate Change and Land" (IPCCC, 2019) indicates that both agriculture and forestry will have increasingly important roles as carbon sinks. As such, alternatives including hydrogen fuel cells, synthetically produced fuel for aviation, and ammonia (NH3) (especially for deep-sea maritime operations) demand further attention.

Electrifying short and medium distance transport

Nordic electric vehicle (EV)[34] sales are increasing each year and they accounted for 14% of new passenger sales in 2018, while updated figures for 2019 (Q1) showed that this has increased to 19% (IEA/NER, 2018). Figure 11.9 highlights the impact of Norway's ambitious policy support since 2012, which has led to the highest per capita share of EVs in the world. In the first quarter of 2019, EVs accounted

Figure 11.7 Nordic GDP, energy-related CO_2 emissions and total primary energy demand.

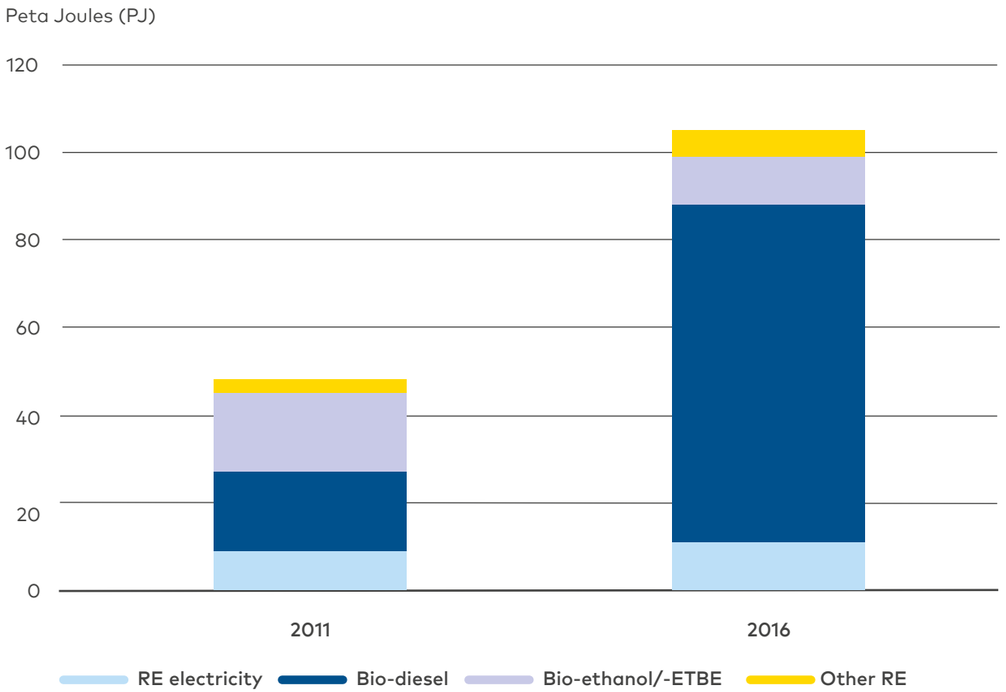


Data source: Nordic Energy Research – Tracking Clean Energy Progress 2019.

[33] The remaining 15% is achieved through offsets.

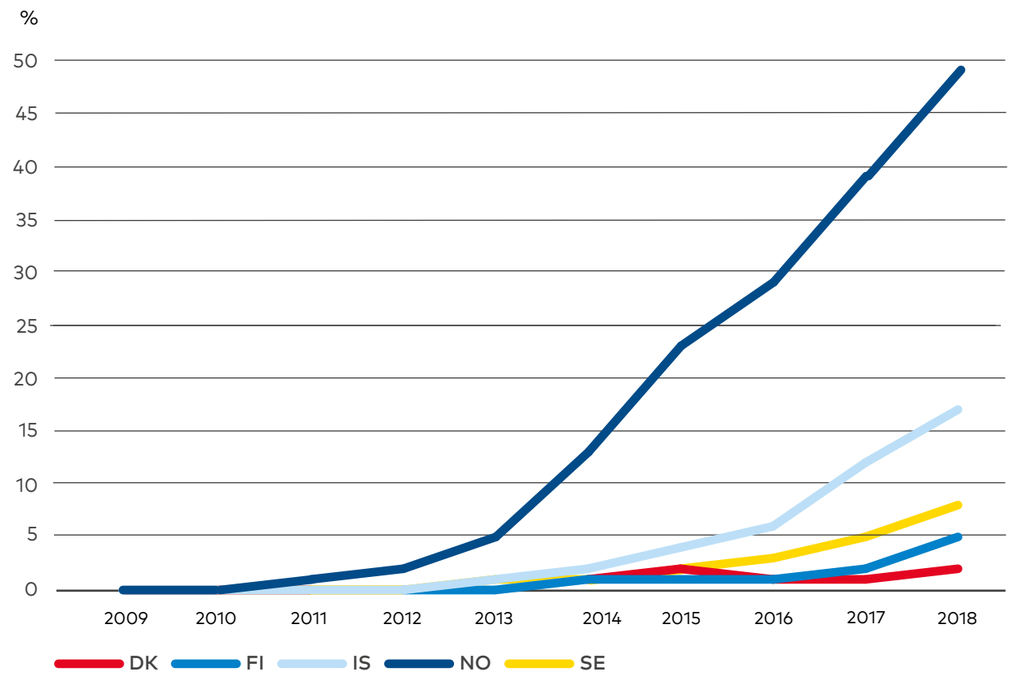
[34] Electric vehicles (EVs) include battery electric vehicles (BEV) and plug-in- hybrid electric vehicles (PHEV).

Figure 11.8 Nordic renewable energy consumption in the transport sector, changes between 2011 and 2016.



Data source: Nordic Energy Research – Tracking Clean Energy Progress 2019.

Figure 11.9 Battery and plug-in hybrid electric vehicles' share of new passenger vehicle sales.



Data source: Nordic Energy Research – Tracking Clean Energy Progress 2019.

for 60% of Norway's total passenger vehicle sales. Policies such as registration tax VAT, free parking, free charging and road toll exemptions have been a key driving force. Due to strong public support these incentives will stay in place until 2021 despite the high cost of the policy (the high price per mitigated tonne CO_2). In contrast, the growth of EV-sales has dwindled in Denmark due to less attractive benefits and a lack of predictability in maintaining policies.

Provided with the right set of predictable incentives, combined with falling EV prices compared to combustion vehicles, the Nordic countries may be capable of an even faster deployment of EVs than the CNS estimates. This is likely to be accompanied by an increasing presence of electric buses, light-duty vehicles and construction machinery. Several models of heavy-duty vehicles with either fuel-cells or batteries are likely to hit the market in the coming years. While fully autonomous vehicle technology is still at an experimental stage, efficient solutions are expected in the coming decade. For freight transport this will include the potential for inter-regional freight convoys, which, if coupled with electricity infrastructure on highways, could provide possibilities for highly efficient freight transport. For personal transport, autonomous vehicle technology could also support other mobility solutions such as car-sharing and mobility-as-service solutions that will further challenge the paradigm of private car ownership.

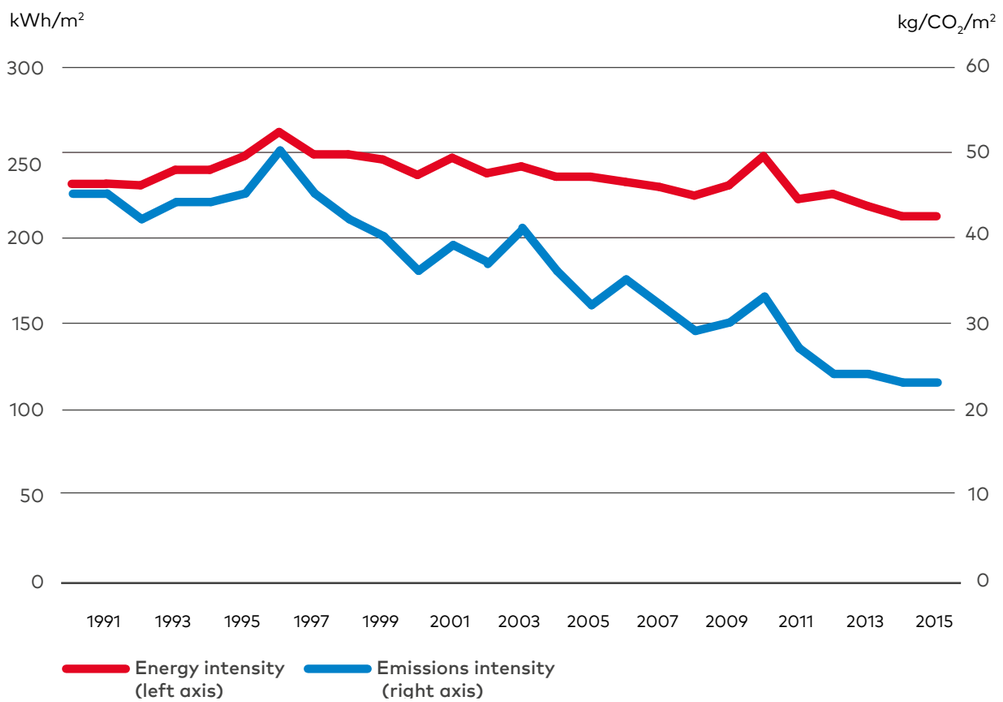
In recent years, the Nordic maritime sector has started to use more biofuels and fuel cells and to electrify ferries and short-haul passenger vessels. A continued shift of this nature in both the public and private sectors has incredible potential for reducing carbon emissions in the Nordic Region and beyond. For example, the Danish shipping firm A.P. Møller-Maersk, which produced annual CO_2 emissions in 2018 that amount to 89% of Denmark's total emissions production (Maersk, 2019) has pledged to make carbon neutral vessels viable by 2030 and to have fully carbon neutral operations by 2050. This will require an unprecedented pace of maturing of new, less carbon-intensive fuels, innovation and the adaption of new technologies. In Norway, there are currently 16 electric car ferries in operation and an additional 39 will be in operation by the end of 2020.

Decarbonising industry

The Nordic countries are among those with the highest concentration of energy-intensive industries in the OECD. With this as a background, industrial energy demand has decreased by 10%, and CO_2 emissions have fallen by 25% since 2007 (cf. national profiles in Figure 11.5 and energy consumption patterns in Figure 11.6). This is due to a 33% reduction in oil consumption and a 13% reduction in gas consumption. Electrification of the industrial sector is already high, especially in Norway and Iceland, and is higher than the average in OECD countries. Biomass also plays a key role in supplying energy to the Nordic industrial sector, particularly in Sweden and Finland.

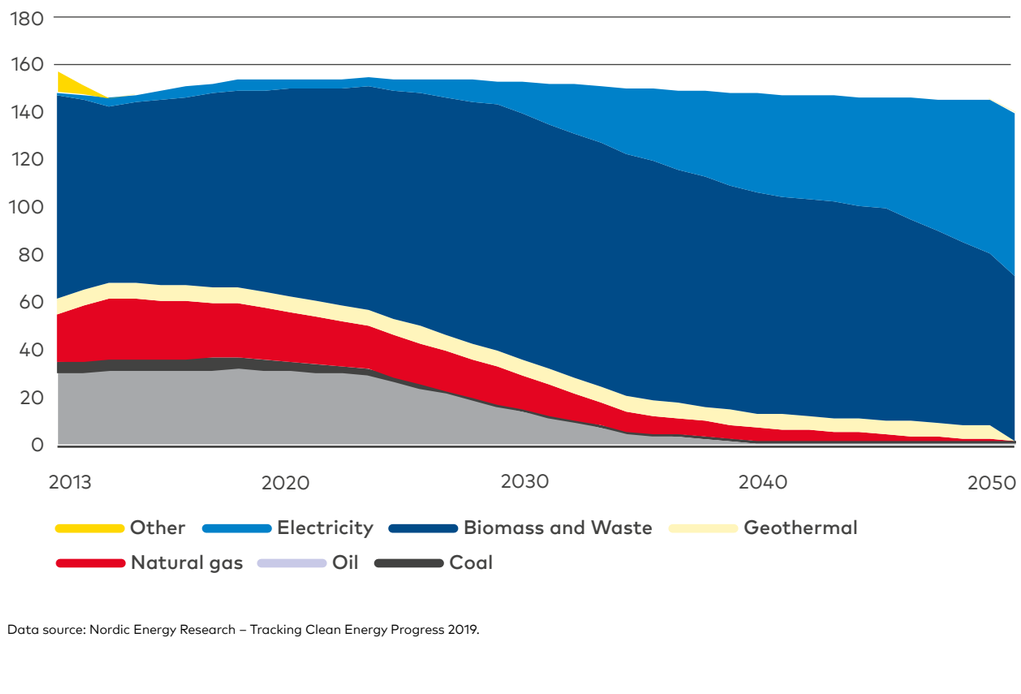
According to the carbon neutral scenario (NETP, 2016), industrial energy consumption in 2050 will have to be reduced by 9% and the CO_2 intensity by 60%, both compared to 2013 levels. As a result, the industrial sector is expected to contribute 39% of the total projected emissions reductions in the Nordic Region in 2050. A main driver of the reductions in emissions intensity between 2030 and 2050 will have to come through the widespread roll-out of carbon capture and storage (CCS) solutions, and widespread shifts to less carbon intensive energy sources. Concerning the latter, SSAB, LKAB and Vattenfall have joined forces to create HYBRIT – an initiative to replace coking coal with hydrogen during the production of ore-based steel. If successful, the result will be the world's first fossil-free steel

Figure 11.10 Nordic energy intensity (kWh/m²) and CO_2 emissions intensity ($kgCO_2/m^2$) in the buildings sector.



Data source: Nordic Energy Research – Tracking Clean Energy Progress 2019.

Figure 11.11 Nordic district heat generation (TWh) in a carbon neutral scenario.



Data source: Nordic Energy Research – Tracking Clean Energy Progress 2019.

production, amounting to a 90% reduction in emissions. Full-scale demonstration of a production facility of LKAB and SSAB is expected by 2035.

Norway has set a goal of realising a cost-effective strategy for full-scale CO_2 management. The strategy aims to identify measures to promote CCS technology development and to reduce CCS costs. Technology Centre Mongstad, Norway, is the world's largest facility for research, development and demonstration of CCS technologies. The centre has access to energy and industrial emissions, which provides a unique opportunity to investigate the various relevant applications of CCS technologies.

In general, Nordic countries are establishing first mover advantages in CCS technologies, which holds promising potential for international application. For example, the Northern Lights Project will capture CO_2 emissions from a cement factory and a waste-to-energy plant, as well as the transportation of CO_2 by ship and subsequent permanent subsea storage. The project includes the vision of transporting captured CO_2 from industrial hubs in Europe for permanent storage. An alliance of carbon-neutral cities (Helsinki, Oslo, Stockholm and Copenhagen) has also recently joined forces to demonstrate CCS technologies at power plants in HELEN (Helsinki), Klemetsrud (Oslo), Exergy (Stockholm) and Amagerverket (Copenhagen).

Greening Nordic buildings – an urban agenda

Buildings account for 43% of final energy demand in the Nordic Region and space-heating accounts for approximately 60% of that total (Eurostat, 2019). However, the corresponding CO_2 emissions are 50% lower than the EU average, due to a larger share of renewable electricity, district heating, electric heating (including heat pumps), geothermal energy and modern biomass in the heating mix.

Figure 11.10 highlights the fact that the decarbonisation of the energy supply (heating, cooling and electricity) is progressing more rapidly than the energy efficiency improvements. During the last ten years, fossil fuels in district heating have decreased by 33% in the Nordic countries, despite a 7% increase in total demand for district heating. Fossil fuels have mainly been replaced by biofuels and waste fuels. Nordic capitals are key drivers in this regard – Helsinki and Copenhagen have each pledged to stop using coal as a fuel source for building energy supply. Figure 11.11 highlights that these trends must continue in order to reach carbon neutrality. In particular, utility-scale heat pumps and electric boilers will facilitate the integration of renewable electricity, which will account for almost half of the heat in district heating networks in 2050.

Figure 11.10 shows that in order to reach the CNS, the average energy demand must drop by 41%, to 126 kWh/m2 in 2050. Current regulations show some disparity in the standards throughout the Nordic Region – the current regulations in Sweden (110 kWh/m²/year in the southern climate zone) and Norway (115 kWh/m²/year for multi-dwelling apartments) fall below the threshold set by the NETP. By comparison, Danish building regulations are among the strictest in the world, and Denmark has set a compliance path of 52.5 kWh/m²/year for dwellings (IEA, 2019).

According to the CNS (IEA/NER, 2016), urban buildings will account for 70% of Nordic building energy reductions in 2050. With urban areas expected to grow at twice the rate of previous decades, an opportunity exists, first and foremost in cities, to transition to efficient low-carbon systems. However, given that 70% of today's building stock will still be standing in 2050, the application of proven technologies to the existing building stock is crucial for achieving our climate goals.

All EU member states are now tasked with developing a long-term building renovation strategy (EC, 2019) in an effort to significantly increase the retrofit rate throughout Europe. These strategies need increasingly to include comprehensive policy

It is now time to advance our leadership in terms of action and results, both at home and abroad

and funding support to facilitate private investment. For example, national policies such as retrofitting subsidies and financial instruments are needed in order to support capital costs. Local strategies to retrofit rental buildings (both publicly and privately owned) are also essential, especially in countries like Sweden, Finland and Denmark, where there is a high proportion of rental and publicly-owned buildings.[35] Therefore, proven mechanisms such as green leases, energy performance contracts, on-bill financing and environmental upgrade agreements should be further developed to respond to specific retrofitting challenges[36] in the rental housing sector.

Concluding remarks

National and regional patterns of GHG emissions show that many cities and their governments are leading by example and are showing the potential of agglomerations to develop low-carbon mobility solutions, energy supply and green building standards. In contrast, per capita emissions are increasing in many rural regions because of energy-intensive industry. However, it needs to be remembered that they are producing goods for consumption outside of the region, in Nordic cities and abroad. In addition, the sparsely-populated and remote nature of many Nordic regions also presents unique challenges in terms of low-carbon transport solutions. These points highlight the complex territorial aspects that impact on the shift towards carbon neutrality. This complexity has also been exemplified in other aspects, including the ever-evolving political decisions on nuclear energy as well as trade-offs between the role of Nordic forests as a (bio)energy source and their roles as vital carbon sinks and as key elements in supporting biodiversity.

The Nordic countries have led the way on development of international climate policy. It is now time to advance our leadership in terms of action and results, both at home and abroad. Several notable initiatives have already been taken, including improved green building standards, major investments in CCS R&D to reduce carbon emissions in the energy and industrial sectors, and effective policies that have significantly increased electric vehicle sales. At the same time, the 2050 carbon-neutral scenario emphasises that achieving carbon neutrality will require continued investment in low-carbon technologies, and that this will not just help us achieve our climate goals but will also enhance Nordic competitiveness through green economic growth. Leading the way can be costly, but it can also lead to lasting competitive advantages in green technologies.

While innovation will be vital to achieving carbon neutrality, Nordic climate policy should also continue to lead the world with a 'no-stone-left-unturned' approach. The approach must also emphasise the importance of subsidies, financial instruments, tax incentives and information campaigns that foster behavioural change and, in turn, support more energy efficient investments and decision-making by end users. This is particularly relevant in the transport and building sectors, but it holds true for consumption of goods and services more generally as well. In this perspective, the wide gulf between territorial emissions (those produced within a country) and consumption emissions (total emissions consumed by a country) constitutes a more transparent recognition of the true impact of the Nordic Region on global climate. This should be acknowledged in climate policies at all levels of government – local, regional and national – as well as within future Nordic co-operation.

Leading the way can be costly, but it can also lead to lasting competitive advantages in green technologies

[35] Sweden (36%), Norway (19%), Finland (28%), Iceland (21%), Denmark (38%) and EU-28 (31%) (Eurostat, 2019b).
[36] For example, split incentives reflect the principle that tenants (who pay energy bills) are the primary benefactors of an energy efficiency improvement, rather than the building owner who makes the capital investment.

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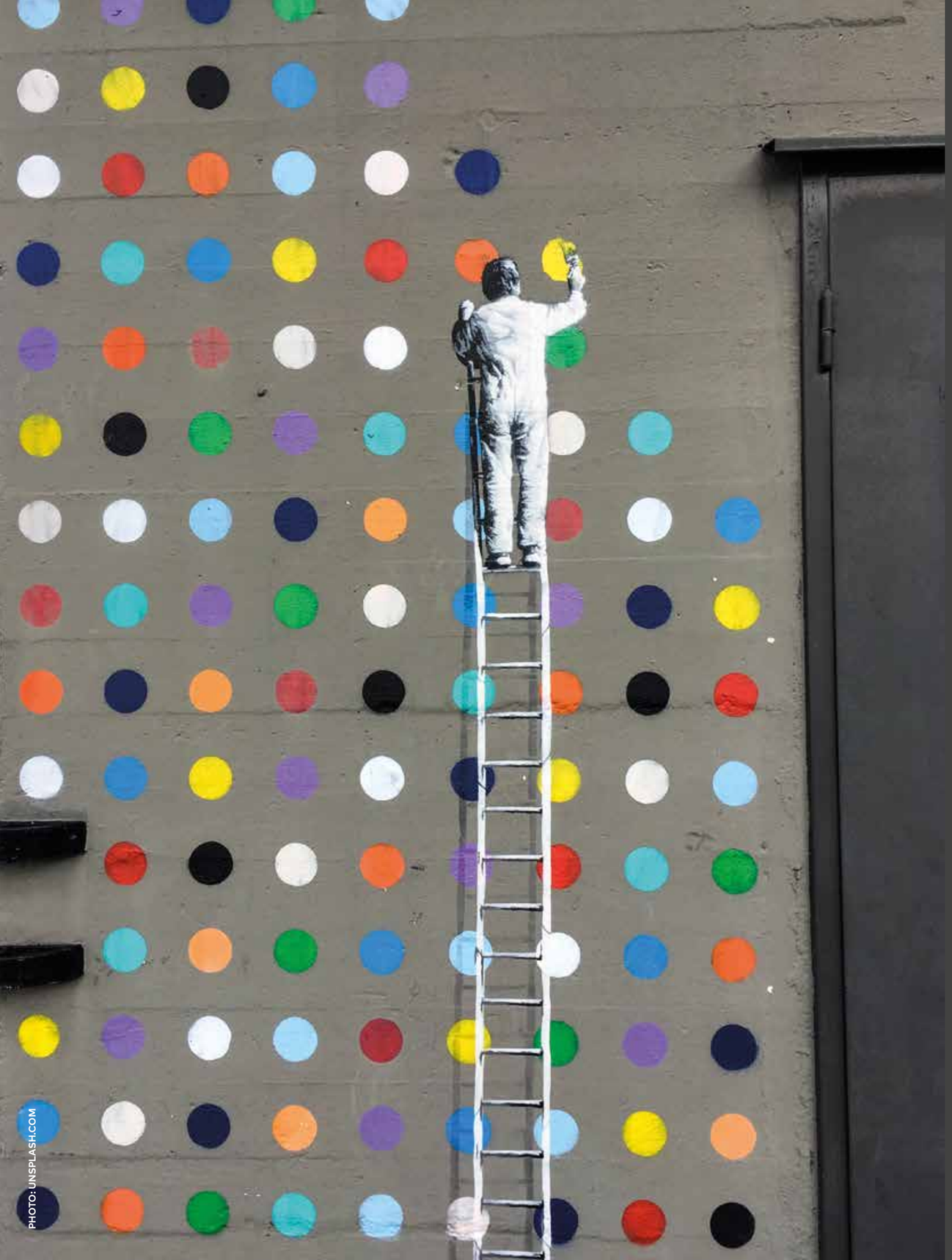


PHOTO: UNSPLASH.COM

THEME 5

REGIONAL POTENTIAL INDEX

Capital city regions still top the rankings

The capital city regions in the Nordic countries top the ranking in this version of the Regional Potential Index, as they did in the two previous versions. Oslo is in first place, followed by the capital regions of Denmark and Stockholm. Regions in Iceland and the Faroe Islands improved their rankings between 2017 and 2019 due to dynamic workforces. In contrast, the opposite was the case for most regions in Norway, mainly due to weaker regional GDP and R&D investment. The Nordic regions that have improved their ranking over the last two years are mainly rural ones.

This is the third edition of the State of the Nordic Region to include the Regional Potential Index (RPI). The RPI seeks to spark discussion among stakeholders about the situation in, and potential of, their regions seen in a wider Nordic context. It highlights several potentials of each region, which, if capitalised upon, could contribute to positive development of the region. The RPI can also be seen as a way to summarise some of the findings found in the thematic chapters in this report. In this edition, comparisons between regions belonging to the same urban-rural category (urban, intermediate and rural) have been added, including graphic visualisations, to provide a detailed overview of the scores achieved by each Nordic region within that specific type of region.

Chapter 12

THE REGIONAL POTENTIAL INDEX

Author: Julien Grunfelder
Map and data: Julien Grunfelder, Gustaf Norlén, Eeva Turunen, Johanna Carolina Jokinen and Oskar Penje

The capital city regions of the Nordic countries top the rankings in this latest version of the Regional Potential Index (RPI) as they did in 2016 and 2018. The "region" of Oslo tops the rankings in this edition; the majority of regions in Norway, Iceland, the Faroe Islands and Åland are in the top half; the regions of Denmark and Sweden are spread throughout the rankings; and the majority of regions in Finland and Greenland are in the lower half.

Figure 12.1 shows the indicators used and the average score for each type of region (urban, intermediate and rural). The economic dimension is clearly a strength in the urban regions, whereas differences are less pronounced between the three types of region on the two other dimensions. Improvements to the methodology for the 2020 edition (see the methodological note at the end of this chapter and Table 12.1) contribute to better reflecting the socio-economic contexts of the Nordic regions. These changes, along with regional reforms in Norway that have reduced the number of regions from 19 to 11, make it difficult to make comparisons between the rankings published in 2018 and in this edition. As such, in order to understand the development of regional potential overtime, a new regional potential score for the RPI 2017 has been calculated for each region based on the improved methodology. It should be noted that all comparisons made in this chapter are based on the results of a ranking developed using these new calculations and not the results published in the 2018 report.

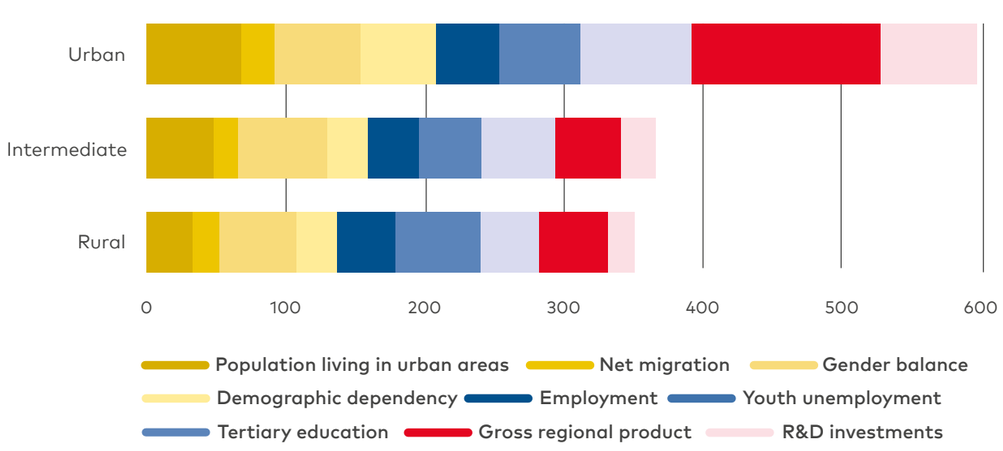
In general, regions in Iceland and the Faroe Islands have a higher ranking in 2019 than in 2017, thanks to a dynamic labour force, whereas the opposite is the case for most of the regions in Norway, mainly due to weaker regional GDP and R&D investment. Rankings are pretty stable between 2017 and 2019 for regions in Denmark and Greenland. The picture in Finland and Sweden is more varied, with a number of regions ranking higher than in 2017 while others have fallen down the rankings in 2019.

The economic dimension is clearly a strength in the urban regions

Those regions that have improved their ranking over the last two years are primarily to be found in the rural parts of the Nordic Region. The region of Austurland (Iceland) jumped 12 places between 2017 and 2019. The increased number of jobs in the tourism sector, requiring an external workforce, is the main reason. Blekinge (Sweden) was the region that dropped furthest in the rankings between 2017 and 2019, by 11 places, as a result of weaker labour and economic factors in comparison to other Nordic regions.

It is worth mentioning that the large majority of regions (53 out of 66) increased their score between 2017 and 2019, with an average increase of 15 points. This indicates that differences between the regions in terms of development potential diminished between 2017 and 2019. Some of the changes are due to domestic contexts (e.g. a more dynamic labour market in Iceland), whereas others are due to specific regional context (e.g. attractive university towns in the region of Uppsala in Sweden with good accessibility to the capital city region of Stockholm).

Figure 12.1. Overview of average number of points for the nine selected indicators in the three types of region 2019.



Data source: Nordregio.

The demographic, labour force and economic dimensions of the Regional Potential Index

Nordregio's Regional Potential Index (RPI) is constructed around a series of key socio-economic indicators with relevance in the analysis of regional development. The data from the nine selected indicators is categorised into three dimensions: demographic, labour force and economic. These dimensions are included in other studies on regional development monitoring and territorial cohesion, for example, ESPON INTERCO (2013), among others. Table 12.1 provides detailed information on the three themes, related indicators and weighting. For instance, the table highlights the fact that the regional data on the labour force and economy used is from 2018 and 2017 respectively. This is because data at regional level is usually released after one or two years. Additional information is found in the methodological note at the end of this chapter.

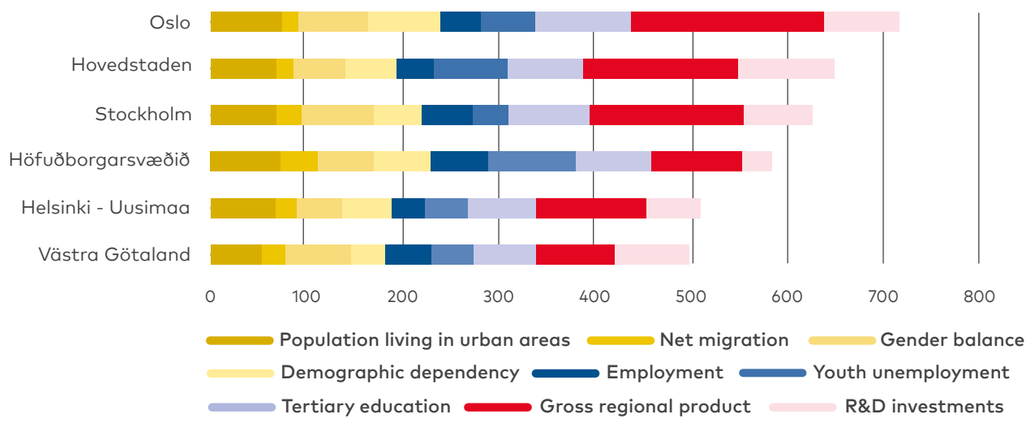
The indicators also have strong communicative value. They are well established and thus are easily understood in the context of regional development. As such, the main intention behind the RPI is to use it as a starting point for stakeholders to discuss the situation in, and potential of, their regions within the wider Nordic context, rather than just the domestic context. The scores for each dimension are in Table 12.3 and are visualised in the map in Figure 12.5.

It is important to know that the geography of an administrative region has an influence on its ranking. This is especially the case when the territory of a functional region goes beyond administrative regional borders. This is the case, for instance, for the "region" of Oslo, which corresponds to its municipal territory, where Oslo is the main node of the functional capital region of Norway, and where a large proportion of the country's workplaces and tertiary education is concentrated. This specific context contributes to Oslo having a high gross regional product (GRP) per capita, high R&D investment and a large proportion of people with a tertiary education up to degree level. As a result, the points for Oslo are somewhat higher than might be expected and the points for the surrounding regions are somewhat lower. The geography of the cross-border regions also influences the results in the ranking, especially when commuter flows are unbalanced. For instance, inhabitants of Skåne (Sweden) working in the Capital Region (in Denmark) contribute to the GRP of the Danish region and not the Swedish one.

Table 12.1 The nine selected indicators included in the Regional Potential Index 2019.

Theme	Indicators in the RPI 2019	Main benefits for the region
Demographic dimension	Proportion of population living in urban areas of 5,000 inhabitants and more in 2019 (maximum number of points allocated: 75). This replaces the indicator "population density" that was included in previous RPI.	Medium-sized and largest cities offer relatively good access to jobs (especially in the tertiary sector), health care, culture, environmentally friendly transport and other services, thanks to a critical mass of population.
	Net migration rate in 2018 (maximum number of points allocated: 75).	This highlights the attractiveness of a region as a place to live and work, both for domestic and international migrants. It contributes to increase in the workforce, taxes and social contributions. However, an important point is that net migration may also make the region fragile (e.g. by imposing a burden on administrative and health services).
	Demographic dependency ratio in 2019 (maximum number of points allocated: 75).	This highlights the economic burden on the working population who have the potential to earn their own income, in supporting members of the population who are not working (young people and pensioners).
	Gender ratio in 2019 (maximum number of points allocated: 75).	In a balanced situation, the regions offer education and workplaces for both genders. An unbalanced situation is often the result of the out-migration of women for education or work purposes, contributing to the intensification of demographic shrinkage (e.g. lower fertility rates and ageing).
Labour force dimension	Employment rate in 2018 (maximum number of points allocated: 100).	Relatively high employment contributes to higher tax revenues and the overall regional economy and its production. It also indicates that the population in a region has the skills sought by employers. A high employment rate also contributes to both social cohesion and life satisfaction.
	Proportion of the 25–64 age group with higher education degree in 2018 (maximum number of points allocated: 100).	A high proportion contributes to a more skilled workforce and a better chance of being an innovation leader. It also tends to improve the quality of jobs and consequently the life satisfaction of the inhabitants in a region.
	Youth unemployment rate in 2018 (maximum number of points allocated: 100)	A low rate of youth unemployment highlights good conditions for entering the labour market.
Economic dimension	GRP per capita in 2017 (maximum number of points allocated: 200).	This provides an indication of the level of production of goods and services in a region. It also generally provides a fairly reliable measure of how a regional economy is doing.
	Total R&D investment per capita in 2017 (maximum number of points allocated: 100). This replaces the indicator "Total R&D investment" that was included in previous RPI.	It helps show the readiness of a region for future development and is seen as a tool for translating innovation into economic growth.

Figure 12.2. Overview of points for the nine selected indicators in the urban regions of the Nordic Region 2019.



Data source: Nordregio.

Strong Nordic urban regions

Six administrative regions in the Nordic Region are classified as predominantly urban (see Figure 1.1 in Chapter 1) in the urban-rural typology developed by Eurostat (Eurostat, 2019) and adapted to the latest administrative structure of the Nordic Region by Nordregio. The top five places in the RPI are occupied by predominantly urban regions. The remaining urban region is ranked seventh. These regions remained at the same rank (+/–1) between 2017 and 2019. Västra Götaland (Sweden) was the only urban region to climb two places; this is due to the region having slightly better scores in all three dimensions (e.g. higher employment rate and higher GRP per capita) as well as another region (Trøndelag) dropping in the ranking.

Apart from being the most urbanised regions within the Nordic Region, these regions have the lowest demographic dependency ratios, relatively high employment rates, the highest proportions of the population with tertiary education, the highest GRP per capita and the highest R&D investments per capita in the Nordic Region. Oslo stands out in this group, largely as a result of having the highest GRP per capita, the highest proportion of the population with a tertiary education and the highest proportion of the population living in urban areas, as well as the lowest demographic dependency ratio (Figure 12.2). This resulted in Oslo taking the top spot in the ranking, followed by the capital region of Denmark and the region of Stockholm. However, as the map in Figure 12.5 shows, the geography of these three urban regions limits their comparability to some extent, with the territory of Oslo being much smaller than the other two. This issue of scale is also mentioned in other studies, such as the report on regional development trends for Norway (Kommunal- og moderniseringsdepartmentet, 2018).

It is interesting to note that the strongest dimension (demography, labour force or economy) is not the same for all the urban regions. The regions of Oslo, Hovedstaden (the Capital Region of Denmark) and Stockholm have economy as their strongest dimension, due to having the highest GRP per capita of the Nordic Region and the highest R&D investment per capita. Höfuðborgarsvæðið, the capital region of Iceland, has demography and labour force as its strongest dimensions, thanks to one of the highest employment rates, one of the lowest demographic dependency rates and one of the highest net migration rates in the Nordic Region. The two remaining urban regions (Helsinki-Uusimaa and Västra Götaland) have demography as their strongest dimension.

Weak economic scores of Nordic intermediate regions

There are 28 intermediate regions in the Nordic Region. They are spread throughout the RPI, indicating the diversity of socio-economic contexts in these regions. An overview of the points for each of the nine selected indicators (Figure 12.3) gives an indication of the main potentials and weaknesses in each region. The demographic dimension is where this group of regions scores best, with an average of 159 points out of 366. Their main weaknesses are in the economic dimension, which is more than 2.2 times weaker than their demographic dimension. This is mainly due to them having the lowest average GRP per capita of the three types of region. The labour force dimension for the intermediate regions is also, on average, relatively weak, with the lowest employment rates and the highest youth unemployment rates of the three types of region.

The region of Uppsala (Sweden) is the intermediate region with the highest overall position – sixth place– just ahead of one of the urban regions. The presence of a large university and life science sector help to explain why Uppsala has the highest proportion of people with a tertiary education and the highest level of R&D investment per capita of the intermediate regions. The region also benefits from the proximity of the capital region of Stockholm and Arlanda Airport, which contributes to Uppsala's high net migration rate. Rogaland (Norway) is the intermediate region with the lowest demographic dependency ratio and the highest GRP per capita. The other intermediate regions with good scores are in Denmark and Norway, while the Swedish regions in this group are to be found in both halves of the rankings. Finnish regions have the lowest scores, and the region of Kymenlaakso has the lowest score of all the intermediate regions. Out-migration, an ageing demographic structure, low employment rates and limited R&D investment explain this situation.

Changes between 2017 and 2019 indicate a slight drop of a couple of places for the majority of the intermediate regions, with the region of Blekinge (Sweden) falling the most (-11). Blekinge had the highest youth unemployment rate of all the Nordic regions in 2018, and one of the lowest GRP per capita. Varsinais-Suomi (Finland) made the biggest move up in the rankings among the intermediate regions (+6), mainly due to higher employment and

The region of Uppsala (Sweden) is the intermediate region with the highest overall position

lower youth unemployment rates. A stronger business sector with a successful shipyard, automotive and life science sectors contributed to this, creating an important number of jobs in the region (Partanen, personal communication, September 2019).

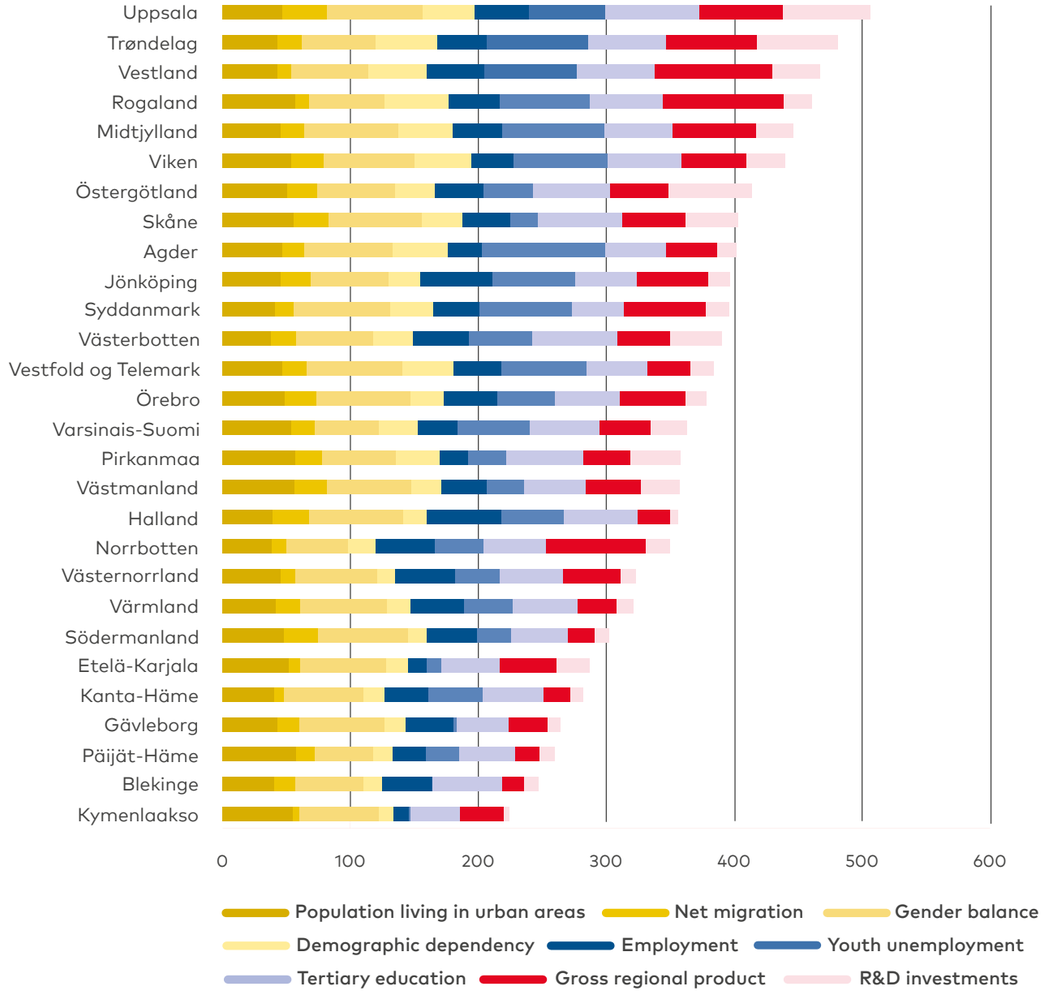
Dynamic labour force in Nordic rural regions

There are 32 rural regions in the Nordic Region. They are ranked between 8 and 66 (the lowest), indicating major differences between their situation, just as is the case for intermediate regions.

An overview of the points for each of the nine indicators (Figure 12.4) gives an indication of the most important potentials and the main weaknesses for each region. The labour force dimension is where the rural regions score best, with an average of 145 out of 352 points. On average, rural regions have relatively good employment rates and the lowest youth unemployment rate of all three types of region. This is partly due to the good scores attained by the rural regions of Iceland and northern Norway, the Faroe Islands and Åland. In fact, the highest employment rate and lowest youth unemployment rate in the Nordic Region is in the Faroe Islands. The economic dimension is the weakest dimension for rural regions, due to limited GRP and R&D investment, especially in rural regions of Denmark, Finland and Sweden.

However, these average values hide a wide range of different contexts among rural regions in the Nordic Region. Suðurnes (Iceland) is the rural region with the highest overall place (8th). Suðurnes has the highest net migration and highest GRP per capita of all the rural regions, benefiting from net migration of labour from abroad and proximity to the capital city region. The other rural regions with relatively good scores are mostly in Iceland, parts of Norway, the Faroe Islands and Åland. The lowest scores are for rural regions in Finland and Greenland. Etelä-Savo (Finland) has the lowest score of

Figure 12.3 Overview of points for the nine selected indicators in the intermediate regions of the Nordic Region 2019.

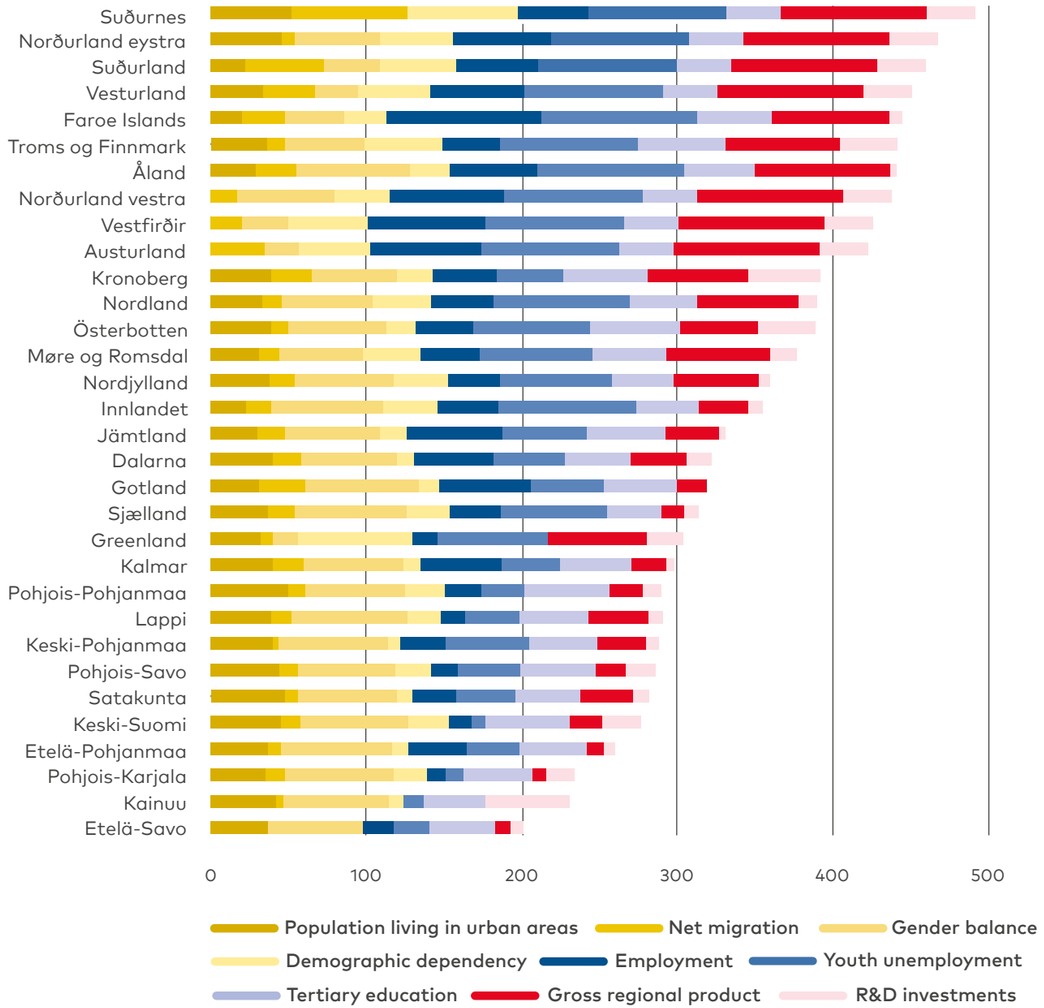


Data source: Nordregio.

all the Nordic regions in 2019. This region has the largest net out-migration, the highest demographic dependency ratio and one of the weakest economic dimensions in the Nordic Region.

The changes between 2017 and 2019 indicate diverse trends in rural regions. On the one hand, Austurland (Iceland) made the biggest jump up the ranking (+12). This is mainly due to improved demographics in the region (e.g. positive net migration and a relatively low demographic dependency ratio), which is explained by the boom in the tourism sector. The settlement of a new labour from abroad is facilitated by a number of measures, such as a multiculturalism policy, language courses and contact points, in the municipality of Hornafjörður in the southern part of the region (Ómarsdóttir, personal communication, October 2019). On the other hand, Møre og Romsdal, a rural region in Norway, dropped furthest in the ranking (-9) due to decreasing GRP per capita. This is explained by a large fall in produc-

Figure 12.4. Overview of points for the nine selected indicators in the rural regions of the Nordic Region 2019.



Data source: Nordregio.

Table 12.2 Top movers 2017–2019 (note: using the adjusted 2019 method for the situation in 2017).

Top 5 rises	Top 5 falls
Austurland (+12) Faroe Islands (+7) Varsinais-Suomi (+6) Suðurland (+6) Vestfirðir (+5)	Blekinge (-11) Møre og Romsdal (-9) Östergötland (-5) Viken (-5) Åland (-5)

tion in the aquaculture, transport and logistics sectors (Jensen, personal communication, October 2019). Looking at the changes in the scores between 2017 and 2019, rural regions have increased by an average of 22 points, making this the group of regions with the highest increase in points.

Methodological note

The nine selected indicators are drawn from solid datasets available at regional level for the whole of the Nordic Region. The data has been harmonised to facilitate comparison over national borders. The indicators do not display high levels of correlation and very little data was missing. The majority of the missing data was for regions in Iceland, except Höfuðborgarsvæðið, the capital city region. It is difficult to calculate estimates, for instance for GRP and R&D investments, for regions with small populations; therefore, the same value has been attributed. As a consequence of this, the economic dimension of these regions in Iceland is slightly overestimated. The normalisation of the data used the min-max calculation, under which each normalised indicator receives a value ranging between 0 and 100. This type of normalisation accentuated the number of points attributed to each region, when comparing to previous editions of the RPI. An equal weighting has been used when aggregating the three dimensions (demography, labour force and economy) to calculate the overall RPI. Finally, the indicator GRP per capita was weighted more heavily than total R&D investment per capita within the economic dimension. The reason for this is that it has historically been determined as the most reliable measure of the economic situation in a region.

The change in the total number of Nordic regions between 2017 and 2019, due to administrative reform in Norway, was a good opportunity to fine-tune the indicators included in the RPI. Table 12.1 mentions that the proportion of the population living in urban areas with a population of 5,000 or more has replaced the previously demographic indicator of population density. This was done to better fit the geography of the Nordic regions where services, workplaces and facilities are concentrated in small and medium sized cities. The indicator of total R&D investment has been replaced by total R&D investment per capita, allowing for more accurate comparison between regions with different population size. These changes in the methodology have only affected the ranking of the Nordic regions by a couple of places. However, the difference in the number of points has increased slightly in some cases. Finally, it is worth noting that the merging of regions in Norway has also affected the allocation of points in the RPI and the resulting ranking.

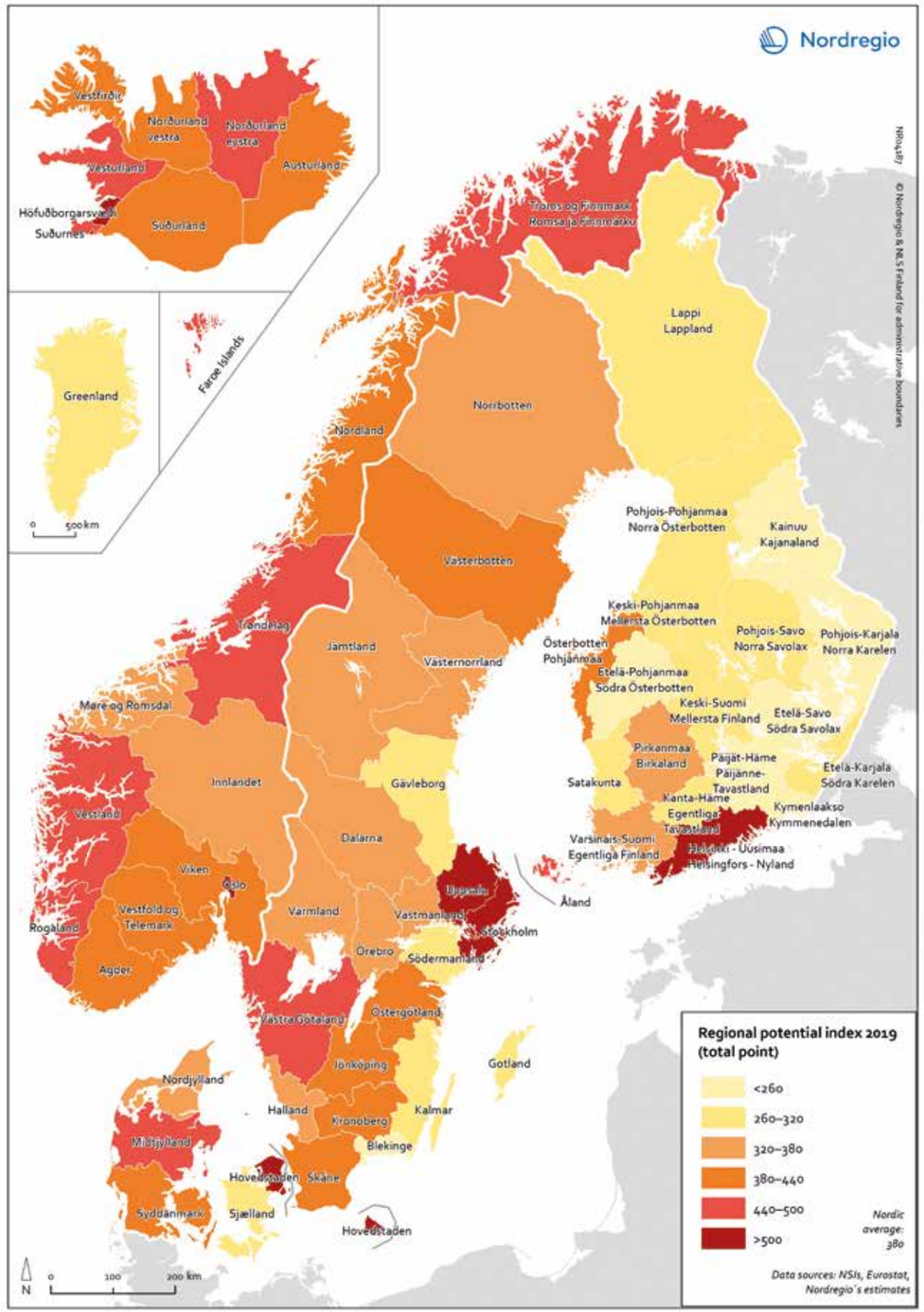
Despite the rigorous process through which the ranking was developed, there are still limitations. First, the lack of a database on cross-border flows affects the ranking of border regions where cross-border flows are not balanced. Second, there is a lack of a good indicator for measuring accessibility to different services at regional level across the region. However, the inclusion of the demographic indicator "share of population living in urban areas with a population of 5,000" instead of the indicator "population density" aims to partially resolve this. Nor does the ranking take into account any other qualitative dimensions, such as life quality, or the existence of regional development or smart specialisation strategies, again due to the lack of a solid indicator available at regional level throughout the Nordic Region. Finally, indicators connected to the environment and emissions of carbon are not included in this ranking. This is mainly due to the lack of reliable and comparable data at regional level. Note that indicators on environmental and welfare aspects are, however, covered in Chapters 10 and 11 of this publication.

Table 12.3 Nordregio's Regional Potential Index 2019.

RPI 2019 rank	Region	2019 score	Demographic dimension	Labour force dimension	Economic dimension
1	Oslo (NO)	717	239	200	278
2	Hovedstaden (DK)	650	194	194	261
3	Stockholm (SE)	625	219	174	232
4	Höfuðborgarsvæðið (IS)	584	229	230	125
5	Helsinki-Uusimaa (FI)	511	189	150	171
6	Uppsala (SE)	505	195	176	133
7	Västra Götaland (SE)	498	182	157	159
8	Suðurnes (IS)	491	198	168	125
9	Trøndelag (NO)	481	168	179	134
10	Norðurland eystra (IS)	468	156	187	125
10	Vestland (NO)	468	161	178	129
12	Suðurland (IS)	460	158	176	125
12	Rogaland (NO)	460	177	166	117
14	Vesturland (IS)	450	141	184	125
15	Midtjylland (DK)	446	180	172	94
16	Faroe Islands (FO)	445	113	248	85
17	Troms og Finnmark (NO)	442	149	182	112
18	Åland (AX)	441	154	196	91
19	Viken (NO)	439	194	164	80
20	Norðurland vestra (IS)	437	115	197	125
21	Vestfirðir (IS)	425	101	199	125
22	Austurland (IS)	423	103	194	125
23	Östergötland (SE)	413	165	137	111
24	Skåne (SE)	403	187	125	90
25	Agder (NO)	401	176	171	54
26	Jönköping (SE)	397	156	169	73
27	Syddanmark (DK)	394	164	149	82
28	Kronoberg (SE)	391	143	138	110
29	Nordland (NO)	390	142	171	77
29	Västerbotten (SE)	390	149	160	80
31	Österbotten (FI)	389	132	170	87
32	Vestfold og Telemark (NO)	383	180	151	52
33	Örebro (SE)	378	173	138	67
33	Møre og Romsdal (NO)	378	136	158	84
35	Varsinais-Suomi (FI)	365	154	142	69
36	Nordjylland (DK)	359	153	144	62
36	Pirkanmaa (FI)	359	171	113	76
38	Västmanland (SE)	357	171	113	73
39	Innlandet (NO)	356	146	168	42
39	Halland (SE)	356	160	165	31
41	Norrbotten (SE)	350	120	133	97
42	Jämtland (SE)	329	125	167	37
43	Västernorrland (SE)	322	135	130	57
43	Värmland (SE)	322	147	131	43
45	Dalarna (SE)	321	130	139	52
46	Gotland (SE)	320	147	153	19
47	Sjælland (DK)	313	153	136	24
48	Greenland (GL)	304	129	88	87
49	Södermanland (SE)	300	159	109	32
50	Kalmar (SE)	297	134	136	26
51	Pohjois-Pohjanmaa (FI)	291	151	106	33
52	Lappi (FI)	290	148	94	48
53	Keski-Pohjanmaa (FI)	288	122	127	39
54	Pohjois-Savo (FI)	287	142	107	38
55	Etelä-Karjala (FI)	286	144	71	70
56	Satakunta (FI)	283	131	108	44
56	Kanta-Häme (FI)	283	127	124	31
58	Keski-Suomi (FI)	277	153	78	46
59	Gävleborg (SE)	265	144	81	40
60	Etelä-Pohjanmaa (FI)	259	126	116	18
61	Päijät-Häme (FI)	258	132	95	31
62	Blekinge (SE)	248	126	94	28
63	Pohjois-Karjala (FI)	234	139	69	27
64	Kainuu (FI)	230	123	53	54
65	Kymenlaakso (FI)	224	134	51	38
66	Etelä-Savo (FI)	200	98	85	18

Urban
Intermediate
Rural

Figure 12.5 Nordregio's Regional Potential Index 2019.



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Nordic Council of Ministers
Nordens Hus
Ved Stranden 18
DK-1061 Copenhagen K
www.norden.org

State of the Nordic Region 2020 gives you a unique look behind the scenes of the world's most integrated region, comprised of Denmark, Finland, Iceland, Norway and Sweden, along with the Faroe Islands, Greenland and Åland. The report presents a series of facts and figures showing the current state of play within core socioeconomic sectors, including demography, labour market and economy. In addition, you can read about wellbeing and energy pathways towards a carbon neutral Nordic Region. State of the Nordic Region 2020 is published by the Nordic Council of Ministers and produced by Nordregio, an international research center for regional development and planning established by the Nordic Council of Ministers.