

### 3. Comparative analysis of Arctic economies at macro level

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The Arctic hosts few people upon vast areas of land and oceans. This vast territory contains rich valuable natural resources, and the Arctic economies are largely based on natural resource extraction. Variations in the regional endowments lead to considerable variations in regional GDP across the Arctic. However, transfers tend to modify the gaps in disposable income per capita between regions. This chapter takes a broader look at the Arctic economies from a macro level perspective, taking a circumpolar outlook as well as comparing the Arctic regions with their non-Arctic counterparts within the countries.

The Arctic economies are generally confined to regions which are encompassed or traversed by the Arctic Circle. In many contexts, however, regions in Europe that are situated somewhat to the south of the Arctic Circle, but participate in the cooperation of the Barents Euro-Arctic Council<sup>1</sup> are included among the Arctic economies. The Arctic regions of the ECONOR project largely comply with this definition, however the Canadian region of Nunavik is left out because Nunavik is part of Quebec and lacks official regional accounts<sup>2</sup> (Figure 3.1). Eight countries have regions belonging to the Arctic economies: United States, Canada, Denmark, Iceland, Norway, Sweden, Finland and Russia.

The overview presented below illustrates regional economic activity in terms of Gross Regional Product (GRP). Further, Disposable Income of Households (DIH) is included to indicate economic welfare of the populations. The data used in this analysis are based

mainly on the regional accounts of the statistical offices of the Arctic countries. The regional data are converted from local currencies to USD in purchaser price parities (PPP), see box I pages 24-25. Box 3.1 below illustrates some of the steps that have to be taken when harmonising the valuation of economic data across regions.

#### **An overview of Arctic economies**

At circumpolar level the Arctic regions with 0.2 percent of the world population generated 0.5 percent of global gross domestic product (GDP) in 2005. The Arctic covers as much as 11 percent of the global surface area.

Arctic states hold different shares of the Arctic in terms of land area, population and GDP. Figure 3.2 illustrates the role of the Arctic states in the entire Arctic region. Arctic Russia covers more than half of the total Arctic surface area. The Russian share of economic activity amounts to 70 percent of total Arctic activity and the population share is similarly high. Canada and Denmark (Greenland and Faroe Islands) take the second and third largest shares of the surface area of the Arctic, but have disproportionately low population densities and economic activity levels. In other Nordic countries – Iceland, Norway, Sweden and Finland – the population densities and economic activity levels are relatively high.

Figure 3.3 shows the role of the Arctic regions in their national context. In the United States and Canada the population and GDP of the Arctic regions represent less than one percent of country level. In Russia the

#### **Box 3.1. The harmonisation of economic values across regions**

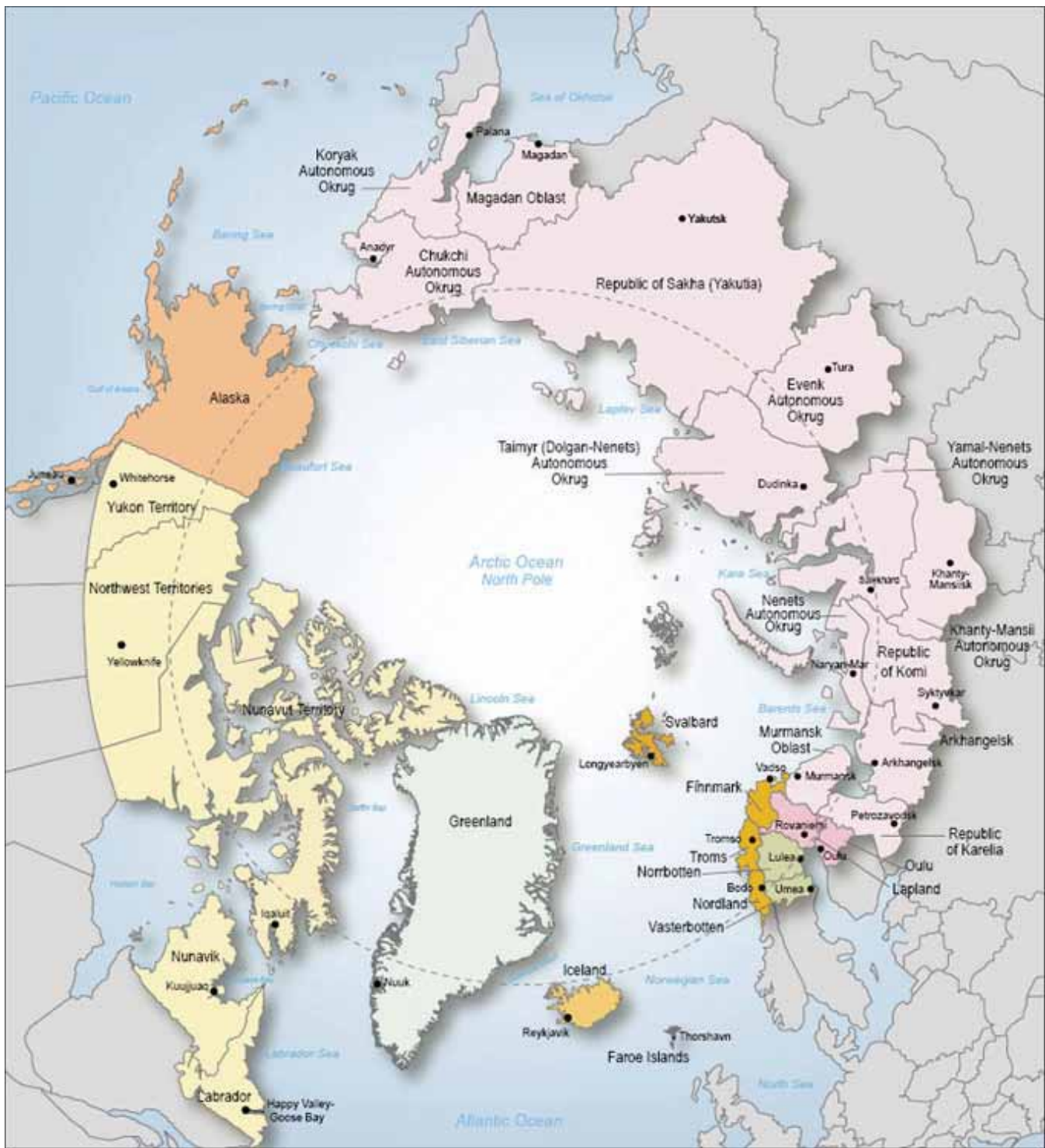
United States, Canada and Sweden provide gross regional product (GRP) at market prices (including the product taxes minus subsidies) whereas other countries present GRP at basic prices (at factor cost or as gross value added). From detailed regional accounts of United States, Canada and Sweden the share of product taxes less subsidies were available, however, and all the GRP figures could be converted into basic prices.

In the national statistics the figures of GRP and disposable income of household (DIH) are expressed in national currencies. They are converted to unified purchasing power parity (PPP) values and expressed in USD 2005. The PPP conversion factors have been taken from the Economic Outlook database of IMF. The role of the PPP conversion factors is

to adjust for differences in regional purchasing power, thus providing a better indicator of the capacity to consume based on regional price levels while at the same time achieving a unified valuation. However, national PPP conversion factors reflecting national price levels have been used, causing some bias in the GRP and DIH values, because the price levels in Arctic regions may differ from the country average price levels.

Regional accounts for Norway, Sweden, Russia, Greenland and Faroe Islands are available only at current prices. To get the volume growth of the regional economy the GRP of the year 2000 are converted into 2005 price level by using the implicit price index of the national GDP series at the IMF database.

Figure 3.1. The circumpolar Arctic



Source: www.arcticstat.org

Arctic share of the population was 5 percent, but the Arctic region generated as much as 15 per cent of total Russian GDP in 2005. Iceland is totally encompassed by the Arctic as defined in this report and so its percentage shares are all equal to 100. For the other countries the Arctic population share is highest in Finland (12 per cent) and Norway (10 per cent).

**Arctic population**

Population growth for Arctic and non-Arctic regions within countries over the whole period 2000–2005 is shown in Figure 3.4. The Arctic regions of both United

States and Canada have experienced a more rapid population growth than the non-Arctic regions within these countries. The population growth in Alaska was 6.7 percent over the 5-year period, in Northern Canada it was 5.9 percent. The population of Arctic Russia declined 1.9 percent – more than in any other Arctic region, but less than in other parts of Russia, where the population decreased by 2.2 percent. Both Sweden and Norway experienced declining population in their Arctic regions, at 0.8 and 0.4 percent respectively. Sweden and Norway were the only Arctic countries with population growth in non-Arctic regions and popula-

Figure 3.2. Arctic surface area, population and GRP of Arctic states as share of the Arctic total. 2005. Per cent

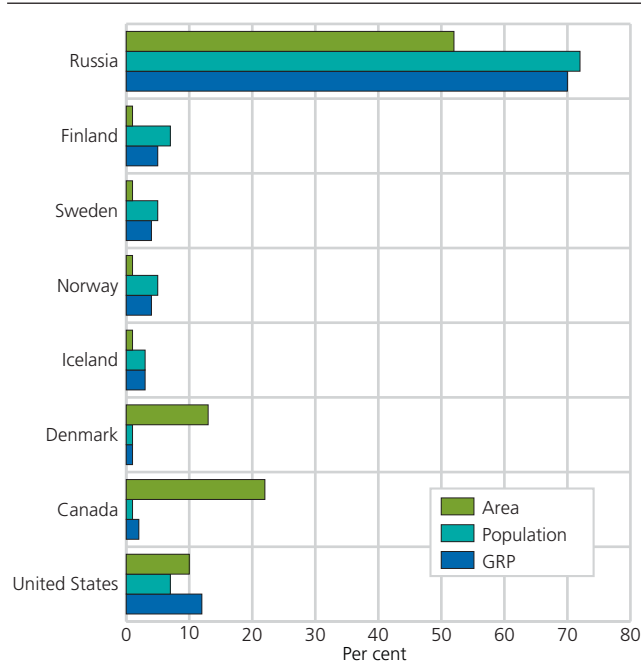
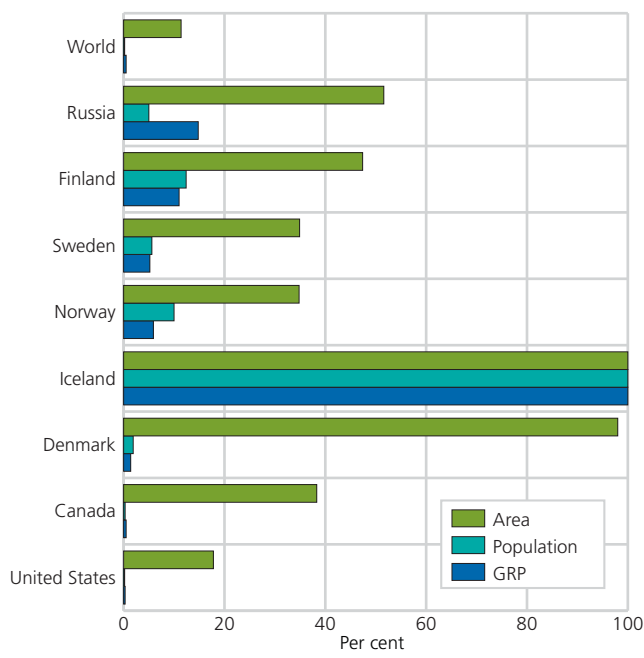


Figure 3.3. Arctic region share of surface area, population and GRP of corresponding country. 2005. Per cent



tion decline in Arctic regions. This development was particularly pronounced in Norway, where the non-Arctic region had a population growth of around 3.5 percent. Arctic Finland experienced a marginal population growth. In the Arctic as a whole, there was a decline in population of 0.8 percent during 2000-2005.

Figure 3.5 shows the population growth at a detailed regional level. In Russia the two regions with large oil and natural gas industries, Yamal-Nenets and Khanty-Mansii, have had rather high population growth at 6.6 and 6.9 percent, respectively. Except for Taimyr, other

Figure 3.4. Population growth. Arctic and non-Arctic regions by country. 2000-2005. Per cent

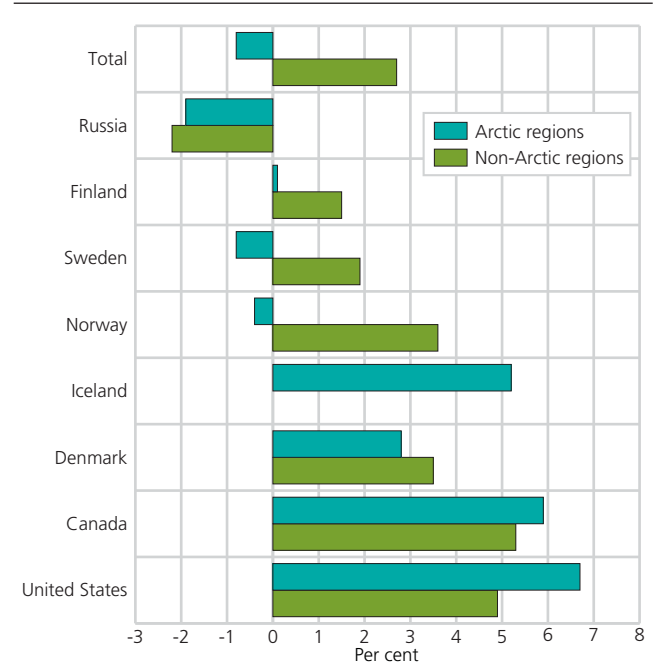
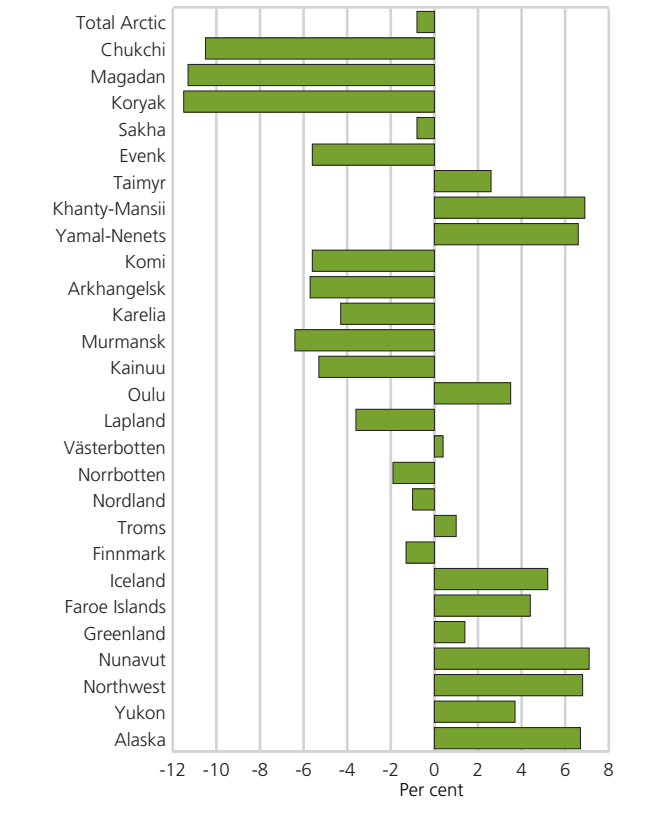


Figure 3.5. Population growth by Arctic region. 2000-2005. Per cent



Russian Arctic regions have declining populations, around 5-6 percent decline in western regions, and above 10 percent decline in the eastern regions of Koryak, Magadan and Chukchi. These numbers reflect the “demographic echo of the World War II”, see chapter 2, page 20, in addition to the economic and social crisis following the break-up of Former Soviet Union, which was modified in some regions by the revitalization

Figure 3.6. **Gross regional product (GRP) per capita. 2005. 1 000 USD-PPP**

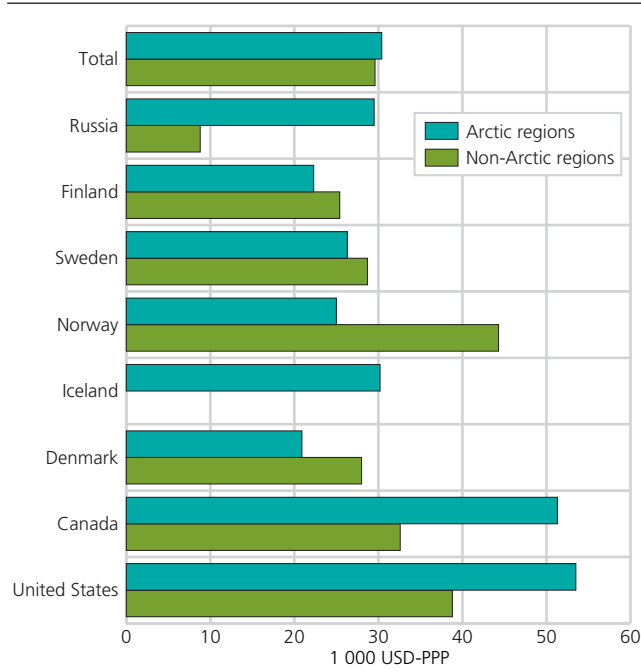
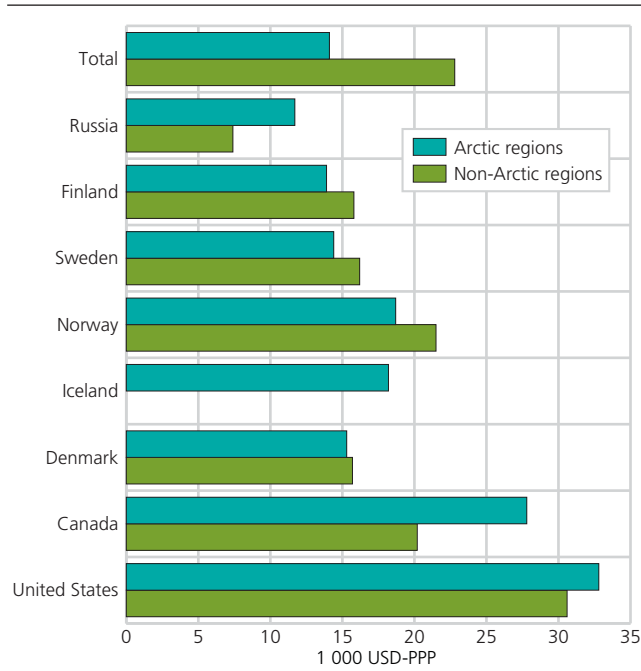


Figure 3.7. **Disposable income of households per capita. 2005. 1 000 USD-PPP**

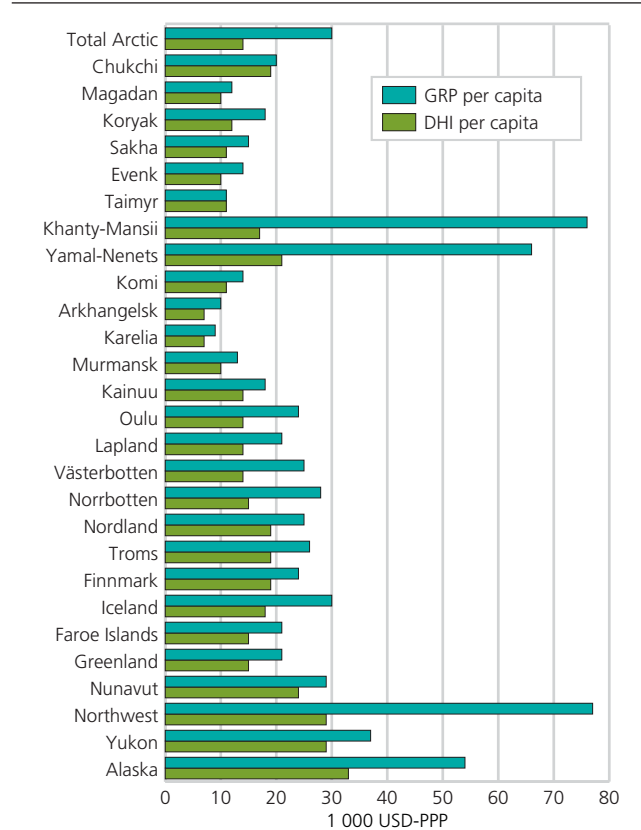


of the petroleum industry. Arctic regions of Finland, Norway and Sweden have one subregion each with population growth, in other subregions the population declines. This structural change is most clearly visible in Arctic Finland, where Oulu has absorbed migrants attracted by the electronic industry and academic institutions.

**The economy of the Arctic**

In resource rich Arctic regions of United States, Canada and Russia the Gross regional product (GRP) per capita is considerably higher than in non-Arctic regions (Figure 3.6). In Russia the GRP per capita in Arctic regions is as much as 3 times higher than in the rest of the

Figure 3.8 **Gross regional product (GRP) per capita and disposable income of households (DIH) per capita, by Arctic regions. 2005. 1 000 USD-PPP**

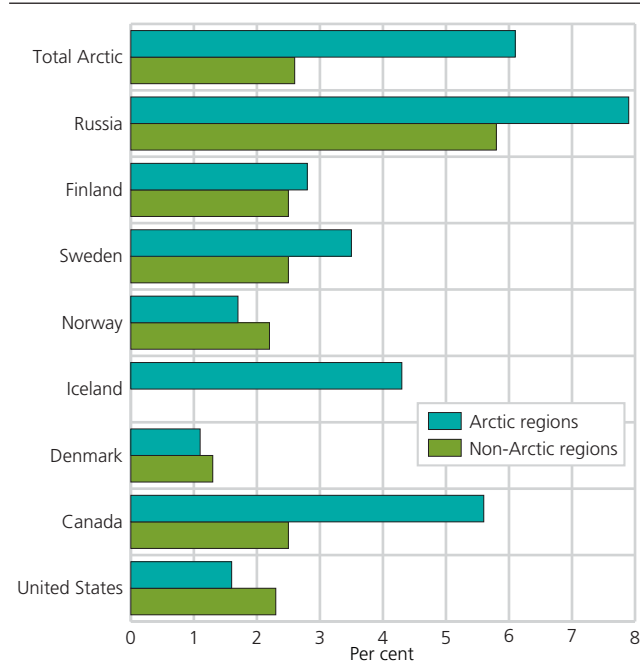


country, reflecting the presence of huge petroleum and mineral industries in Arctic Russia. In Norway, where revenue from oil and natural gas extraction is generated in non-Arctic regions, the difference in favour of non-Arctic regions is large. Sweden, Finland and Denmark also have higher GRP per capita in the non-Arctic regions, although the difference is much smaller than in Norway. GRP per capita in Iceland matches the circumpolar average, and among Arctic regions, only Arctic Canada and Alaska had higher GRP per capita.

Differences in disposable income per capita across Arctic countries are smaller than differences in GRP per capita, and the gap between Arctic and non-Arctic regions are considerably smaller than the difference in GRP per capita (Figure 3.7). This follows from income redistribution mechanisms as revenues and taxes from natural resource extraction in Arctic regions enter the country level economies whereas the regions of resource origin receive transfers.

Among Arctic regions, disposable income per capita is highest in United States. Note, however, that a comparison of disposable income per capita between countries can only roughly indicate differences in welfare. In United States, the government covers a lower share of educational and health expenditures than in other countries. For better comparability, public expenditures to household services should be added to the disposable incomes. The share of GRP devoted to public services can be found in chapter 4 in this report.

Figure 3.9. Average annual economic growth of Arctic and non-Arctic regions, by country. 2000-2005. Per cent



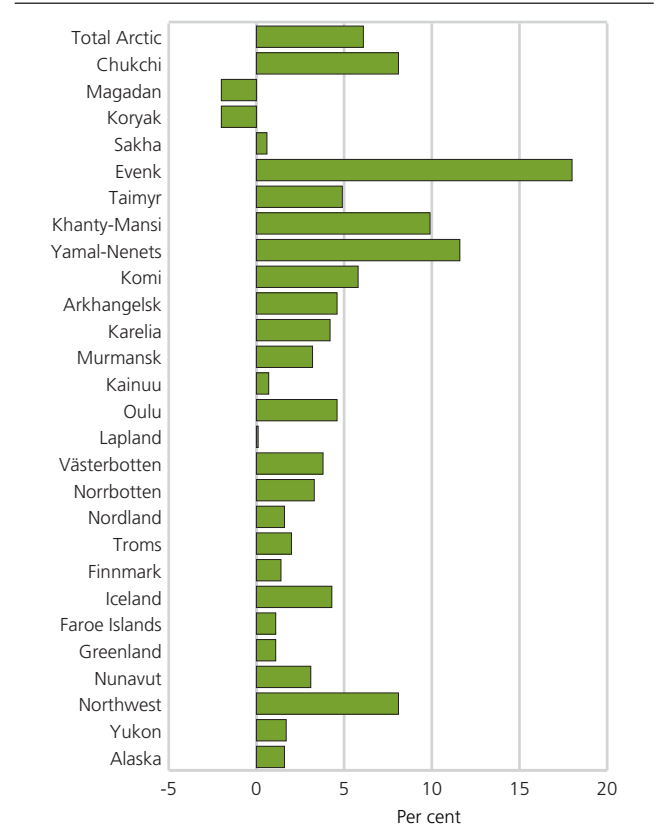
Further, it is important to keep in mind that Arctic and non-Arctic regions within the same country might have different price levels, tending to be higher in Arctic regions with low population density and high transportation costs. Hence, Figure 3.7 may overestimate the actual welfare level of Arctic regions when compared with non-Arctic regions. On the other hand, own hunting and harvesting of food is more widespread in the Arctic regions.

Figure 3.8 shows GRP and disposable income per capita at a detailed regional breakdown. The four regions with exceptionally high GRP per capita figures are Khanty-Mansii and Yamal-Nenets in Russia, Northwest Territories in Canada and Alaska in the United States. These regions are all characterised by substantial revenues from extraction of natural resources, particularly from oil and natural gas production in Russian regions and Alaska, and from diamonds in the Northwest Territories.

The redistribution is particularly visible in the Nordic countries Norway, Sweden and Finland. Despite differences in per capita GRP among sub-regions, the disposable income differences are negligible within each country.

Among the Russian sub-regions, Chukchi, Yamal-Nenets and Khanty-Mansii had disposable income per capita above the circumpolar average. GRP per capita in Khanty-Mansii is more than 4 times higher than disposable income per capita. The Northwest territories in Canada with high revenues from diamond extraction in 2005, had only slightly higher level of GRP per capita than Khanty-Mansii, but a disposable income about 70 percent above the level in Khanty-Mansii

Figure 3.10. Average annual economic growth, by Arctic region. 2000-2005. Per cent



For the Arctic as a whole, GRP per capita is twice as high as disposable income per capita.

**Economic growth 2000-2005**

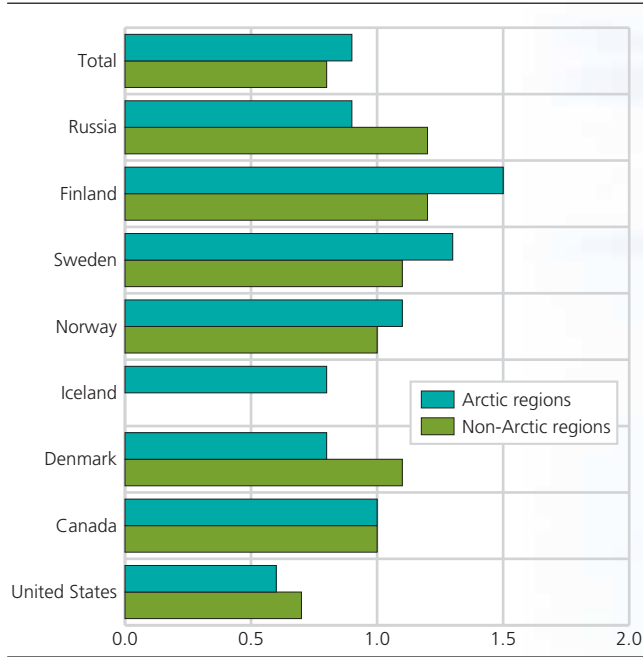
The economic growth rates presented here are calculated as average yearly percentage change of GRP 2000-2005 in constant (chained) prices. At circumpolar level the economic growth rate of Arctic regions has been over two times higher than the growth rate of the non-Arctic regions (Figure 3.9). Only in the United States, Denmark and Norway the Arctic regions have had slower growth than the non-Arctic regions.

The economic growth rates of Arctic sub-regions are shown in Figure 3.10. Especially high growth has taken place in Evenk Autonomous Okrug, where petroleum exploration and production has started up. Among the smallest and poorest Arctic regional economies, Evenk has been experiencing around 18 per cent annual growth on average during 2000-2005. This economic growth has so far not lead to population growth, as there was a decline in population of almost 6 per cent over the period 2000-2005, which is considerably lower than in other Russian Arctic subregions such as Koryak, Magadan and Chukchi without substantial mineral extraction (figure 3.5)

Koryak and Magadan both had economies declining 2 percent per year on average, combined with population reduction of 11 percent over the 5 year period (Figure



Figure 3.11. **Dependency ratio in Arctic and non-Arctic regions, by country. 2005**



3.5). All other sub-regions had positive, but highly variable, economic growth.

The rapid economic growth of the Northwest Territories up to 2005 in Canada is mainly related to the development of diamond mining.

**Dependency rate**

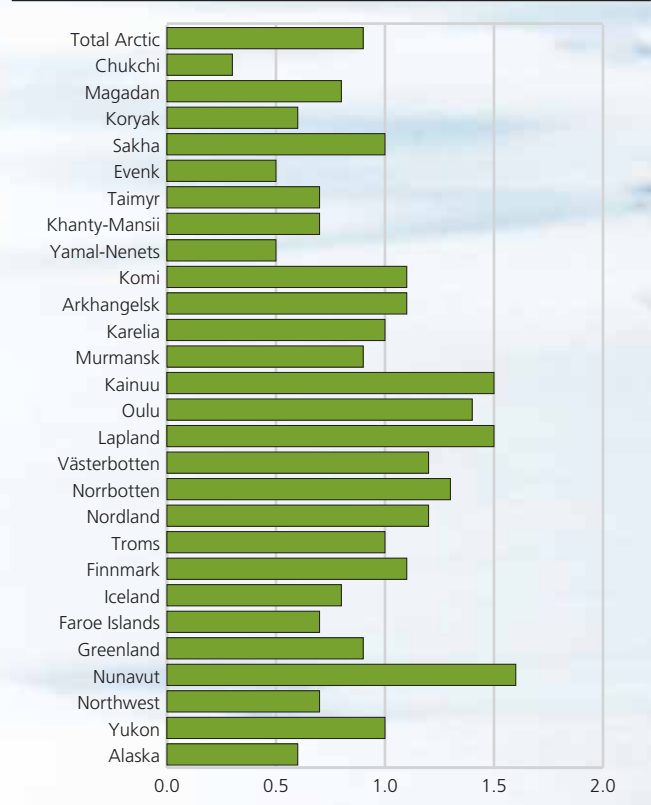
A useful socio-economic indicator is the economic dependency ratio, which is the number of persons unemployed or outside the labour force per employed person. The persons outside the labour force include children, elderly, disabled, students, unemployed, and, especially relevant in the Arctic, people involved in informal subsistence economy.

Figure 3.11 shows that in North America, Denmark and Russia the Arctic regions have lower dependency ratios than the non-Arctic regions. The use of seasonal and migrant labour in petroleum and mining industries may explain the low dependency ratios of the US (Alaska) and Arctic Russia. In Nordic countries, especially in Finland, the dependency ratios in Arctic regions are higher than in non-Arctic regions.

The dependency ratios of Arctic sub-regions are presented in Figure 3.12. For understanding the factors behind the differences of dependency ratios, more detailed statistics on the population age structure etc. would be needed.

The main petroleum producing regions Alaska, Khanty-Mansii and Yamal-Nenets, have fairly low dependency ratios, indicating use of seasonal/temporary labour. So is the case with the Northwest territories of Canada with diamond production. Denmark with Greenland and Faroe Islands have lower dependence ratio than

Figure 3.12. **Dependency ratio, by Arctic sub-region. 2005**



the non-Arctic region, pointing to subsistence as one reason, another is that young people leave for higher education in other countries. The Fennoscandinavian regions have higher dependency ratios, reflecting a greater variety in the economic basis and public services supporting more stable settlements. Nunavut has the highest dependency ratio.

**Notes**

<sup>1</sup> See: <http://www.beac.st>

<sup>2</sup> Regional accounts for Nunavik have, however been compiled for 1938, 1991, 1998 and 2003, and are available at [Nunivaat.org](http://www.nunivaat.org) or <http://www.chaireconditionautochtone.fss.ulaval.ca/extranet/doc/152.pdf>. See also Duhaime, G, and V. Robichaud, 2007. Economic Portrait of Nunavik 2004. Québec, Canada Research Chair on Comparative Aboriginal Coudition, 66p.





## Box II. Notes on Gross Domestic Product and Value Added Comparisons Across Arctic Regions

Gross Domestic Product (GDP) is the total value of final goods and services<sup>1</sup> produced within a territory in a specified time period. It is one of the important measures of the level of economic activity in a region, along with employment and personal income.

GDP is a measure of how much output a region can produce as well as how much income it can generate from that production. In this regard GDP is equivalent to Value Added (VA), defined as the economic contribution to goods and services production at each step in the production process by the factors of production—mostly labor and capital. Since the sum of value added equals both the value of output and the income to factors of production, total income equals total output.

The international standard for measuring GDP is established in the System of National Accounts (SNA93) prepared by representatives of the International Monetary Fund, European Union, Organization for Economic Cooperation and Development, United Nations, and World Bank. The rules and measures for the measurement of national accounts are designed to be flexible, to allow for differences in local statistical needs and conditions.<sup>2</sup> GDP statistics are available for most countries and are commonly used to track and compare economic performance.

GDP is generally measured in the local currency, and so to compare the economic activity or performance between different countries requires that they be converted to a common base, typically using either the currency exchange rate or the purchasing power parity exchange rate. The choice depends on the objective of the comparison. The former compares the international purchasing power of different economies. The latter is a better measure of the domestic purchasing power of the average producer or consumer within the countries. Some implications of this choice with relevance for The Economy of the North are illustrated in Box I.

Analysts using GDP as a measure of economic performance for a country need to keep in mind that it has a number of well-known shortcomings including:

1. Non-market transactions (child rearing, homemaker production, etc.) are generally excluded.
2. Economic «bads» are included. More production simply means a higher GDP, regardless of what is produced.
3. The value of leisure and other aspects of the quality of life are excluded.
4. The distribution of income across the population is not measured.
5. The sustainability of production is ignored.

In many countries GDP is also calculated at a regional level, allowing comparisons between regions within a country as well as between regions in different countries. These comparisons need to recognize certain features of regional GDP calculations, particularly when the regions are small and remote.

**1. Residency**—GDP is a measure of the value of production within a region, regardless of the residence of the labor used in production or the ownership of the capital. A companion measure at the national level, Gross National Product (GNP), measures the value of production by the residence of the owners of the labour and capital used in production, wherever that production takes place, but there is no comparable figure at the regional level, at least in the United States.

This can be a problem when using GDP as a measure of the income of a small and remote regional economy. A significant share of the work force could consist of commuters or seasonal workers who live outside the region. A large share of the capital could be owned by non-residents and the profits from production could leave the region. If these conditions are true then the income accruing to the residents of the regional economy will be less than the value of production.



It is also possible that the opposite would be the case. The state of Alaska controls a large investment fund, the Alaska Permanent Fund, with a portfolio of investments that is entirely outside the state. Each year the Fund generates several billion dollars of income that is not included in Alaska GDP because the production associated with those investments occurs outside the state.

**2. Federal Assistance**—A remote rural region of a national economy may be dependent upon assistance from the central government to pay for and provide public services, over and above the level that taxes from the region to the central government can provide. In such a case the GDP, which generally includes all public sector spending in the region, will be an overestimate of the productive capacity of the region itself by the amount of the «subsidy». For example, an increase in the subsidy will increase GDP, even though it does not represent a strengthening of the regional economy.

**3. Location of Production**—When production involves inputs located in different regions it can be difficult to allocate the share of value added attributable to each region. For example oil production on Alaska's North Slope depends on the inputs physically located in Alaska, but also on capital and labor inputs located in the headquarters offices of the oil companies outside the state. Allocating economic rents (the value of output in excess of that required to compensate capital and labor) between regions in this case is arbitrary.

Production may occur in one region and be reported in another. A share of the seafood harvested in the ocean adjacent to Alaska is done by boats headquartered outside the state. The value of their harvest is reported as occurring in other locations rather than in Alaska.

**4. Valuing Subsistence Activities**—A share of the population in many remote rural regional economies engages in productive activities outside normal economic markets, such as the subsistence activities of indigenous people. The valuation of these subsistence activities can be handled in several different ways in the GDP accounts. They may be excluded altogether as is the case in the United States. If they are included, there may be differences in the types of activities included. For those included activities valuation may be done by comparison of the outputs to similar outputs that have market prices (replacement value), by valuing the outputs at the cost of the inputs, or by some other method of imputing a value to the activity.

**5. Price Variation**—Small remote regional economies may be dominated by a limited number of primary commodity producing industries. The value added in the production of those commodities can be quite volatile from year to year because of volatility in their market prices. The Alaska GDP is heavily influenced by the importance of oil production, and much of the change in GDP from year to year is a result of the change in the price of oil rather than any change in the physical output of the economy.

This volatility means that comparisons with other regions are sensitive to the year in which the comparison is made. A comparison when the price of oil is high will indicate a larger Alaska economy relative to other locations than would be the case of a comparison when the price of oil is low.

**6. Data Collection Difficulties**—The small size of regional economies results in less precision in estimates of GDP based on sampling (due to sampling error). Remoteness can also contribute to imprecision due to the challenges of data collection associated with travel, weather, and other variables.

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<sup>1</sup> Including exports.

<sup>2</sup> Countries may differ in the types of non-market activities they chose to include in GDP. They also may differ in which prices they use to present output figures. Among the alternatives are market prices (including any sales, property, and excise taxes) or factor costs (market prices net of taxes which are not a return to a factor of production).



Iceberg, Icefjord north of Nuuk, Greenland. Photo: Tom Nicolaysen