Demographic and economic characteristics of Arctic Regions

ABSTRACT: We use demographic and economic indicators to analyze spatial differences and temporal trends across 18 regions surrounding the Arctic Ocean. Multifactor and cluster analysis were used on 10 indicators reflecting income, employment and demography from 1995-2008. The main difference is between regions with high population densities, low natural growth rate, and low unemployment (Russia, Norway and Iceland) and regions with high unemployment rate and high natural growth rate (mainly North-American regions). However, once those parameters were accounted for sub-regional differences start to emerge. Variation among the regions was a result of national policies and regional differences such as access and presence of natural resources (i.e. oil, gas, mining, etc.). We found only weak temporal trends, but regions with resource extraction show some signs of higher volatility. Overall, the Arctic has experienced out-migration with only Iceland and two regions in Canada experiencing in-migration.

Key words: Arctic, demo-economic systems, factor analysis, mixed economy, resource development, socio-economic indicators

Introduction

The Arctic is a complex environment that is continuously evolving physically, socially, and economically (ACIA 2004; Einarsson et al. 2004; Glomsrød and Aslaksen 2009). This region of the world contains highly-populated urban centers along with isolated remote villages. Although, the environment and people of the Arctic are changing, this change is not constant across all geographic areas. Regions of the Arctic respond differently to exogenous shocks based on their physical location, socio-economic conditions, and ability to adapt (Arnason 2007, Petrov 2010, Pearce et al. 2012). Previous research has referred to the Arctic as a whole when in fact they are only focusing on a specific area, economic sector, or social topic (Auchet 2011, Lindholt and Glomsrød 2012, Kajan 2014). We believe that to grasp a better understanding of the Arctic one needs to use a more fine scale spatial approach and include a diversity of socio-economic variables. Our research aims to better understand regional variation and trends in socio-economic conditions in the Arctic. For this purpose we analyze 10 demographic and economic variables among 18 Arctic regions over 14 years.

Even though the Arctic is diverse, many communities have a single "base" industry which can be resource extraction, tourism, or, in the absence of an industry, the government (Randall and Ironside 1996, Fay and Karlsdottir 2011, Petrov 2010). Communities, which rely on resource extraction, tend to be vulnerable due to fluctuations in market demand and price. In response to the loss or scarcity of jobs people are forced to choose between moving out of the region to find employment or remaining in the community unemployed (Heleniak 1997, Huskey et al. 2004). The extremely high mobility of the northern labor force (Heleniak 1997, 2012, Huskey and Southcott 2010, Petrov 2010, Finnegan and Jacobs 2015) makes the communities especially vulnerable to changes in economic activity such as a closure of a mine. Loss of job opportunities can alter the demographic structure, i.e. age structure and sex ratio, and migration of a region, and this will in turn affect consumption and spending patterns, thus spilling over to other economic activities in the region. This tight relationship between human demography and the economy has been called a ‘demo-economic’ system, and such systems tend to have especially large fluctuations in less economically developed areas (Ledent and Gordon 1980; Strulik 1999). In this paper we use the concept of demo-economic system to frame our analysis and to explore the variation in demographic and economic variables across Arctic regions and over time.

There are a few empirical studies investigating the spatial interdependencies between economy and demography in the Arctic (Bowes-Lyon et al. 2009, Petrov 2010, Larsen 2013), but none at as large a scale as ours or over as many years. We acknowledge that there have been multiple initiatives which have collected and systematized data for monitoring and assessment purposed in this region such as: the assessment of human well-being in the Arctic (Einarsson et al. 2004), Survey of Living Conditions in the Arctic (SLiCA) (Kruse et al. 2008), Arctic Social Indicators (Larsen et al. 2010), ECONOR research on socio-economic indicators in Arctic countries (Glomsrød and Aslaksen 2009), ArcticStat (www.arcticstat.org), and the Arctic Observation Network (Haley et al. 2011). To a limited extent these rich data assessments have been subject to cross-national statistical analyses that investigate the regional similarities and differences among countries in the Arctic, including the spillover effects of resource extraction economies on migration, population growth, and local employment. This paper utilizes and builds on these previous research efforts. On the other hand, it departs from the previous studies by choice of geographic scale, combination of indicators, time series, and methods.

The purpose of this paper is to identify the regional variation and relationships between demographic and economic factors in the regions surrounding the Arctic Ocean. Our focus is not the temporal dynamics within regions but rather to compare the pronounced characteristics of regions with each other, including general trends in demographic and economic factors. The socio-economic conditions within regions may vary greatly from community to community but this underlying variation is neither the overall goal with this paper. The main reason for the choice of scale, combination of indicators and methods is the idea behind demo-economic systems and spillover effects on a regional level. Similar to Petrov (2010) we analyze the regional variation by using factor analysis combined with hierarchical clustering. We differ by taking into account the time series data by use of Multi- Factor Analysis (MFA) (Escofier and Pagès 1994). Indicators were chosen to analyze the demo-economic structure in the different regions over time. The paper proceeds as follows: in the next section we present the data on demography (population density, natural population growth, and net migration) and economy (economic structure, income in comparable U.S. $ units, fuel costs, and unemployment), and the methods used to analyze the data. Next, we present the results of the analysis, before discussing and comparing the results with previous analysis of the Arctic.

Data and methodology

Study area, indicators and data sources

We selected regions that directly or indirectly border the Arctic Ocean through adjoining seas (Barents Sea, Norwegian Sea, Greenland Sea, Kara Sea, Laptev Sea, East Siberian Sea, Chukchi Sea, Beaufort Sea, Baffin bay), which includes 18 regions in 6 countries (Figure 1).

[Figure 1 near here]

The lowest scale at which continuous time series of demo-economic indicators existed was at the regional level. We defined the regional level as human population census areas in Alaska, territories in Canada, federal subjects in Russia, and counties in Norway. The following regions met our selection criteria: the North Slope, Northwest Arctic, Nome and Wade Hampton census areas in Alaska, Yukon, Northwest and Nunavut Territories in Canada, Murmansk, Nenets, Yamal-Nenets, Taimyr, Sakha, and Chukotka federal subjects in Russia, the three northernmost counties Nordland, Troms and Finnmark in Norway, and Greenland and Iceland in their entirety. Our analysis would benefit from including Greenland at the municipality level, but data was unavailable.

We chose demographic and economic indicators which have previously been used to describe and characterize socio-economic conditions in the Arctic (Duhaime and Caron 2009, Duhaime and Édouard 2014, Glomsrød and Aslaksen 2009). The demographic indicators used include population density, natural population growth and net migration. Population density and growth to take into account connectivity among people/communities and remoteness. We calculated population density based on habitable areas only (no ice or water). Natural population growth reflects whether births outpace deaths within a region. This means that a region with a high population growth has many births compared to deaths such that the natural population growth will be positive. A high natural population growth rate often indicates a younger population than does a low rate. Meanwhile, net migration captures movement of people in and out of a region. Taken together natural population growth and net migration show whether the population increases or decreases from one year to another in a region.

We have chosen two indicators to describe monetary income. First, average income within each region is the total pre-tax income per person above 18 years, encompassing wages, capital income and transfers. To take into account differences in currency and the purchasing power of the different currencies, the average income is converted into U.S. $ units by the use of the purchasing power parity (PPP) index. We have applied PPP-converters from the OECD-Eurostat PPP-program. Appendix Table 1 gives the PPP index for each of the countries for the analysis period.

The second income indicator is the average income, as described above, but now divided by the local price of fuel (95-octane). The fuel indicator represents the cost of fuel in relation to income within each country. This indicator takes into account the fact that purchasing power in the Arctic regions of a country may differ from the average purchasing power of the national currency. Thus, whereas the first income measure gives the average income in comparable monetary units across the circumpolar Arctic regions, this second income measure gives the number of 95-octane liters, which can be bought for the average income. In some countries fuel prices are, due to transportation costs, limited storing possibilities, and small markets, higher in Arctic regions than in more central parts of the country (Brinkman et al 2014). Other countries, such as Norway, pursue policies which aim to level out regional price gaps in order to secure equal living conditions in all parts of the country (Nordic Council of Ministers 2006). Since fuel is of utmost importance for the living conditions in Arctic regions it is necessary to include an indicator which takes into account the cost of buying fuel. Note, however, that this indicator does not take into account the fuel dependency of the various regions. Ideally, we also wanted to include an indicator which measured; income inequality, e.g. the Gini index. This indicator was only available at a higher geographic level than our regions and it was incomparable across countries

We used the indicators participation rate and unemployment rate to describe the labor market. Participation rate is defined as the number of individuals working or looking for work (labor force) among the total number of persons of working age. Working age is defined as individuals 15-74 years old, except in Russia, which due to the lower life expectancy was 16-60 for women and 16-64 for men. The number of people in the labor force can decline due to individuals who seek education, retire early, and others who have stopped pursuing employment. Labor laws typically allow an individual to work while in high school (10th – 12th grade). We acknowledge that in regions with a younger age structure the calculation of participation rate may be biased downward because younger people may still be supported by an adult. However, even in regions with a younger age class the number of adults (>18 years old) is greater than the number of people between 15 and 18 years old. Thus, we assume that employment rates by adults is the most influential and therefore the most relevant for causing changes in participation rate within each region.

Unemployment is the number of individuals unemployed among the labor force. Differing trends in the two indices can occur during tough economic times when the participation rate decreases because people decide to go back to school. Even if the number of individuals unemployed remains the same, the labor force decreases and thus the unemployment rate increases. We chose these official statistics because they are indicators commonly used when describing regional and national economic activity and thus easily interpretable and comparable across regions and countries.

Typically gross regional product (GRP) data within industry sectors is used to describe the industrial economy of a region. However, GRP data are not continuously published for every region. Hence, as an approximation to the importance of the different economic sectors in a region, we apply the share of total employment in the sector. Norway, Greenland and Iceland follow a Standard Industrial Classification (SIC) which corresponds to EU's revised industrial classification NACE Rev.2 (Nomenclature Europeenne des activites economiques). The United States of America (USA) and Canada follow the NAICS (North-American Industry Classification Standard), and Russia follows their own classification. The three broad sectors we used are goods producing, service producing, and public. Appendix Table 2 shows how we merged the different sub-sectors. Private farmers and fishers, which have no employees, are not included in this statistics. In most regions there are a few employees not belonging to any of the three sectors. These are not included in our numbers, causing the aggregate of the three employment shares to be less than one. Formal definitions of each indicator are given in the Appendix Table 3.

Our main data source is the official statistical bureaus of the respective countries. Additional data we received from regional authorities. For Greenland, Iceland, Norway and the USA all data are freely available, whereas for Canada there is a fee to access most data at the regional level. In Russia, most data are freely available, but some regional statistical reports had to be obtained in paper form. Lastly, we extensively used the ArcticStat database (http://www.arcticstat.org).

Statistical analysis

To explore the regional and temporal differences across Arctic regions circumpolar we use multivariate factor analysis (MFA) which allowed us to utilize time series data and 3D structured data (Escofier and Pagès 1994). This statistical approach is an extension of principal component analysis (PCA) tailored to handle multiple data tables (i.e. years) that measure the same sets of variables collected on the same observations (i.e. individual regions). PCA attempts to reduce a large number of variables and deconstructs the variance so that the principal components ordered by the amount of variance explained by each axis. The distance between the annual region observations reflects similarities in the indicators across the regions. Meanwhile, the center of gravity within each cluster is the average regional value and offshoots represent yearly value. Clusters (e.g., regions) with offshoots that are lengthy (e.g. far from the center) can be viewed as highly variable because the longer the offshoot the larger that year was from the mean value. Annual offshoots that tend to drift in a given direction over a time period indicate a temporal trend. We interpret the principal axis similar to Petitgas and Poulard (2009), and count the number of times the correlation coefficients of the economic and demographic indicators to the principle components were greater than the absolute value of 0.5.

The assumptions of MFA are that the data is normally distributed and data sets are not correlated (Aitchison 1982). For those indicators not fulfilling the normal distribution condition we took the natural logarithm to achieve a normal distribution. To avoid countries that have more regions (e.g. Russia has 6 regions and Iceland and Greenland just 1) dominating the construction of the dimensions, we weighted MFA so that there were equal weights for each of the six countries. For example, the sum of the regions in Russia contributed 1/6 to the construction of the components. Another precondition is the absence of compositional data (i.e. when two or more of the variables in the dataset per definition sum up to a constant). Thus we used the goods and public employment sector only to identify resource dependent regions and those dependent on governmental employment.

To better understand spatial relationships we ranked the regions according to average indicators and used the coefficient of variation (CV) to examine volatility among regions. By volatility we mean the variation around the mean indicator value within each of the regions. Regions which have more fluctuations in indicator values are more volatile. The CV along with the size of the "offshoots" in the MFA allows us to look at volatility. The trends/direction of changes was interpreted by inspecting the MFA diagram and by calculating multivariate spatial indices similar to Petitgas and Poulard (2009).

The principle components with the highest inertia whose cumulative variance was more than 80% were used for hierarchical cluster analysis (HCA) using Ward's method and Euclidean distances (Ward 1963). The optimal number of clusters was chosen according to Husson and Pagès (2011). We also used the K-means algorithm and iterative calculations to consolidate the clusters. A v.test was performed to test if the mean of the cluster is lower or greater than the overall mean. Only those results obtaining values greater than 1.96 corresponding to a p-value less than 0.05 were retained (Lebart et al. 2006).

Results

The multivariate factor analysis

The first four axes of the MFA accounts for a total of 80.9% with 31.9% explained by the first and 21.2% by the second axes, respectively. The first axis separates regions with higher population densities, lower natural growth rates, and lower unemployment on the left (Russia, Norway and Iceland) from some of the more remote North American regions on the right side of the axis that have higher natural growth rates and unemployment rates (Figure 2). The North Slope in Alaska stands apart from the other North American regions because it has the highest fuel cost relative to income, income, and employment in the goods sector of all the regions (Figure 3 and 4). On the opposite end of the second axis are the Russian regions and Wade

Hampton, but for slightly different reasons. Regions in Russia have the lowest income and fuel costs relative to income of all the regions.

[Figure 2 and 3 near here]

Meanwhile, Wade Hampton occurs in the lower right hand corner because they have the largest share of employees in the public sector and the lowest participation and income of all the non-Russian regions. The average percent in the public sector in Wade Hampton during our study year is 15% higher than the closest region Finnmark, 65% and 50% respectively (Figure 4).

[Figure 4 near here]

Variation in Alaska is high with regions occuring at both ends of the spectrum (Figure 3 and 4). For example, Wade Hampton has the highest public sector employment rate and the lowest goods producing sector employment rate while the North Slope is the opposite (Figure 4). Yukon, Northwest Territories and Greenland have a lower natural growth rate and higher fuel PP compared to other North American regions. Lastly, Iceland is similar in population density to the Russian and Norway regions, but it has higher participation rate, income, and fuel costs relative to income. The first two axes mostly represent contrast among regions and show no strong temporal trends but rather indicate that regional differences stay pronounced over time (Figure 2).

Dimension 3 and 4 explain 14.5% and 13.3% of the remaining variation, respectively (Figure 5). Overall, income and fuel costs relative to income still explain the variation but less so with employment sectors and participation being more influential at explaining the residual variation. Strong regional differences still persist on these two axes with Russian regions tending to have slightly more employment in the goods sector and higher participation rates. Regions in

Russia also saw large gains in income incomparable U.S.$ and income measured in fuel units which resulted in later points occurring closer to other Arctic regions (Figure 5). Russia was the only country encompassing regions where gains in income measured in fuel units outpaced gains in income in comparable U.S. $. This indicates that fuel became cheaper relative to other consumer goods in Russian regions. Meanwhile, income measured in fuel units dramatically decreased in all North American regions, and decreased more than income in comparable U.S.$. The latter means that fuel became more expensive relative to other consumer goods in these regions. Yamal is closer to the North Slope due to the higher employment in the goods sector versus other regions in Russia. Iceland has lower employment in the public sector and higher employment in the goods sector combined with lower unemployment, and therefore differs slightly from Norway (Figure 2 and 3). Finnmark has higher out-migration and public sector employment share, with slightly lower income than the other two Norwegian regions (Figure 3 and 4).

These two axes also reveal which regions tend to have large annual variation (i.e. length of offshoots). For example, the North Slope in the later years tend to occur left of the center of mass (Figure 5) which was driven by an increase in employment of the good sector) and decrease in out-migration. Chukotka has offshoots more towards the top and right because of a 10 fold decrease in out-migration (Figure 5).

[Figure 5 near here].

Cluster analysis

Cluster analysis identified 3 clusters that were strongly associated with geographic regions and level of involvement in the Western cash-based economy (Figure 6). The 3 clusters identified were: 1) remote, largely indigenous areas with mixed economies (e.g. cash and subsistence), 2) Russia, and 3) areas with increased access to markets and immersion in Western cash-based economies. Interestingly, the North Slope and the Yukon Territory was clustered together with Nordic regions in cluster 3 because they have lower unemployment rates within their respective regions in cluster 1. Yukon has minimal employment in the good sector which is why it occurs more closely with other Nordic regions.

[Figure 6 near here]

Cluster 1 is associated with high natural population growth rate, unemployment rate, and lower participation rates. Cluster 2, was associated with lower income, fuel costs relative to income, natural population growth rate, and higher employment in the good producing sector. Among all the indicators, only migration was not significantly different in cluster 1 from the overall mean migration rate. This is likely because average migration rates were negative (e.g. out-migration) for all regions except Iceland, Yukon, and the Northwest Territories. The third cluster represents regions with higher income, fuel costs relative to income, and lower unemployment.

Volatility within region and temporal trends

We have ranked the regions from highest to lowest based on their CV on each of the indicators (Figure 7) and provided their average values by region (Appendix Table 4).

[Figure 7 near here]

The rankings within each indicator support the structure observed in the MFA analysis. In general, Nordic regions, espcially Norway, are relatively stable in that they have the lowest CV among the regions within each indicator (Figure 7). All three regions in Norway had the lowest average CV rank (Troms 14.0, Nordland 13.0, Finnmark 12.8).

Regions in Russia and Alaska tend to have the most variation with Russia comprising the 3 regions that on average ranked highest (Nenets 4.4, Taimyr 5.6, Chukotka 6.7). In Russia, income and fuel costs relative to income have a large CV due to increases in income but they still remain far below the other countries (Figure 3; Appendix Table 4).

Most of the regions in the Arctic were dependent on the public sector (12 of 18; Figure 3) which was also the most stable of the three sectors (CV = 24.6). Only the North Slope and Yamal had a majority of employment in the goods producing sector and this sector varied the largest among the regions (CV = 58.1). Also, comparisons of variation within each region revealed that the goods-producing sector had more variation than the other two economic sectors in 13 of the 18 regions.

Discussion

Previous reports (Duhaime and Caron 2009) show that national socio-economic systems play (the most) crucial role for the living conditions in the Arctic and show continent-wide "clustering" of Arctic regions. North American, Russia, and Scandinavia were the three main Arctic regions identified largely based on disposable income. Our analyses indicate that the Arctic is more complex when the labor market and the employment in the three economic sectors are included. Pursuing the idea of demo-economic systems we combined demographic and economic variables in our analysis.

Our results indicate an extensive amount of variation, not only among Arctic countries, but also across regions within one and the same country. This suggests that the Arctic is largely driven by a combination of demo-economic characteristics which differ between regions within countries as well as between countries. For example, North American regions differ from Russian and Nordic regions by having high income, but also high unemployment. Russian regions on one hand resemble Nordic regions in that they have low unemployment and high population densities. On the other hand they resemble some of the North American regions with high employment shares in the goods producing sector, indicating extensive resource extraction. Inclusion of the service sector shows that the top three service regions occur in largely indigenous regions (e.g. Nome, NW Territories, and NW Arctic). The high employment share in the service sector indicates the absence of exploitable resources to be sold on markets, but also lower access to jobs in the public sector.

Previous research has focused mostly at the national level and subsequent discussion often identified national policies as the driving forces for differentiation among regions. Our results are explained by a mix of national policies and regional socio-economic differences. For example, the reduced volatility in the Nordic countries is likely due to policies that aim to level out economic differences between different regions of the country (Nordic Council of Ministries, 2006; Duhaime & Caron, 2009), whereas in the U.S. such widespread policies do not exist and regions in the Arctic are greatly influenced by the free market and global prices. For example, regions in Northwest Alaska gas prices nearly doubled from 2005 to 2008 (ADCCED 2012) and rural regions in Alaska are especially vulnerable to these fluctuations in prices (Brinkman et al 2014). Lastly, the higher population densities and network of roads observed in Russia are partially a legacy effect of communist policies which encouraged development of the Arctic. Even though since the collapse of the Soviet Union out-migration from the Arctic has increased

(Heleniak 2007) the connectivity of the road system still exists as do several residents (Heleniak 2012).

Another example of the reduced influence of national policies is the deviation of North Slope and Yukon from the general pattern in North America (Figure 6). Employment in the three sectors varies more within Alaska than among all the circumpolar regions (Figure 4). Particularly North Slope is distinguished by the higher participation rate and income connected to resource extraction (Appendix A4). In Canada, on the other hand, Yukon deviates from the other regions by the highway which traverses the southern edge of the territory and connects Alaska with the contiguous U.S.. Also the largest city, Whitehorse, is found along this road and makes up 68.8% of the population in Yukon (Statistics Canada 2006). Indigenous residents make up a much smaller proportion of the population in the Yukon (25%) in comparison to the Northwest Territory (50%) and Nunavut (85%) (Statistics Canada 2006). Overall, North American regions are largely populated by indigenous residents, and most communities are involved in mixed economies (Goldsmith 2007, Harder and Wenzel 2012) and sharing networks (Collings et al. 1998, Ford et al. 2012, Gerlach and Loring 2013).

The subsistence economy is not the only economy not captured in our data; the informal economy in which people do not officially register with employment offices and/or trade services for commodities is not included. Russia has a large informal economy with estimates ranging from 7.0% to 46.6% between 1995 and 2007 (Johnson et al. 1997, Schneider and Buehn 2007, Schneider et al. 2010), but nevertheless still has moderate unemployment rates. This indicates that people there participate in both the formal and informal economy, as well as subsistence activities. Due to less developed markets the informal economy is widespread allowing money to be transferred outside of the formal market (Kim 2002, Timofeyev 2013).

The income generated or services swapped in the informal economy would not be captured in our estimates of income which likely also explains why income in comparable U.S.$ and income in fuel units was so low in Russia (Einarsson et al. 2004).

One of the important messages in the analyses made by e.g. Petrov (2010) is that in resource dependent regions with a small service sector, negative shocks in the resource based industries are amplified by large out-migration, which in turn leads to decreases in the service sector. On the other hand, a boost in the resource (goods producing) sector will attract people to the regions, which in turn will increase the consumer demand and employment in other sectors. Such a pattern may be used to understand why out-migration on the North Slope reversed course after 2004 and rapidly decreased (-5.2 in 2004 to -0.7 in 2008) which also coincided with large increases in oil and gas jobs (Fried 2013). Many regions in the Arctic have experienced a gender or age imbalance when referring to migration (Kruse et al. 2004, Hamilton and Rasmussen 2010, Rasmussen 2011). Further exploration of more detailed migration data in connection with resource extractions will allow for us to explore such linkages.

Although Greenland and Iceland show many similarities to Norway, they also share characteristics with North America. Like Norway, Greenland has subsidies to lower the costs of transportation and goods in towns on the south-western coast (Nuttall 1994, Shackel 2011), but portions of Greenland are extremely isolated and socio-economic conditions are more similar to those found in North America (Nordregio 2011). Meanwhile, even though Iceland has a lower percentage of people working in the public sector, they also have similar tax policies and the worlds' lowest income inequality as measured by the Gini coefficient (Statistics Iceland 2010). Others have found that Iceland differentiated from other Nordic regions because the redistribution system is not as extensive (Duhaime and Caron 2009) and gross regional product per capital is higher than other Arctic regions expect for Alaska and Canada (Mäenpää 2009).

Data issues and limitations

Research which includes several years over such a large and diverse area will nevertheless face issues with finding data, especially comparable data. The use of multiple demographic and economic indicators means that we are not dependent on a single characterization of a region and thus slight inaccuracies on one parameter may be offset or corrected for in another.

For example employment among the sectors, is likely biased by the inclusion of non-resident workers especially in remote areas with resource extraction. However, if the effects of resource extraction are not important then this would be reflected in income and employment indices like participation and unemployment rates. Also, the effects of outstanding years, when the extraction of the resources was either unusually low or high due to e.g. global economic events will be levelled out.

Future research with more detailed migration data could help better understand the linkage between demographics and economy. We used migration to more examine the relationship between the demographic and economic characteristics of a region, as in the demo-economic systems described by Petrov (2010). However, we would need to know the demographic characteristics of who is migrating in and out of regions for making more exact predictions of how this in turn spills over to the other economic sectors. .

Another limitation is the inability to account for the percent of the population which is indigenous. Statistics on ethnicity are not typically collected in Norway. Lastly, due to data availability Greenland was analyzed in its entirety although region within are diverse with different population sizes and employment opportunities (Nordregio 2011).

Conclusions

Similar to Petrov (2010) we find that demographic and economic dynamics in Arctic regions differs along multiple dimensions which do not necessarily follow national boundaries. Our results show that regions, which are scarcely populated, have high natural population growth and low participation rate occurred together. Closer inspection shows that these regions predominately have a subsistence lifestyle. It is noteworthy that the two regions in North American that have natural resources or road access, North Slope and Yukon, at some point in our analysis differed from their respective countries. The same is the case for the two Russian regions with Yamal having rich oil and gas resources and Murmansk extensive road and railway access. Increased resource extraction, coupled with road and market access and highly mobile residents (Heleniak 2012), could cause economic expansion in some Arctic regions, attracting people from the south but also possibly from other Arctic regions (within the same country), which would then experience a decline.

Overall, we feel it is important to gain a better understanding of the interaction between demographic and economic variables in Arctic regions because these regions are likely to see continued changes such as the likelihood for trans-Arctic sea-routes and increasing resource extraction opportunities (Brubaker and Ragner 2012). We have illustrated that the Arctic encompasses several systems interlinking demographic and economic variables, and that the way these systems work depends on the presence of goods producing industries and whether there exists policies that level out economic wealth and services within the country.

References

Aitchison, J., 1982, The statistical analysis of compositional data. *Journal of the Royal Statistical Society, Series B (Methodology)*, **44**(2), pp. 139–177.

ACIA, 2004, *Arctic Climate Impact Assessment*. (Cambridge: Cambridge University Press). Available from: http://www.acia.uaf.edu/default.html [Accessed 22 December 2014].

Alaska Department of Commerce, Community, and Economic Development (ADCCED), 2012, *Current community conditions: Alaska fuel price report*. (Anchorage, AK: Research and Analysis Section, Division of Community and Regional Affairs, Alaska Department of Commerce, Community, and Economic Development).

Arnason, R., 2007, Climate change and fisheries: assessing the economic impact in Iceland and Greenland. *Natural Resource Modeling*, **20**(2), pp. 163–197.

Auchet, M., 2011, Greenland at the crossroads: what strategy for the Arctic? *International Journal*, **66**(4), pp. 957–970.

Bowes-Lyon, L.M., Richards, L.P., and McGee, T.M., 2009, Socio-economic impacts of Nanisivik and Polaris Mines, Nunavut, Canada. In: *Mining, Society, and a Sustainable World*, L. P. Richards (Eds.), pp. 371–396 (New York, NY: Springer).

Brinkman, T., *et al.*, 2014, Impact of fuel costs on high-latitude subsistence activities. *Ecology and Society*, **19**(4), 18. doi:10.5751/ES-06861-190418

Brubaker, M., *et al*., 2011, Climate change and health effects in Northwest Alaska. *Global Health Action*, **4**, pp. 8445.

Brubaker, R. D., and Ragner, C. L., 2012, A review of the International Northern Sea Route Program (INSROP) – 10 years on. *Polar Geography*, **33**(1-2), pp. 15–38.

Collings, P., Wenzel G., and Condon R. G., 1998, Modern food sharing networks and community integration in the Central Canadian Arctic. *Arctic*, **51**, pp. 301–314.

Duhaime, G., and Caron, A., 2009, *Economic and social conditions of Arctic regions*. In: Glomsrød, S. and I. Aslaksen, (Eds.), *The Economy of the North 2008*. Report 112. Statistics Norway. Available from: http://www.ssb.no/a/english/publikasjoner/pdf/sa112_en/kap2.pdf [Accessed 11 September 2014].

Duhaime G. and Édouard R., 2014, Social stratification through the capabilities approach: the case of the Inuit of Nunavik, *Polar Geography*, **37**, pp. 325-343.

Einarsson, N., Larsen, J. N., Nilsson, A., and Young, O. R., 2004, *AHDR: Arctic human development report*. (Akureyri, Iceland: Stefansson Arctic Institute).

Escofier, B., and Pagès, J., 1994, Multi factor analysis (AFMULT package). *Computational and Statistical Data Analyses*, **18**(1), pp. 121–140.

Fay, G., and Karlsdottir, A., 2011, Social Indicators for Arctic Tourism: observing trends and assessing data. *Polar Geography*, **34**(1-2), pp. 63–86.

Ford, J. D., Lardeau, M. P, and Vanderbilt, W., 2012, The characteristics and experience of community food program users in Arctic Canada: a case study from Iqalui, Nunavut. *BMC Public Health*, **12**, pp. 464 Available from: http://www.biomedcentral.com/1471-2458/12/464 [Accessed 11 September 2014].

Finnegan G. F. and Jacobs J., 2015, Canadian interprovincial employees in the Canadian Arctic: a case study in fly-in/fly-out employment metrics, 2004–2009, *Polar Geography*, April 24, 2015, DOI:10.1080/1088937X.2015.1034795.

Fried, N., 2013, *Alaska's oil and gas industry*. Alaska Economic Trends, June. Available from: http://labor.alaska.gov/trends/jun13.pdf [Accessed 11 September 2014].

Gerlach, C., and Loring, P. A., 2013, Rebuilding northern foodsheds, sustainable food systems, community well-being, and food security. *International Journal of Circumpolar Health*, **72**: pp. 21560.

Glomsrød, S., and Aslaksen, I., (Eds.), 2009, *The Economy of the North 2008*. Report no 112. Statistics Norway. Available from: http://www.ssb.no/a/english/publikasjoner/pdf/sa112_en/sa112_en.pdf [Accessed 11 September 2014].

Goldsmith, S., 2007, *The remote rural economy of Alaska*. (Anchorage, Alaska: Institute of Social and Economic Research), Available from: https://kidscount.alaska.edu/ISER/Publications/u_ak/uak_remoteruraleconomyak.pdf [Accessed 11 September 2014].

Haley, S., Klick, M., Szymoniak, N., and Crow, A., 2011, Observing trends and assessing data for Arctic mining. *Polar Geography*, **34**(1-2), pp. 37–61.

Hamilton, L. C., and Rasmussen, R. O., 2010, Sex ratios and development in Greenland. *Arctic*, **63**(1), pp. 43–52.

Harder, M. T., and Wenzel, G. W., 2012, Inuit subsistence, social economy and food security in Clyde River, Nunavut. *Arctic*, **65**(3), pp. 305–318.

Heleniak, T., 1997, Internal migration in Russia during the economic transition. *Post-Soviet Geography and Economics*, **38**(2), pp. 81–104.

Heleniak, T., 2012, International comparisons of population mobility in Russia. *International Journal of Population Research*, 361497, pp. 13.

Husson F., Lê S., and Pagès J., 2011, *Exploratory Multivariate Analysis by Example Using R*. (London: Chapman & Hall, CRC Press).

Huskey, L., 2005, Challenges to economic development: dimensions of "remoteness" in the north. *Polar Geography*, **29**(2), pp. 119–125.

Huskey, L., Berman, M., and Hill, A., 2004, Leaving home, returning home: migration as a labor market choice for Alaska Natives. *Annals of Regional Science*, **38**(1), pp. 75–92.

Huskey, L., and Southcott, C., (Eds.), 2010, *Migration in the Circumpolar North: issues and contexts*. (Edmonton, Canada: CCI Press).

Johnson, S., Kaufmann, D., and Shleifer, A., 1997, The unofficial economy in transition. *Brookings Papers on Economic Activity*, pp. 159–221.

Kajan, E., 2014, Arctic tourism and sustainable adaptation: community perspectives to vulnerability and climate change. *Scandinavian Journal of Hospitality and Tourism*, **14**(1), pp. 60–79.

Kim, B., 2002, The participation of Russian households in the informal economy: evidence from VTsIOM data. *Economics of Transition*, pp. 10:685–713.

Kruse, J., *et al.*, 2008, Survey of living conditions in the Arctic (SLiCA). In *Barometers of Quality of Life Around the Globe How are We Doing?* V. Møller, D. Huschka, and A.C. Michalos (Eds.), pp. 107–134 (New York, NY: Springer).

Larsen, J. N., 2013, Global change, northern transformations and a changing socio-economic landscape. In: *Environmental Security in the Arctic Ocean*, P. A. Vylegzhanin and N. Alexander (Eds.), pp. 219-229 (Dordrecht: Springer).

Larsen, J. N., Schweitzer, P., and Fondahl G., (Eds.), 2010, *Arctic Social Indicators: A follow up to the Arctic Human Development Report*. (Copenhagen: Nordic Council of Ministers).

Lebart L., Piron M. and Morineau A., 2006, *Statistique exploratoire multidimensionnelle: visualisation et inférence en fouilles de données*. 4th ed. (Paris: Dunod).

Lindholt, L., and Glomsrød, S., 2012, The Arctic: no big bonanza for the global petroleum industry. *Energy Economics*, **34**, pp. 1465–1474.

Mäenpää, I., 2009, Comparative analysis of Arctic economies at macro level. *In*: *The Economy of the North 2008*. Report 112, Glomsrød, S. and I. Aslaksen, (Eds.) Statistics Norway Available from: http://www.ssb.no/a/english/publikasjoner/pdf/sa112_en/kap2.pdf [Accessed 11 September 2014].

Nordic Council of Ministers, 2006, Nordic co-operation on taxation. Available from: http://www.norden.org/en/about-nordic-co-operation/areas-of-co-operation/taxation/nordic-co-operation-on-taxation [Accessed 11 September 2014].

Nordregio, 2011, Megatrends. Nordic Council of Ministers, Copenhagen. Available from: http://www.norden.org/en/publications/publications/2011-527 [Accessed 22 January 2015].

Nuttall, M., 1994, Greenland: emergence of an Inuit homeland. In: *Polar peoples: self-determination and development*, Minority Rights Group (Eds.), pp. 1–28 (London: Minority Rights Publications).

Pearce, T., *et al.*, 2012, Climate change adaptation in remote, resource-dependent communities: an Arctic example. *Regional Environmental Change*, **12**(4), pp. 825–837.

Petrov, A., 2010, Post-staple bust: modelling economic effects of mine closure and post-mine demographic shifts in an Arctic economy (Yukon). *Polar Geography*, **33**(1-2), pp. 39–61.

Petitgas, P., and Poulard, C. J., 2009, A multivariate indicator to monitor changes in spatial patterns of age-structured fish populations. *Aquatic Living Resources*, **22**(2), pp. 165–171.

Randall, J. E., and Ironside, R. G., 1996, Communities on the edge: An economic geography of resource-dependent communities in Canada. *Canadian Geographer*, **40**(1), pp. 17–35.

Rasmussen, R.O., 2011, Why the other half leave: gender aspects of northern sparsely populated areas. In *Demography at the Edge*, D. Carson, R.O. Rasmussen, P. Ensign, L. Huskey, and A. Taylor (Eds.), pp. 237–245 (Ashgate Publishing Company).

Schneider, F., Buehn, and Montengero, C.E., 2010, Shadow economies all over the world: new estimates for 162 countries from 1999 to 2007. *Policy Research Working* Paper No. 5356. Available from:

https://openknowledge.worldbank.org/bitstream/handle/10986/3928/WPS5356.pdf?sequence=1 [Accessed 26 December 2014].

Statistics Canada, 2006, *Statistics Canada*. Available from: http://www.statcan.gc.ca/start-debut-eng.html [Accessed 22 January 2015].

Statistics Iceland, 2010, *Statistics Iceland*. Available from: http://www.statice.is/Pages/444?NewsID=5093 [Accessed 11 September 2014].

Strulik, H., 1999, Demographic transition, stagnation, and demoeconomic cycles in a model for the less developed economy. Journal of Macroeconomics, **21**(2), pp. 397–413.

Timofeyev, J., 2013, The effects of the informal sector on income of the poor in Russia. *Social Indicator Research*, **111**(3), pp. 855–866.

Ward, J. H., Jr., 1963, Hierarchical Grouping to Optimize an Objective Function. *Journal of the American Statistical Association*, **58**(301), pp. 236–244.

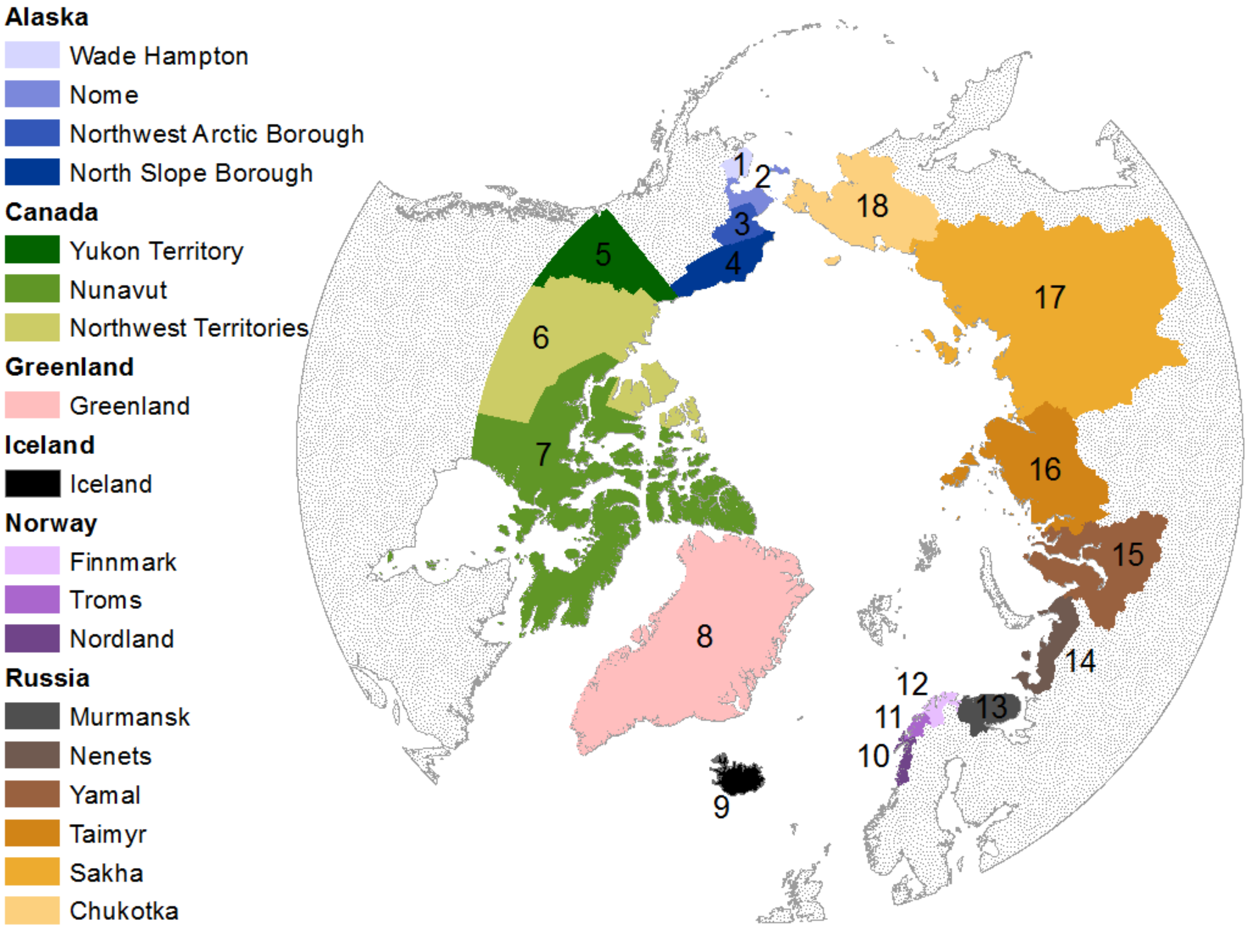

Figure 1. Regions surrounding the Arctic Ocean and which were applied in the multifactorial analysis.

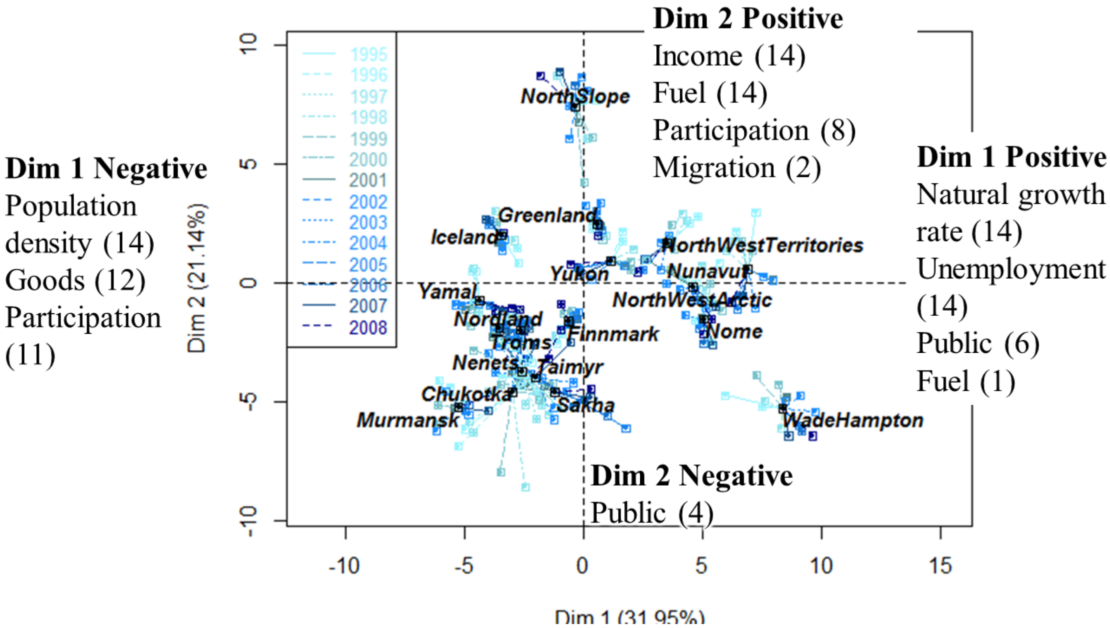

Figure 2. Multifactor analysis results showing the 2 first dimensions for 9 indicators covering the time period 1995-2008 and distributed according to the 18 study regions. The numbers in parenthesis after the indicators indicate the number of years (out of 14) in which the correlation of the indicator with the respective dimension is greater than 0.5 (positive correlation) or smaller than -0.5 (negative correlation).

Rank	Population density	Natural growth rate	Migration	Goods	Services	Public	Unemploy-ment	Participation	Income	Fuel
1	Murmansk	Wade Hampton	Chukotka	North Slope	Nome	Wade Hampton	Nunavut	Greenland	North Slope	Greenland
2	Nordland	Nunavut	North Slope	Yamal	Northwest Territories	Finnmark	Northwest Territories	Iceland	Northwest Territories	North Slope
3	Troms	Northwest Arctic	Northwest Arctic	Nenets	Northwest Arctic	Troms	Wade Hampton	Yamal	Yukon	Northwest Territories
4	Iceland	North Slope	Wade Hampton	Iceland	Yukon	Greenland	Northwest Arctic	Chukotka	Nunavut	Yukon
5	Finnmark	Nome	Taimyr	Murmansk	Nunavut	Yukon	Murmansk	Yukon	Iceland	Nunavut
6	Yamal	Northwest Territories	Nome	Chukotka	Iceland	Nordland	Nome	North Slope	Troms	Northwest Arctic
7	Sakha	Greenland	Murmansk	Taimyr	Troms	Nunavut	Nenets	Taimyr	Finnmark	Nome
8	Nenets	Iceland	Sakha	Sakha	Nordland	Chukotka	Sakha	Troms	Nordland	Iceland
9	Wade Hampton	Yamal	Finnmark	Greenland	Wade Hampton	Nome	Taimyr	Finnmark	Nome	Troms
10	Nome	Yukon	Greenland	Nordland	Murmansk	Sakha	Yukon	Nenets	Northwest Arctic	Finnmark
11	Greenland	Finnmark	Nenets	Finnmark	Finnmark	Taimyr	Greenland	Nordland	Greenland	Nordland
12	Chukotka	Sakha	Nordland	Northwest Territories	Greenland	Nenets	Yamal	Northwest Territories	Wade Hampton	Wade Hampton
13	Northwest Arctic	Taimyr	Troms	Northwest Arctic	Sakha	Northwest Arctic	North Slope	Murmansk	Yamal	Yamal
14	Yukon	Troms	Yamal	Troms	Taimyr	Northwest Territories	Chukotka	Sakha	Nenets	Nenets
15	Taimyr	Chukotka	Nunavut	Nunavut	Chukotka	Murmansk	Finnmark	Nunavut	Chukotka	Chukotka
16	Northwest Territories	Nenets	Yukona	Yukon	Yamal	Iceland	Nordland	Nome	Taimyr	Murmansk
17	North Slope	Nordland	Northwest Territoriesa	Nome	North Slope	Yamal	Troms	Northwest Arctic	Sakha	Sakha
18	Nunavut	Murmansk	Iceland[a]	Wade Hampton	Nenets	North Slope	Iceland	Wade Hampton	Murmansk	Taimyr
Key	Alaska	Canada	Greenland	Iceland	Norway	Russia				

Figure 3. Regions ranked within their indicator value from most (1) to least (18). Natural growth rate and migration can be largely positive (1) or negative (18). [A] Indication positive migration (i.e. in-migration) with the largest positive migration in Iceland. Income is in comparable US $ units, and fuel represents cost of fuel in relation to income within each country.

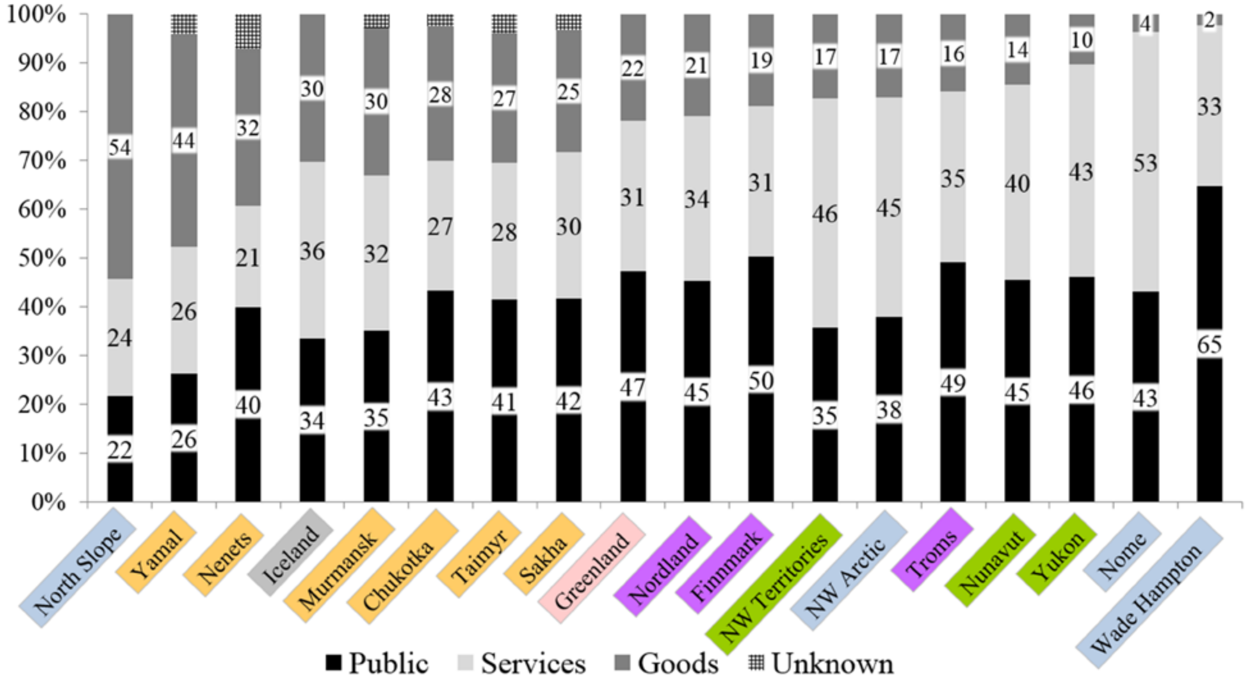

Figure 4. Average employment in public, service and goods sectors for the 18 regions. Regions in Russia do not total 100% because some employment numbers could not be assigned to the three categories used.

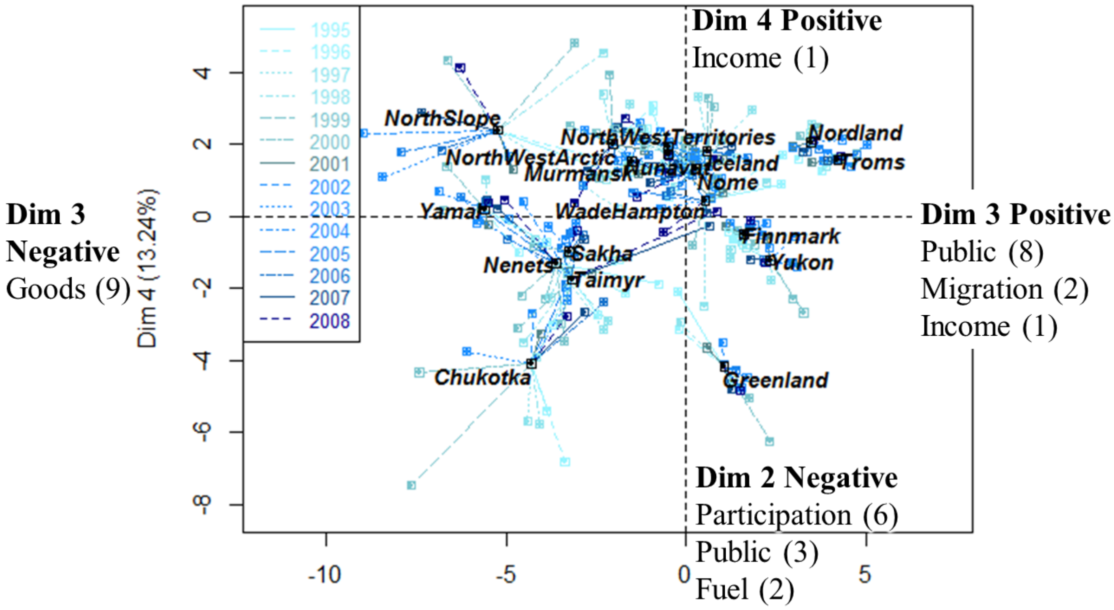

Figure 5. Multifactor analysis results showing dimensions 3 and 4 for 9 indicators covering the time period 1995-2008 and distributed according to the 18 study regions. The numbers in parenthesis after the indicators indicate the number of years (out of 14) in which the correlation of the indicator with the respective dimension is greater than 0.5 (positive correlation) or smaller than -0.5 (negative correlation). Income is in comparable US $ units, and fuel represents cost of fuel in relation to income within each country.

		Cluster 1	Cluster 2	Cluster 3
Human	Population density	-5.75	NS	5.23
	Migration	NS	-3.65	2.98
	Natural growth rate	12.37	-8.70	-3.07
Employment	Employment in goods	-8.94	6.82	NS
	Employment in services	9.77	-8.23	NS
	Employment in public	3.62	-3.94	NS
	Participation	-10.99	2.66	7.58
	Unemployment	11.05	NS	-9.05
Monetary	Income	5.08	-13.67	8.40
	Fuel	4.39	-12.10	7.52

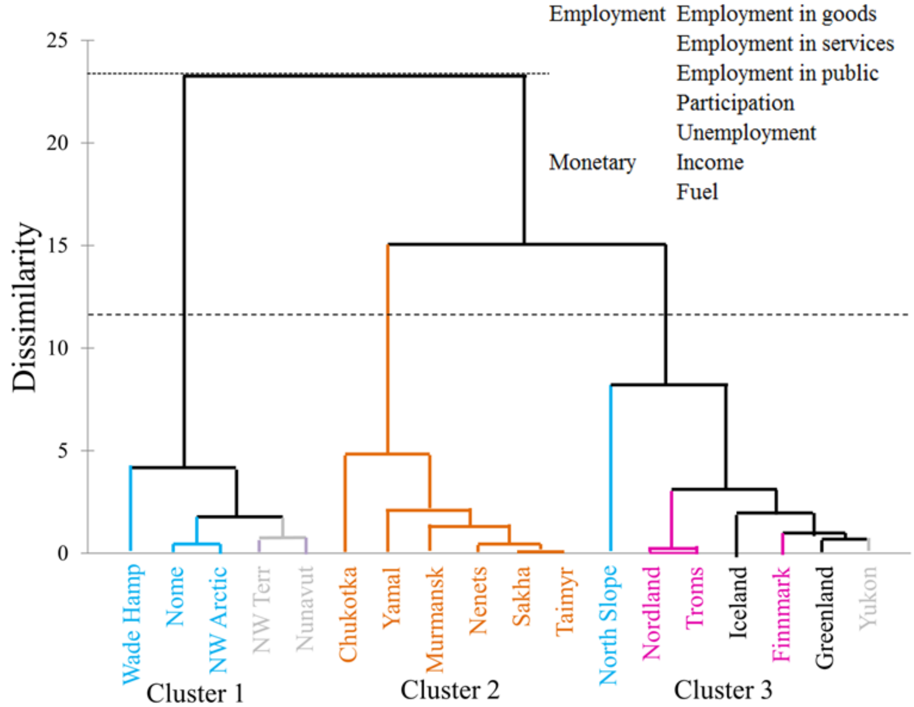

Figure 6. Cluster analysis and v-test results with 10 indicator parameters from 1995 through 2008 for 18 regions within Alaska (blue), Canada (grey), Greenland (black), Iceland (black), Norway (pink), and Russia (orange). NS means that the indicators in the cluster were not significantly different from the overall mean ($p < 0.05$). Income is in comparable US $ units, and fuel represents cost of fuel in relation to income within each country.

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Rank	Population density	Natural growth rate	Migration	Goods	Services	Public	Unemploy-ment	Participation	Income	Fuel
1	Chukotka	Nordland	Iceland	Nome	Taimyr	Nunavut	Iceland	Taimyr	Nenets	Nenets
2	Nunavut	Taimyr	Yukon	Wade Hampton	Nenets	Nenets	Chukotka	Northwest Arctic	Chukotka	Chukotka
3	Murmansk	Chukotka	Northwest Territories	Taimyr	Nunavut	North Slope	Nenets	Yamal	Murmansk	Taimyr
4	Iceland	Nenets	Greenland	Nenets	Murmansk	Northwest Arctic	Murmansk	North Slope	Taimyr	Murmansk
5	Wade Hampton	Yukon	Murmansk	Yukon	Yamal	Greenland	Yukon	Sakha	Yamal	Sakha
6	Nenets	Finnmark	Wade Hampton	Murmansk	Wade Hampton	Wade Hampton	Yamal	Nenets	Sakha	Yamal
7	Northwest Arctic	Sakha	Sakha	Greenland	Greenland	Northwest Territories	Taimyr	Nome	North Slope	Wade Hampton
8	Yamal	Greenland	Finnmark	Nunavut	North Slope	Taimyr	North Slope	Wade Hampton	Iceland	Northwest Arctic
9	North Slope	North Slope	Nordland	Sakha	Sakha	Chukotka	Sakha	Murmansk	Troms	North Slope
10	Sakha	Troms	Chukotka	Northwest Arctic	Northwest Arctic	Yamal	Wade Hampton	Chukotka	Nordland	Iceland
11	Northwest Territories	Yamal	Northwest Arctic	Finnmark	Chukotka	Nome	Northwest Arctic	Nunavut	Finnmark	Nome
12	Yukon	Northwest Arctic	Nome	Northwest Territories	Northwest Territories	Murmansk	Nordland	Yukon	Nome	Troms
13	Taimyr	Northwest Territories	North Slope	North Slope	Iceland	Yukon	Troms	Troms	Northwest Territories	Nordland
14	Nome	Nome	Taimyr	Iceland	Nome	Iceland	Finnmark	Northwest Territories	Northwest Arctic	Finnmark
15	Finnmark	Wade Hampton	Nenets	Yamal	Yukon	Sakha	Nunavut	Finnmark	Wade Hampton	Greenland
16	Troms	Nunavut	Troms	Troms	Finnmark	Nordland	Northwest Territories	Iceland	Yukon	Nunavut
17	Nordland	Iceland	Nunavut	Chukotka	Nordland	Troms	Nome	Nordland	Nunavut	Yukon
18	Greenland	Murmansk	Yamal	Nordland	Troms	Finnmark	Greenland	Greenland	Greenland	Northwest Territories
Key	Alaska	Canada	Greenland	Iceland	Norway	Russia				

Figure 7. Regions ranked based on coefficient of variation from most (1) to least (18). Income is in comparable US $ units, and fuel represents cost of fuel in relation to income within each country.

Appendix Table 1. Table of the purchasing power parity (PPP) conversion factors used for this analysis (1995-2008). The United States of America (USA) is set to one.

Year	USA	Canada	Greenland	Iceland	Norway	Russia
1995	1.00	1.22	8.49	73.26	9.19	1.72
1996	1.00	1.29	8.45	75.05	9.06	2.46
1997	1.00	1.20	8.44	74.53	9.10	2.78
1998	1.00	1.19	8.40	77.26	9.39	3.26
1999	1.00	1.190	8.47	79.68	9.33	5.54
2000	1.00	1.23	8.41	84.31	9.13	7.31
2001	1.00	1.22	8.47	88.93	9.18	8.32
2002	1.00	1.23	8.30	91.34	9.11	9.27
2003	1.00	1.23	8.54	94.48	9.11	9.87
2004	1.00	1.23	8.40	94.25	8.99	11.55
2005	1.00	1.21	8.59	99.08	8.90	12.74
2006	1.00	1.21	8.34	107.31	8.70	12.64
2007	1.00	1.21	8.24	113.11	8.78	13.97
2008	1.00	1.23	8.01	117.42	8.75	14.34

Appendix Table 2. Table of the industrial activity classifications within the goods, service, and public employment sectors.

Sector	Industry codes	NACE*	NAICS**	Russia
Goods	Agriculture, forestry, fisheries, aquaculture	01-03	11	NA
	Mining, service for mining, oil and gas exploration	05-09	21	Mineral extraction
	Manufacturing, waste management	10-33, 38-39	31-33, 56	Proceeding industry
	Utilities and construction	35-37, 41-43	22-23	Electricity, gas and water, construction
Service	Trade and repairs	45-47	42, 44-45	Trade and repair of vehicle and other personal items
	Accommodation and restaurant	55-56	72	Hotel and restaurants
	Transportation, mail, telephone, etc.	49-53, 58-63	48-49, 51	Transport and communication
	Commercial services	64-66, 68-74, 75, 77-82	52- 55, 71	Finances, immoveable trade, personal services
Public	Public administration, public services, personal services	84-88, 90-97, 99	61-62, 81, 92	Governance, military and social insurance, education, medical and social services

* NACE code Rev.2 (Nomenclature Europeenne des activites economiques)

** NAICS code (North-American Industry Classification Standard)

Appendix Table 3. Table of economic and demographic indicators definitions used in this paper.

Natural population growth rate	$\frac{\text{number of born } - \text{number of dead}}{\text{population}}$
Net migration rate	$\frac{\text{number of immigrants} - \text{number of emigrants}}{\text{population}}$
Fuel	$\frac{\text{nominal income in national currency in the region}}{\text{regional price on 1 litre 95 octane fuel in national currency}}$
Income	$\frac{\text{real average income in the region}}{\text{PPP} - \text{index (as given in table A1)}}$
Participation rate	$\frac{\text{number of persons in the labour force} *}{\text{total number of persons in working age } (15-74 \text{ years}) **}$
Unemployment rate	$\frac{\text{number of persons unemployed}}{\text{number of persons in the labour force}}$
Employment share in sector	$\frac{\text{number of employees working in sector} ***}{\text{number of employees aggregated over all sectors}}$
Population density	$\frac{\text{Population of the region in actual numbers}}{\text{Area of the region in km}^2}$

*the labor force is the sum of all persons either being employed or seeking employment

**Due to lower life expectancy, in Russia working age is 16-60 for women and 16-64 for men.

*** Sector includes goods, services, and public.

Appendix Table 4. Table of mean indicator values per region with standard deviation in parenthesis. Income is in comparable US $ units, and fuel represents cost of fuel in relation to income within each country.

	Population density	Natural growth rate	Migration	Goods	Service	Public	Unemplo y-ment	Particip -ation	Income	Fuel
Chukotka	0.09	0.24	-3.76	0.28	0.27	0.43	0.06	0.77	1,185	612
		(0.12)	(2.70)	(0.02)	(0.02)	(0.03)	(0.02)	(0.03)	(575)	(422)
Sakha	0.32	0.48	-0.95	0.25	0.30	0.42	0.09	0.67	771	409
		(0.09)	(0.53)	(0.03)	(0.03)	(0.01)	(0.02)	(0.04)	(250)	(241)
Taimyr	0.05	0.4	-1.19	0.27	0.28	0.42	0.09	0.72	790	407
		(0.2)	(1.33)	(0.10)	(0.08)	(0.03)	(0.03)	(0.10)	(260)	(257)
Yamal	0.66	0.75	-0.1	0.44	0.26	0.27	0.08	0.78	1,548	932
		(0.09)	(0.54)	(0.04)	(0.04)	(0.02)	(0.03)	(0.06)	(505)	(541)
Nenets	0.24	0.215	-0.41	0.32	0.21	0.40	0.10	0.71	1,234	860
		(0.10)	(0.72)	(0.09)	(0.06)	(0.09)	(0.04)	(0.04)	(989)	(756)
Murmansk	6.43	-0.25	-1.00	0.30	0.32	0.35	0.12	0.69	687	437
		(0.10)	(0.39)	(0.06)	(0.07)	(0.02)	(0.04)	(0.03)	(278)	(272)
Finnmark	1.52	0.477	-0.9	0.19	0.31	0.50	0.05	0.71	24,605	22,771
		(0.18)	(0.51)	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)	(5,565)	(2,275)
Troms	5.87	0.39	-0.27	0.16	0.35	0.49	0.03	0.72	25,561	23,632

		(0.061)	(0.48)	(0.01)	(0.003)	(0.01)	(0.01)	(0.01)	(5,958)	(2,571)
Nordland	6.19	0.14	-0.35	0.21	0.34	0.45	0.04	0.71	24,510	22,665
		(0.08)	(0.24)	(0.01)	(0.004)	(0.01)	(0.01)	(0.01)	(5,693)	(2,420)
Iceland	2.77	0.85	0.44	0.30	0.36	0.34	0.02	0.79	27,238	24,805
		(0.04)	(0.69)	(0.03)	(0.02)	(0.01)	(0.01)	(0.01)	(6,830)	(4,961)
Greenland	0.03	0.863	-0.735	0.22	0.31	0.47	0.09	0.83	19,238	74,304
		(0.15)	(0.26)	(0.03)	(0.03)	(0.05)	(0.01)	(0.004)	(2,315)	(6,785)
Nunavut	0.01	2.165	-0.003	0.14	0.4	0.45	0.24	0.645	28,002	37,828
		(0.20)	(0.02)	(0.02)	(0.09)	(0.10)	(0.10)	(0.02)	(3,748)	(3,380)
Northwest Territory	0.04	1.26	0.13	0.17	0.46	0.35	0.20	0.70	33,530	44,964
		(0.13)	(0.06)	(0.02)	(0.03)	(0.03)	(0.02)	(0.01)	(5,673)	(2,197)
Yukon	0.07	0.69	0.122	0.10	0.433	0.45	0.09	0.77	29,004	41,779
		(0.27)	(0.07)	(0.03)	(0.02)	(0.03)	(0.03)	(0.07)	(4,332)	(3,371)
North Slope	0.03	1.76	-1.71	0.54	0.24	0.22	0.07	0.74	38,372	60,047
		(0.30)	(1.90)	(0.06)	(0.02)	(0.05)	(0.02)	(0.04)	(12,227)	(14,488)
Northwest Arctic	0.08	1.945	-1.39	0.17	0.45	0.38	0.12	0.59	24,088	37,471
		(0.21)	(1.01)	(0.02)	(0.04)	(0.04)	(0.02)	(0.05)	(3,985)	(12,417)
Nome	0.16	1.69	-1.03	0.04	0.53	0.43	0.11	0.59	24,287	36,168

		(0.15)	(0.88)	(0.02)	(0.03)	(0.03)	(0.01)	(0.03)	(4,341)	(6,988)
Wade Hampton	0.16	2.52	-1.30	0.02	0.33	0.65	0.16	0.55	141,916	20,147
		(0.25)	(0.67)	(0.01)	(0.06)	(0.05)	(0.04)	(0.03)	(2,434)	(6,706)