



Economic Systems

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Economic activities create and distribute wealth that individuals, households, and societies can use in reaching different social and material goals. Therefore, economics is a fundamental dimension of human development. In the Arctic, subsistence activities have been important to local economies, but the region is also incorporated in the economies of the Arctic nations and in the global economy. These connections are becoming increasingly important. Examples include exploitation of oil, gas, and mineral resources but also harvesting of the vast biological resources in the region. Government or state supported public service illustrates the close connection to national economies. Taken as a whole, the Arctic economy is large enough to be geopolitically important.

The first part of this chapter looks at the Arctic as a whole and describes its economy by exploring three major characteristics: the large-scale resource exploitation, the lack of manufacturing, and the prominent role of public service and transfer payments. The second part identifies the principal similarities and differences amongst different parts of the Arctic, while the third part discusses the most striking recent trends that will affect the future of the Arctic economy.

The industrial distribution of the Arctic economy

Three characteristics set the economic situation of the Arctic apart from that of other regions of the world (4, 5). First, the formal economy is mainly based on large-scale resource exploitation. Second, family-based commercial fishing or customary hunting, fishing, breeding, and gathering activities continue to be important. Third, much consumption, in particular public services, is supported by transfer payments to regional governments and individuals from cen-

Area of study

The circumpolar area discussed in this chapter includes all political or administrative entities overlapping the Arctic for which relevant sets of data are publicly available. They are:

- Alaska
- in Canada: the Yukon, the Northwest Territories, Nunavut, Nunavik, and Labrador
- Greenland
- The Faroe Islands
- Iceland
- in Norway: Nordland, Troms, Finnmark, and Svalbard
- in Sweden: Västerbotten and Norrbotten
- in Finland: the provinces of Oulu and Lapland
- in the Russian Federation: the republics of Karelia, Komi, and Sakha; the oblasts of Arkhangelsk, Murmansk, Tyumen, Kamtchatka, and Magadan; the autonomous okrugs of Nenets, Khanty-Mansii, Yamal-Nenets, Krasnoyarsk Krai, Taimyr (Dolgan-Nenets), Evenk, Koryak, and Chukchi.

Few regions of the Russian Federation extend beyond the Arctic, e.g. the Tyumen Oblast. These have nevertheless been incorporated in full, since the economic data published by Goskomstat Russia are not available on a smaller scale. The area covered in the chapter corresponds to that examined in previous studies that are used to identify economic trends and changes (1, 2, 3).

Map of Arctic Region

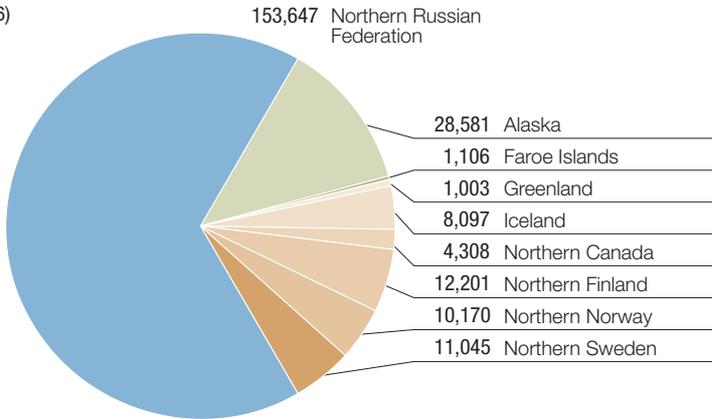


— Arctic circle
— Arctic boundary: AMAP
— Arctic boundary: AHDR

Compiled by W.K. Dallmann,
Norwegian Polar Institute

Gross Product. Circumpolar Arctic, regions and countries, 2001
(Millions of \$US-PPP, 2002)

Circumpolar Arctic
(230,156)



tral governments. After placing the Arctic economy in a global context, this section describes the different sectors of the Arctic economy.

A global view

Considered as a whole, the production created in the formal Arctic economy amounts to over \$US-PPP 230,000 million. This would be the gross domestic product of the circumpolar Arctic. The following comparisons make it possible to assess the Arctic's significance in the world economy.

This production is equivalent to one-quarter of the entire Canadian economy and 80% of the entire economy of Saudi Arabia, the world's

Industrial Distribution of Gross Product, by sectors. Circumpolar Arctic, regions and countries, 2001
(Millions of \$US-PPP)



leading oil producer and exporter. It approaches the value of Belgium's entire economy, and it equals the entire economy of the Russian Federation. It surpasses that of Sweden, a country whose demographic weight is similar to that of the entire Arctic area and is among the most industrialized countries in the world.

What does this result mean? First and foremost, it means that the Arctic production is of significant scale. It is based in large part on the intensive exploitation of the vast natural resources in the Arctic, and the formal economy of the Arctic revolves around these large-scale, capital-intensive activities.

\$US-PPP – a definition

The data used to describe and analyze the formal economy come in different currencies and concern different years. To allow for comparability, two conversions must be made: the first one converts the national currencies into a common currency and the second one has the data refer to a common year. In other words, the data must first undergo a conversion in space, followed by a conversion in time. The PPP makes it possible to obtain conversion rates between currencies that eliminate differences in price levels between countries (6). The method for calculating the PPP basically consists of collecting data on the price of a representative basket of goods and services for a specific country and to compare it with a reference basket. If, for example, the reference basket costs 100 US\$ in the United States in 2000 and 947 Swedish kronor in Sweden, the PPP conversion rate is then 9.47 Kronors per US dollar PPP. By convention, published data are expressed in \$ US PPP. After "moving" all of the data to the United States, a common year is obtained by using the GDP Deflator, which measures the price variations for all of the goods and services that are produced and used in the economy of a region or a country.

Large-scale resource exploitation is central to the Arctic economy

Arctic regions have long been considered vast reservoirs of natural resources by the countries that encompass them. First exploited for fish, whales, and furs, these regions revealed substantial diversity and enormous quantities of other resources, such as minerals and fossil fuels. Today, the economic activity of Arctic countries is characterized by the large-scale exploitation of metallic minerals, precious metals, hydrocarbons, and precious and semi-pre-

Source:
Arctic Map by W.K. Dallmann,
Norwegian Polar Institute

cious stones, as well as fish from the coastal seas. Primary extraction represents \$US-PPP 60,000 million. This is equivalent to the value of almost all of Saudi Arabia's exports, or the total value of Brazilian exports.

The large-scale exploitation of minerals and hydrocarbons is central to the national economy of several Arctic countries. This is especially true for Russia, where the Arctic regions have vast reserves of gold (Magadan, Chukotka), nickel (Murmansk, Krasnoyarsk), tin (Sakha, Chukotka), and diamonds (Sakha). Also, petroleum and gas exploration is massive, especially in the Yamalo-Nenets and Khanty-Mansii Autonomous Okrugs (7,8).

In Canada, there is major exploitation of mineral resources and hydrocarbons in the Northwest Territories, Nunavut, and Nunavik. Mineral exploitation is also a central economic activity in Finnmark in Norway, and Norrbotten and Västerbotten in Sweden. Alaska extracts considerable quantities of oil from the Beaufort Sea and has one of the world's biggest zinc mines.

While the industrial-scale natural resource exploitation creates considerable wealth, these activities are mainly carried out to supply markets outside the Arctic regions. Moreover, the resources generally belong to sources of capital outside the Arctic, which control the activities and profits. A few large corporations dominate the extraction activities, and some of them are present in several Arctic countries. This fits well with the concept of "Resource frontier regions," (9,10) where the massive riches are destined for export and only a fraction of the income and profits remains.

Sometimes, the resource exploitation generates economic spin-off effects in local areas and regions (see also Chapter 8. *Community Viability*). In such cases, these large-scale activities represent the very core of local and regional economies, around which a vast set of subsidiary activities gravitate, including the construction and operation of infrastructure (roads, ports, and airports) and the organization of services (transportation, retailing, and housing). Thus, even under these conditions when neither the direct income from sales of the extracted resources nor the profits remain in the affected region, there are still significant economic consequences.

In other cases, these large-scale activities are totally separated from the regional socio-economic environment. They are carried out on an

autonomous basis and have practically no economic impact on the permanent communities in the vicinity. In this situation, the entire economic activity, as well as the extractive and subsidiary activities, brings benefits exclusively to the rest of the world. The phenomenon of economic decoupling, also characteristic of 'resource frontier regions,' represents the extreme case but is nonetheless not unusual in the Arctic.

Large-scale resource exploitation has considerable impact on the local natural and human environment. Examples are toxic discharges from gold and nickel mining operations, which have caused problems that have yet to be solved. In those cases where the residents inhabit or use land that borders on exploitation areas, which is common in Alaska, the Canadian North and northern Russia, the effects on the human environment are multiple and often poorly documented (11, 12, 13). These include poor health related to industrial discharges, as well as the subordination of local governments and authorities of civil society (unions, associations). They can also entail forced changes in how people move over land in fishing, hunting or trapping areas and can diminish the productivity of such traditional activities when the land is disturbed (14, 15, 16, 17). Socially, there are often disparities in standard of living and social status between employees of the industrial sector and the rest of the population, often correlated with ethnicity.

In summary, the way in which large-scale resource exploitation is currently organized in the Arctic is characterized by outside control and resources moving out of the region. Generally, there is not much overlap with local

Industrial Complex Nickel, Kola Peninsula, Russia.



PHOTO G. DURAND

and regional economies, and it appears unlikely that these activities will create economic alternatives that can enable the local communities to survive after the extractive activity is finished. It is thus difficult to see how they can contribute to sustainable development in the region.

Fisheries remain a backbone of the economy

In almost all coastal and island areas of the Arctic, fisheries form one of the backbones of the economy. In the Faroe Islands, this is the most important industry, comprising more than a fifth of the gross national product. The catch is diversified and includes a substantial whale harvest. Fisheries are likewise very important and equally diversified in Greenland, whose shrimp catch makes Greenland the second largest exporter of shrimp in the world. Around Iceland, warm and cold currents come together creating particularly rich fishing opportunities, and fisheries have long been important to the national economy of Iceland. In Greenland and Iceland, the production of the primary sector is largely based on fisheries.

Coastal fisheries assume considerable economic significance in Alaska, northern Norway,

and all of northern Russia. For example, practically every coastal Norwegian town or village has its own fishing port. Furthermore, lake and river fishing is practiced everywhere in the Arctic, and is significant to local economies. For instance, both commercial and customary freshwater fisheries have been and still are important among the Dene nation in the Canadian Northwest Territories.

Fisheries may be organized according to many distinct systems of exploitation. Industrial fisheries, based on factory ships, demonstrate many similarities with large-scale extraction of mineral and hydrocarbon resources and can involve importing both the capital and workforce from abroad, and taking both resources and revenue out of the region. In such cases, the generation of local economic wealth can be tenuous at best. In several Arctic regions, regional authorities or entrepreneurs do own the factory ships themselves, and consequently can retain the benefits (or what is called the "rent") within the region, and hence favor the regional workforce as well.

Fisheries can also be organized in a way where the captain-owner of a ship hires a small crew or takes care of all the work himself, sometimes with family members. This labor-intensive

Benefit sharing agreements: a trend in Arctic big business

Red Dog Mine, the world's largest producer of zinc concentrate, is located in the DeLong Mountains of Alaska's Brooks Range, approximately 144 kilometres north of Kotzebue and 88 kilometres from the Chukchi Sea. First discovered in 1953, initial mine development began in 1986 and by November 1989 construction was complete. Operations and production began in December 1989. With an open pit, truck/shovel operation, Red Dog has a production capacity of over 600,000 tons per annum of zinc contained in concentrate. Facilities were expanded in 1998 and again in 2001. In 2003, it produced 579,300 tons of zinc concentrate and 124,900 tons of lead concentrate. Concentrate from the mill is trucked to a port facility at tidewater where it is stored prior to loading onto vessels. Given its Arctic location, Red Dog has a summer shipping season of 100 days, during which the concentrate ore is shipped to markets in North America, Asia, and Europe.

The interest in Red Dog Mine does not merely lie in its size, in its integration with large corporations or in the spatial distribution of its operations. Rather, the interest lies in the relationships between the mine and the Northwest Alaska Native Association (NANA) Corporation. Native Alaska land claims against the United States were settled in 1971. The NANA Corporation is one of the corporations created in connection with the Alaska Native Claims Settlement Act. Cominco and NANA agreed in 1982 to a land lease with wide-ranging terms regarding devel-

opment of the deposit. Under the agreement, Cominco financed, constructed and now operates the mine and the mill, in addition to marketing the concentrates produced. NANA receives an annual royalty in the form of a payment, which is equivalent to 4.5% of the annual production value. This rate will remain in effect until Cominco recovers its capital investment with interest. Thereafter, NANA will receive a share of the mine's net profits; this share will be 25% and will increase by 5% per five-year period, up to 50%. Moreover, the agreement includes provisions for training and hiring NANA members, and first preference on all Red Dog jobs goes to qualified Natives in the NANA region. As a result, more than 50% of the 365 jobs are held by NANA members. The agreement also includes provisions for contract and purchasing preferences, subsistence resources protection as well as various consulting and approval mechanisms.

This is one of the first benefit-sharing agreements known in the Arctic and illustrates an increasingly common way to maximize benefits of resource development for Arctic residents rather than continuing with the "decoupling" model of development. It is also used to attenuate negative impacts of resource development, including making provisions for the bust cycle at the end of the mine's life. Among other tools, such as environment and social impact assessments, this is one way to improve resource development from the perspective of increasing benefits for Arctic residents (18).



Fishing trawlers in Nuuk, Greenland

system, widespread in the circumpolar North, is of the utmost importance not only economically but also from a social and political point of view. It involves a significant number of jobs (more than 20% in Greenland, around 5% in Iceland and northern Norway). It entails making arrangements, negotiations and compromises between actors, such as commercial discussions with local suppliers, local buyers and processing plants, participation with municipal, regional and national governments, concerning regulations etc. And in contrast to industrial fisheries with factory boats, these fisheries contribute to local food supplies. Moreover, as long as fish stocks are not over-harvested, they provide a guaranteed long-term activity. However, the depletion of fish stocks is beyond the control of the local fishermen and this activity, established for generations, is also subject to external influences that may even threaten its survival (19, 20, 21, 22). For further discussion of fisheries, see *Chapter 7. Resource Governance* and *Chapter 11. Gender Issues*.

Manufacturing is very limited

Aside from customary harvesting and food from commercial fisheries and reindeer herding, most food and other products consumed in the Arctic are imported. Manufacturing

activity is limited. This sector has atrophied in some areas and was never established in others. In places where it remains important, it is usually not very diversified. For example, in Iceland and Greenland, it is primarily concentrated in fish processing, most of which is exported. In some areas in northern Russia, mining activities have led to a primary refining of the minerals.

One of the few manufacturing activities in the Arctic area is the electronics industry around Oulu in northern Finland. This sector is very dynamic in development and production, and includes companies such as Nokia that provides more than 3,000 jobs in the region. This is more than 5,000 jobs in the electronics industry, which represents some 10% of jobs in the secondary sector (31, 32, 33). This situation is exceptional. The Oulu region is one of the few that has managed to overcome the difficulties of creating a manufacturing industry in the Arctic. Due to the geographical isolation of most Arctic regions, production costs are high. While specific raw materials can be found within the region, technology, qualified labor, and capital have to be imported most of the time. Transportation costs not only impact production itself; they also affect costs for getting products to their markets which tend to be

located outside the Arctic. As a result, costs are often too high to successfully compete with non-Arctic manufacturers who have more access to resources (including cheaper transportation systems). It is therefore difficult to generate sufficient economic benefits to sustain commercial activities.

In general, the role of the circumpolar North in the global economy is asymmetrical: it exports raw materials on a large scale to developed regions and imports most finished products for its own domestic consumption. Only a part of the food supply is locally produced.

The service sector is dominated by public service

The service sector is strongly developed in many parts of the Arctic. This includes activities in fields such as retail, transport, and tourism as well as education, health care, and administration in the public sector. This so-called tertiary sector represents almost three-quarters of the economy of northern Sweden and Norway and approximately two-thirds of the economy of

Subsistence activities still play a role

Biological resources are also harvested in small-scale subsistence activities. In particular, rural and indigenous populations reinforce traditional practices outside the formal economy, which include fishing, hunting, and trapping, as well as gathering fruit, mushrooms and wild eggs.

This customary harvesting forms a significant part of the dietary intake of households and communities in some parts of the Arctic (23, 24, 25, 26). In Alaska, recent studies indicate that rural villages have an annual production that generally varies between 69.5 and 301.8 kg per capita (27, 28). For the Canadian Arctic, the annual harvest in edible weight varies between 84 and 284 kg per capita (29). The latter value would be equivalent to the production before other sources of food were available. In Greenland, a majority of the households eat food of this type five times or more per week. The daily quantity consumed is estimated at 0.33 kg/day/person on average. When "commodity production" intended for the market is taken into account, the quantities produced in traditional harvesting activities vary from 1.21 to 3.50 kg/per capita/day, depending on paid employment and the level of involvement in the harvest (30).

Customary harvesting practices are not only culturally but also economically important locally, though their role varies by region, ethnic group, urban or rural setting, and generation. This harvesting is important for its contribution to food production and consumption. Food from the land is one of few substitutes to imports in the Arctic, and in several regions, its contribution to food intake is central. It is also important for its contribution to the meaning of life, because customary activities create links both between past and present and between people living together. They are termed customary, because they reproduce the past practices of the people living in the Arctic; but similarly and more generally, they are clearly embedded into the modern world, as they put together heritage with capital, modern technology, present-day know-how, and government regulations.

other regions, excluding northern Russia, where it constitutes slightly more than half of the gross domestic product.

Retail and transport activities account for about 12 to 25% of the service sector. Within the service sector, transport has an important place in the Arctic economy. It creates from 5 to 12% of the production value, depending on the region. Facilitating long distance mobility, the transport sector is important in exporting local products and for importing goods on which northern consumers depend. It also encourages northern tourism.

Tourism is well developed in a number of regions and is of growing importance in the Arctic economy. It is almost impossible however, at the present stage of economic statistics, to put a number figure on this service industry. A decade ago, and excluding Russia, the number

Tourists

Circumpolar Arctic, regions and countries, selected years

Country or Region	Number of Tourists
Alaska	1,074,800
Greenland	6,000
Iceland	129,000
Northern Canada	224,820
Northern Scandinavia	529,000

Source: Margaret E. Johnston. *Patterns and Issues in Arctic and Sub-Arctic Tourism*. In Hall, C.M. and M.E. Johnston. *Polar Tourism*. Chichester, Wiley, 1995, p. 31

of visitors was estimated at 1.9 million, of whom half were in Alaska and 500,000 were in northern Scandinavia (34). There is no indication that this industry has decreased in the last decade. On the contrary, some regions are giving high priority to tourism development. This is the case in Iceland and Finland for instance, and in almost all regions where it is less developed, efforts are being made to build up the industry.

Nonetheless, public services account for the majority of the service sector. This includes public administration, health care, and education. Altogether, public services comprise the second largest industry in all the Arctic regions, and they represent a share of the gross domestic product that ranges from 20 to 25% (in regions such as Alaska), up to 40% in Canada and Fennoscandia (35) (see box next page).

Theme summary

Three characteristics set the economic situation of the Arctic apart from other regions of the world. First, the Arctic has been used as a large reservoir of resources to meet the energy needs

of developed countries. Its formal economy is mainly based on large-scale exploitation and export of minerals, hydrocarbons, and marine resources. Much of the remaining part of the formal economy revolves around these activities. In contrast to the Arctic countries, there is little manufacturing industry in the northern regions.

Secondly, much consumption, in particular public services, is supported by transfer payments to regional governments and individuals from central governments. However, the transfers are small in comparison to revenues from regional production, and if the Arctic regions had the political power to collect taxes from the large-scale exploitation of the Arctic's natural resources, the level of dependence on transfers would likely be different.

Thirdly, family-based commercial fishing or customary hunting, fishing, breeding, and gathering activities continue to be important, both for the economy and for the identity of those involved. These activities are inextricably linked to the monetary economy. Therefore, the means used to carry them out, their efficiency, and their distribution methods are important for people's income and their standard of living.

The spatial distribution of the Arctic economy

Overall economic characteristics differ across the Arctic, with significant variations in both size and structure of the economy from one region to another. This section makes some international and internal comparisons between regions. It tries to assess the regions' contribution to the circumpolar economy as a whole, and the difference between each northern region and the countries they belong to. It suggests ways for analysis of flows between the Arctic and the rest of the world.

Regional variation in total production

The Russian Federation produces about two-thirds of the total wealth created in the circumpolar Arctic. This share exceeds by far the contribution of all other countries and regions. The Russian North is the widest area in the circumpolar world, and the most populated one. The industrial exploitation of large non-renewable resource reserves has been carried out on a very large scale throughout the area for decades, and is a backbone of the Russian overall economy.

Iceland, northern Norway, Sweden, and

Public administration as an industry

The tertiary sector accounts for between one-half and three-quarters of the total economic production in the Arctic, and dominating this sector is public administration. In several regions for which the data is available, public administration services account for more than one fifth of the formal economy. In some regions, the majority of all paid jobs belong to this sector, which can legitimately be called an industry.

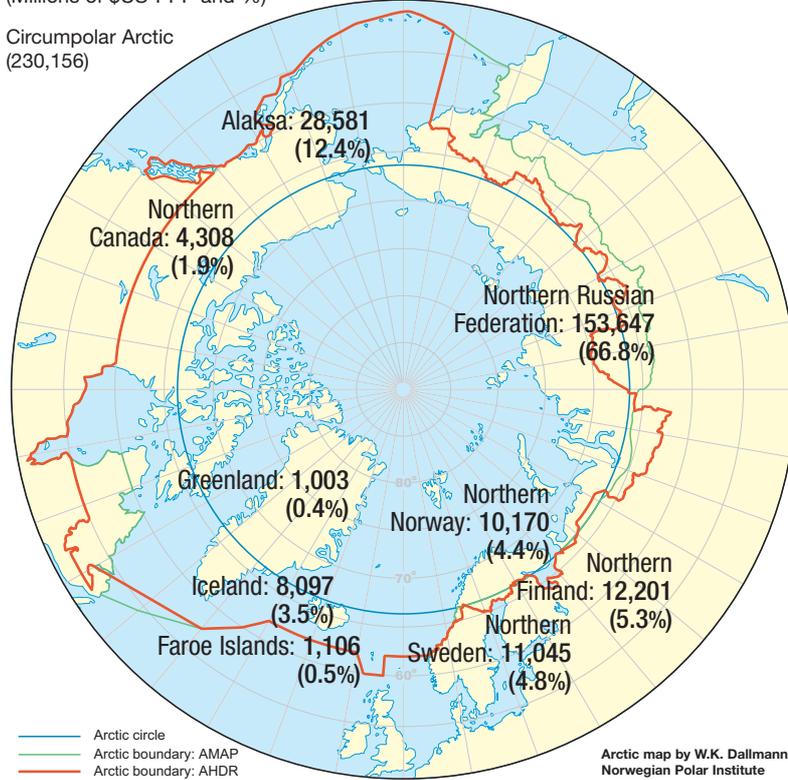
This "over-development" of public administration compared to other sectors has a history that goes back at least 50 years. In Alaska, northern Canada, and Greenland, it can be explained by the policies of nation states to move the Inuit population into permanent settlements. These policies were especially prominent during two different time periods. The first was with the militarization of the Arctic during World War II and the following Cold War period which brought to the world's attention the material distress afflicting the Inuit, which followed the sharp decline in the fur trade after 1929. States took responsibility for building permanent villages and for assuming the recurrent operating costs. The second time period coincides with the frantic growth in consumption in the 1960s, and the oil crisis of 1973. These developments fueled North America's appetite for the Arctic's fossil fuel resources. However, at that time, the indigenous peoples opposed other's claims to these resources. They wanted guaranteed access both to the territory and to the use of the resources, as well as compensation for the losses resulting from the exploitation. They called for a significant place in polit-

ical decision-making as it concerned their own affairs. The restructuring and growth of the public administration ensued from subsequent agreements: the Alaska Native Claims Settlement Act (ANCSA-1971), James Bay and Northern Québec Agreement (JBNQA-1975), Northeastern Québec Agreement (NEQA-1978), Greenland Home Rule (1979), Inuvialuit Final Agreement (IFA-1984).

The story is not altogether different in northwest Russia. Geological exploration carried out at the start of the 20th century revealed the abundance of the region's ore deposits (36). The building of mining towns between 1900 and 1930 within the context of the centralized Soviet system led to major public expenditures. However, the indigenous peoples did not have the same influence as in North America. Saami and Komi reindeer breeders gradually saw some of their pasturelands transformed, either by the building of mines, cities and roads, or by the pollution affecting the natural environment, forcing them to change areas and, in some cases, economic activity. The Komi were constituted in a district in 1921, then in a Soviet socialist republic in 1936. Since the fall of the Soviet Union in 1990, this jurisdiction has taken on the name of the Republic of Komi. As for the Saami, they are spread out across the northern countries (Norway, Sweden, Finland), as well as in the Russian Barents region.

In summary, the size of the public administration within the Arctic economy is linked to the development of resources and to concerns raised by their exploitation.

Gross Product. Circumpolar Arctic, regions and countries, 2001
(Millions of \$US-PPP and %)



Finland are the most densely populated regions in the Arctic. Together, they represent three quarters of the Arctic population outside of the Russian Federation. They display a number of common characteristics. For example, their communication networks, transportation infrastructures (including extensive road systems), commercial and personal services, and public services are remarkably advanced. Indeed, their tertiary sectors are among the most developed

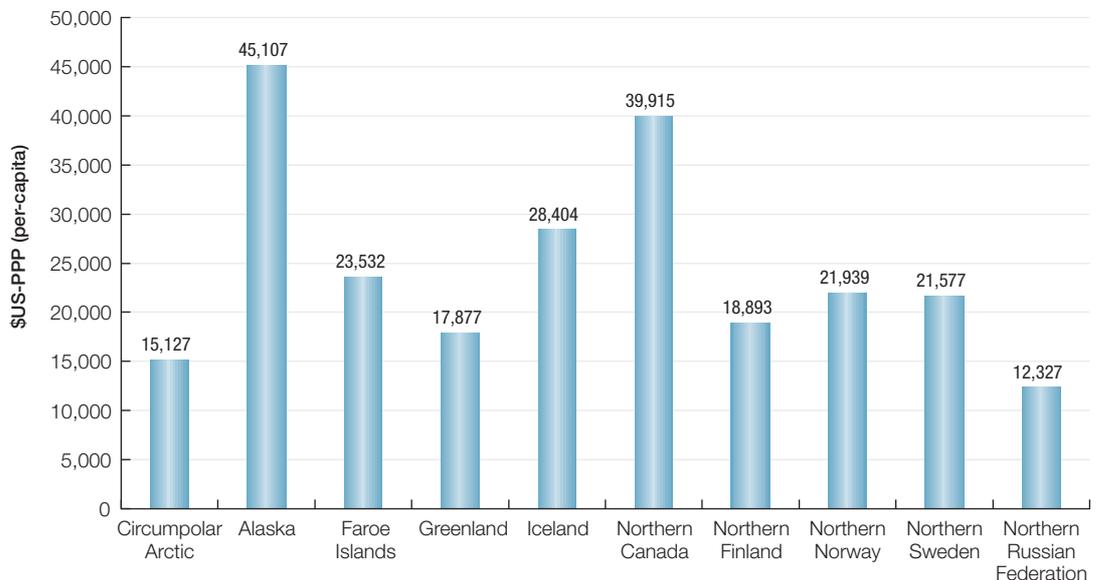
in the polar world and globally, with economic diversification being the most advanced in these areas. On the whole, these regions make an important contribution to the entire economy of the circumpolar North, amounting to almost one fifth of the total.

In North America, the contribution to the total Arctic economy varies considerably across the regions. Alaska has the second most important contribution on the circumpolar scale. This is due to the massive oil extraction and transportation from Prudhoe Bay south through the Alaska pipeline, and to a diversified economy, particularly in the southern and urban part of the state. By contrast, the contribution of the Canadian North to global circumpolar wealth creation is much more modest, with its population widely dispersed through vast territories, and with regional economies much less diversified than those in northernmost Europe.

Disparities among and within countries

When looking at GDP relative to the per capita GDP in the different regions, some significant contrasts do appear. While northern Russia makes up more than 66% of the total GDP of the circumpolar Arctic economy, the per capita GDP in Russia is very low, in fact, uniquely so. At the other end of the spectrum, the Alaska per capita GDP is the highest among the Arctic regions, and far above the circumpolar average. Canada, whose contribution to the global Arctic economy is modest, has the second highest

Per Capita Gross Product. Circumpolar Arctic, regions and countries, 2001



Gross Product. Circumpolar Arctic, regions and countries, 2001

(% of national GDP, and per capita difference)

Country or region	Gross product as percentage of national GDP, 2001. (% of national GDP in \$US-PPP)	Difference between GDP per capita of the region (or country) and the national level, 2001. (\$US-PPP per capita)
Circumpolar Arctic	1.87	n.a.
Alaska	0.29	10,787
Faroe Islands	0.71	-5,468
Greenland	0.65	-11,123
Iceland	100.00	0
Northern Canada	0.51	12,785
Northern Finland	9.63	-5,537
Northern Norway	7.61	-7,681
Northern Sweden	5.14	-2,603
Northern Russian Federation	14.95	5,227

Notes: n.a.: not applicable

GDP per capita. These differences are the result of multiple factors, including the scale of the Alaskan resource exploitation relative to population. In Russia, the large population and the generally poor economic situation, including low prices are largely responsible.

More interesting are the internal differences that may be extracted from these statistics. The economy of Northern Russia represents a substantial proportion of the economy of the Russian Federation. This proportion greatly exceeds the Arctic part of the economy for other Arctic nation states (except Iceland, which is the only country which falls entirely within the Arctic region). This supports the conclusion previously drawn about the importance of the Russian economy in the circumpolar and global economies, and importantly, highlights the great role of the North in the overall Russian economy.

The economy of the northern regions of Fennoscandia also represents a substantial proportion of the economies of each of these countries. This may be seen as evidence of the key role of some specific industries to the respective national economies (e.g. minerals and fisheries in northern Norway, manufacturing and commerce in northern Finland, etc.). It is also a sign of economic diversification and the fact that the service sector is comparatively well developed. Moreover, the northern parts of these countries are much more integrated in their national economies. In other parts of the Arctic world, the contribution to the country's national economy is much more humble, even though it may be strategically very important, for instance as part of the nation's resource supplies.

When calculated on a per capita basis, the differences between countries reveal another aspect of the Arctic economic reality, namely the high value of production in large-scale resource devel-

opment relative to population size. Specifically, the per capita GDP is higher in northern Russia than in the federation as a whole, and the situation is similar in northern Canada and in Alaska. Northern territories can be seen as wealthy places relative to the national situation, and in fact, some of them with large-scale resource exploitation are often perceived as such.

What the statistics do not reveal are the significant disparities that exist between regions of the same country. Within Russia for instance, massive economic activities are highly concentrated in certain regions: the Tyumen Oblast creates as much wealth as the seven other Arctic regions of the Russian Federation combined, and the Krasnoyarsk Krai creates as much wealth as the State of Alaska. Within Canada the economic indicators vary widely between regions with substantial large-scale mineral exploitation, such as the Northwest Territories, and regions where this sort of development is more limited, as in Labrador. This suggests severe regional disparities that should be properly analyzed with more disaggregated data.

Import and export

The balance between imports and exports is poorly documented. However, it is still worth examining from an explorative point of view.

As discussed earlier, the Arctic is exporting raw materials, such as minerals, gas and oil, fish, and sea food, in order to satisfy the energy needs of industrial development and mass consumption. The presence of extractive industries on a large scale in several Arctic regions generates considerable wealth. It also increases geographical differentiation: regions where it operates are generally wealthier, and regions without such resources (due to insufficient quantities or exhaustion from previous exploitation) are generally poorer. Finally, it increases social strat-

ification between well-paid workers and contracting entrepreneurs in these export sectors, and less-paid workers in other sectors.

In this type of industry, not only resources but also benefits are exported. Most of the time, these enterprises are subsidiary companies of national or transnational corporations, which provide them with the capital, technology, and know-how that ultimately lead to sales on the world market. They generally pay royalties and taxes to central governments in whose jurisdiction they operate. Finally, they pay dividends to the shareholders.

In sharp contrast, and because of limited manufacturing activity, the Arctic imports goods and services on a large scale to meet internal demands. Food is one of the few commodities where the Arctic is sometimes able to meet its

own demands, by virtue of its own food industry. The Arctic imports petroleum products for machinery and motors even in regions producing crude oil, and electricity even in regions producing hydroelectricity. It imports capital and technology for all purposes, including for some customary herding, hunting, and fishing practices. Such activities are therefore embedded in the market logic. The extent of this is so significant that the withdrawal of state support for reindeer herding generated a dramatic setback in northern Russia. In general, the geographical isolation brings higher costs for producers and consumers, as transportation and work force costs are higher in the Arctic. Importers use south-north channels in a way that links the northern economy of a given country closely with the metropolises. Consequently, most

The gaps between standards of living are significant throughout the Arctic

The standard of living is uneven throughout the circumpolar Arctic. In the following paragraphs, the formal incomes of individuals are compared, whether from paid jobs, transfer payments, or investments.

Personal Income and Personal Disposable Income Circumpolar Arctic, regions and countries, 2001

Country or Region	Personal income (\$US-PPP per capita)	Disposable Income (\$US-PPP per capita)
Circumpolar Arctic	n.a.	n.a.
Alaska	31,027	27,099
Faroe Islands	n.a.	n.a.
Greenland	14,802	10,547
Iceland	18,068	n.a.
Northern Canada	26,166	21,253
Northern Finland	n.a.	n.a.
Northern Norway	22,171	14,608
Northern Sweden	n.a.	11,448
Northern Russian Federation	5,843	n.a.

Note: n.a. : Original data not available

The Russian standard of living is the weakest in the Arctic. Moreover, some regions of northern Russia have much lower personal incomes than the national average, and dramatically lower than the circumpolar average. This is the case for the Republic of Karelia, and the region of Arkhangelsk, the Taimyr Autonomous Okrug, as well as the regions of the Far East: Kamtchatka and Magadan, and the districts of Koryak and Chukchi Autonomous Okrug. Even in regions that are relatively rich in mineral resources, such as the Republic of Sakha, the average personal income may fall below the average for the rest of the Arctic. Although salaries are generally high in the extractive industry, these are only enjoyed by a small segment of the population. In the Republic of Sakha for instance, about 16% of the workforce is employed in the mining industry where the salaries are higher. For the vast majority of workers in other industries, salaries are lower when compared to the mining industries, and most of the time, lower when compared to other

Arctic regions. According to Syrovatski (37), a reindeer herder's salary is usually less than 600 US\$ a year. In other words, the gaps between incomes in different economic domains are especially significant, and the majority of the population have lower incomes than the national or the Arctic average elsewhere. The economy of a few other regions, such as the Yamal-Nenets and Khanty-Mansii Autonomous Okrug, is driven by mega-scale oil and gas exploitation. In these regions, personal incomes are about four times the average personal incomes in the poorest regions of Russia.

The situation is somewhat different in Fennoscandia, in Iceland and in Greenland. In a circumpolar comparison, the personal incomes fall in the middle range. The standards of living in Iceland and in Greenland are higher than in Russia. Generally in these regions, the standard of living is also indirectly supplemented by considerable contributions from public services. This is however less the case in the Russian North nowadays, which may help explain the widening gap between the different regions of the Arctic. However, regional disparities do exist in Fennoscandia as well. Some central areas provide highly paid jobs, while salaries in the northern periphery are generally lower (38). Differences between urban centers and rural areas are also important, both there and in Greenland, with large contrasts between the big municipal centers and the small settlements (39).

The standard of living is the highest in the North American Arctic with Alaska ranked top. Here again, significant differences internally do exist. For instance, in the Canadian Northwest Territories workers get high salaries from the mining industry, and, as a result, the income per capita is quite high. In Nunavut, the best paid jobs are in the government sector, and the average is lower than elsewhere in the Canadian Arctic. In Nunavik, recent work from Chabot (40) shows that more than 55% of the Inuit households, representing 68% of the total population, were living below the low-income threshold. Longitudinal studies have shown that the Nunavik Inuit earn less than the non-Inuit workers in this region, but the gap is very slowly narrowing (41).

investments in the Arctic result in spin-offs further south, since they generally generate new imports.

This disequilibrium between exports (of raw materials, as well as economic rents) and imports, is a new element of the asymmetrical relations between the Arctic and the rest of the world. One of the main implications is that it is almost impossible for the regions themselves to cover the costs of public services given the limitations of their fiscal capacity. Most of the time, they cannot benefit from large corporate profits, because the corporations are outside of their jurisdiction. Also, in Arctic regions with limited or no large-scale resource exploitation, costs of public services must be covered by the capital regions.

Transfer payments are another kind of import, which in many cases are an indispensable source of funding needed in order to maintain a minimal level of public services. This is the case in the Russian Far East for instance. In certain cases, however, this is the price to be paid for maintaining the capacity for exploitation of resources of a given territory. This is the situation in certain areas where large scale resource exploitation has generated substantial profits, and where the central powers wish to maintain jurisdiction over the territories. Transfer payments also exist in places where the democratic setting allows the residents to assert their rights to be part of the deal. Negotiations of so-called "benefit-sharing agreements" would fall under this category.

Theme summary

Overall, economic characteristics differ across the Arctic with significant variations in both size and structure of the economy from one region to another. While the Russian contribution to the circumpolar economy is the highest, the population's standard of living there is the lowest. In Fennoscandia, the economy is generally more diversified than in other parts of the Arctic. Across North America, the contribution to the circumpolar economy is highly variable. The greatest concentration of relative wealth is in Alaska. The gaps between wealthy and poor regions appear everywhere but are most extreme in Russia and North America. Finally, the asymmetrical relations between Arctic regions and the rest of the world should be statistically documented, in order to support definite conclusions.

Trends and forecasts

With increasing connections between the Arctic and the rest of the world, the future of the Arctic economy is highly dependent on global economic and political trends. These include the continued importance of mineral and hydrocarbon resources, as well as the increasing influence of private ownership.

Continued role as reservoir of resources

Most of the economic characteristics of today's Arctic were already apparent in 1978 when Armstrong, Rogers and Rowley (42) published their work on the geography, politics and economics of the circumpolar region. For example, there was resource exploitation and export on a large scale, and this had been the case for a long time in many regions. Sugden's historic model of development in successive waves based on one key product (43, 44) also continues to be pertinent. The two major types of regions he described, "Resource Frontier Regions" and "Downward Transitional Areas," are still visible today (45). These economic phenomena constitute basic trends in the Arctic and are inseparable from the role of the region and its resources in the global economy. Therefore one can confidently predict that they will persist.

Furs and whales are still used in customary economy to a great extent, but they are no longer the most sought-after resources. For more than a century, the vast quantities of mineral resources, especially hydrocarbons, have taken over that role in the Arctic. This exploitation is likely to continue in years to come, subject to the conjunction of three principal factors. Firstly, the exploitation would be contingent on the rising prices of metals that are abundant in the Arctic, such as nickel and gold, which would render exploitation of distant deposits profitable, notwithstanding generally high costs of production and transportation (46). This presupposes that, in the long run, the demand for these metals should remain strong.

Secondly, despite the weak increase in demand for petroleum over the past few years, economic and geopolitical factors have given non-OPEC countries a new role in production. In particular, supply is rising in Russia (which has become the second largest exporter in the world), in Canada, and in the United States (47). A considerable portion of the reserves under development is situated in the northern parts of

these countries: in Western Siberia, in the Northwest Territories and the Mackenzie River Delta, in Alaska, and in the Beaufort Sea.

Thirdly, world gas consumption has been growing. In the coming decades, more new gas pipeline projects transporting this fuel from the Arctic to markets, including southern Canada, the United States, Western Europe, and the very fast growing market of China, would intensify this type of exploitation. Taken together, these trends, if realized, will perpetuate the Arctic's global economic role as a vast reservoir of resources.

Privatization will affect the form of economic development

Privatization is a general trend that also applies to the Arctic. This trend in itself will not alter the Arctic's economic structure. Nonetheless, it will affect the forms of economic development taking place, including those in the metal and energy sectors. This is especially true for Russia but it also applies to other parts of the Arctic.

Since the break-up of the Soviet Union in 1991, northern Russia has undergone profound changes. From a political perspective, territorial restructuring and the pushing by republics and regions have led to an evolution of the union towards a confederate system (48). The increased power in the regions and republics has laid the groundwork for dynamically developing regional economies. Yet, at the same time privatization of the economy has led to significant economic declines in northern regions. For example, in less industrialized cities, the sale of state enterprises to private interests was used as an opportunity to shed social responsibilities inherited from the former regime. This led to privatization expanding even further to also include services, such as healthcare and daycare. These services were seriously affected, if not completely abandoned. These phenomena imposed new burdens on the citizens and harmed their quality of life.

Many cities in northern Russia experienced waves of emigration, an exodus of hundreds of thousands of people (49) (see also *Chapter 2. Arctic Demography*). Such was the case in Murmansk, for example. Some of the richest cities were affected. This emigration was partly supported by the central government, whose new political framework favored freedom of movement and was no longer aimed at preventing such emigration. In the midst of the eco-

nomical turmoil of the 1990s, especially in the Far East, many villages, abandoned by public authorities, were deserted and became ghost towns (50).

The implementation of privatization policies has had a profound effect on the economic practices of many communities, in particular in the northeastern regions, including Yakutia, Chukotka, Magadan, and Kamchatka. These communities specialize in breeding reindeer. As a result of the central government's disinvestment, the domestic reindeer population fell by more than one-third between 1991 and 1999, from 2.2 million head to 1.4 million (51). One result of the reduction of this economic activity has been a more settled way of life, instead of following the reindeer.

When the supply networks that supported production and ensured distribution were cut off or became intermittent, people also had to make greater investment in hunting, fishing and trapping activities. (52, 53). Among the Dolgan and the Nganasan, more isolated now than in the past thirty years, the main source of protein comes from subsistence hunting, fishing and harvesting (54). Prior to the dismantling of the Soviet Union, reindeer and fish were obtained through local markets, state businesses, and stores in urban centers. Nowadays the importance of the domestic and community informal sectors has increased, and non-market distribution of food products has developed. As local residents no longer have money for modern technology, the diversity of prey has increased while the distance covered has declined (55). In short, activities that comprised the major exploitation of biological resources amongst indigenous peoples in the past have re-emerged.

Privatization does not only affect northern Russia. Greenland has proceeded with a restructuring of its state company in the food distribution sector, for instance. The operations of the Greenland state company formerly called KNI, Kalaallit Niuerfiat or Greenland Trade, were dismantled, and two distinct enterprises were created in which private interests will be heavily involved from now on. One is expected to supply key market centers. The other, which is responsible for supplying less populous communities, will receive financial subsidies. The government-supported policy of uniform pricing throughout Greenland, aimed at diminishing regional disparities due mainly to distance, has been modified (56).

Other aspects of neo-liberal policies have affected northern regions across the Arctic. For example in the Canadian North, restrictions have been imposed on employment insurance and social assistance. There have also been cuts in governmental services such as healthcare, education and subsidized housing. As a result, places such as Nunavut and Nunavik have been, and still are, experiencing a severe shortage of proper housing. In coastal regions where seasonal fishing provides the bulk of monetary income, the tightening of admissibility criteria for social benefits is having significant consequences. In other words, forces that promote globalization by means of privatization and neo-liberal policies are affecting the Arctic today and will influence future development.

Partnerships and competition

The North is experiencing diversification of the economy, particularly in Iceland, Fennoscandia, and in parts of Alaska, where the economies are not as centered on large-scale exploitation of a single resource. Examples include tourist development, especially ecotourism or “green tourism,” where the north of Finland and Iceland serve as models.

A significant diversification is taking place among agents involved in the northern economy, where privatization has opened up resources to new investors. International partnerships, for example between Russian and Norwegian enterprises in the energy sector, are more numerous than ever.

In certain regions residents have concerned themselves in development and are receiving a portion of the accrued profits, or at least some of the benefits. This is particularly true in regions that are rich in resources and have enough political power to enable residents to defend their demands with respect to planned development. This phenomenon can be observed in the region of Yamal-Nenets and Khanty-Mansii, where political reforms and the abundance of strategic energy resources have allowed for the emergence of regional power. Similarly, this has been witnessed in regions where large companies have reached agreements with local and regional authorities, usually in terms of a benefit-sharing agreement. In some cases, the local authorities or residents’ associations themselves become investors or entrepreneurs. This active local participation limits the most adverse effects of exploitation, because residents’ concerns are taken into account.

Social stratification can increase both within a community and between communities and regions, however, depending on who benefits from development and who does not (see *Chapter 8. Community Viability* for further discussion). Also, the economic activity encouraged by this apparent convergence increases competition for resources. In regions lacking independent political power, local vulnerable populations will feel the effects of competition more keenly. Examples of such situations may be the Saami reindeer breeders, faced with severe competition from the forest industry in Finland, and the mining industry in Murmansk. Another is the Nenets reindeer breeders facing competition from the petroleum and gas industry in Arkhangelsk.

Conclusion

Considered as a whole, the formal economy of the Arctic is of fundamental geo-political importance. Indeed, it permits the production of raw materials that contribute to meeting the needs of the industrialized world.

However, the natural resources are distributed unevenly in the circumpolar area and the conditions of their exploitation vary greatly. In regions that are rich in mineral resources and where civil society exerts a real influence in the public arena, exploitation activities are supervised. For example, big companies must guarantee through tangible measures that the environmental impacts will be minimized or that the economic spin-offs for the local populations will be maximized.

However, this type of supervision is recent and does not exist everywhere. On the contrary, there are numerous large-scale mineral and hydrocarbon production operations that have been carried out – and that continue to be carried out – with little concern shown for the natural and human environment. These situations are most common in regions where local residents have little say vis-à-vis central governments or big industry, for example in one-industry towns where the dominant industry’s considerable power allows for the virtual imposition of conditions on employees, their families, and other residents.

Another conclusion from reviewing the economic systems of the Arctic is the central role played by the state. Accounting for the greatest number of jobs in several regions, the state is a very important economic agent. The state also

plays an important mediation role between private interests and civil society, for example to ensure that the expectations of civil society are reflected in the practices of enterprises. State intervention has occasionally been decisive in allowing Arctic residents to play a larger role in the market economy, not only as employees, but also as entrepreneurs.

A global trend reflected also in the Arctic is state withdrawal and privatization. It can be drastic as in Russia after the fall of the Soviet Union or partial as in Greenland. In many cases, the withdrawal has divided residents and contributed to making the Arctic's economic future more uncertain. Social policies may need to be a priority in order to counterbalance this uncertainty.

Gaps in knowledge

Resource developments in the Arctic are based on a wide variety of practices. Some are based on a pure market ideology, while others make room for social and environmental concerns. The scope of this chapter did not allow for an in-depth analysis of different practices of their importance in the Arctic world. This should be one of the topics for a follow-up of the AHDR.

In most regions of the Arctic, economic development is viewed as the best way to promote social advancement. However, relationships between economic and social development are not a given, nor automatic or unidirectional. In some regions for instance, the domination of a market ideology has created major social problems, be it in decreasing social programs, or be it in harming the social and natural environment of the Arctic residents. There is a clear need to deepen the relationships between economic development and human development in the Arctic, rather than to assume that what is good for companies is good for societies. This model should be challenged empirically within the context of the Arctic, and by jointly analyzing data sets on both economic and social development.

In some regions, economic rents from resource exploitation are so important that they could cover the costs of public services, if only regional authorities could control the rent. In other regions, economic rents have been re-directed toward regional authorities, but few assessments have been made of the results of such arrangements. Research initiatives should be launched to analyze this, and to study the regional government arrangements and their

results. Such an initiative could be beneficial to Arctic regions that are experiencing economic and social changes, where few models exist for comparison. A major research initiative should be launched to help shed light on the wide range of practices available. This could be a specific focus for a follow up AHDR. One complication in undertaking such an endeavor is the difficulty of acquiring the appropriate data sets.

Indeed, difficulties in acquiring statistical data sets for the Arctic region that would allow for rigorous comparisons have been experienced in creating this report. The AHDR would have benefited significantly from a proper access to circumpolar statistics. Our capacity to deepen our understanding of the economic and social situation in the different regions of the Arctic is highly limited by the non-availability of statistics.

Chapter summary

The formal economy of the Arctic is mainly based on large-scale exploitation of natural resources (e.g. mineral, oil and gas, and fish), most of which are exported. The service sector is well developed in many parts of the Arctic, whereas manufacturing plays a relatively minor role. Public services are often supported by transfer payments from central governments but overall, more money is flowing out of the Arctic than into the region.

The large-scale exploitation of Arctic resources is important to the national economies of several Arctic countries, as well as in the global economy. This is especially true for the Russian Arctic.

The size and structure of the economy differ between and within countries. The gaps between wealthy and poor regions appear everywhere but are most extreme in Russia and North America.

The Arctic is likely to continue to play a role as a reservoir of resources for the rest of the world. New trends are privatization of resources and new forms of economic partnerships.

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4. In such a geographic area, where varying political systems and diversified economic practices can be found, it is necessary to employ a number of sources and complementary methods. The system of national accounts measures transactions in the formal economy, namely legal currency transactions subject to taxation. The system is useful for it enables us to describe very meticulously the size and structure of transactions and economic flows, as well as compare the standard of living that may differ considerably amongst countries. The application of the system of national accounts to the Circumpolar Arctic has never been done before and constitutes a major component of this chapter. The data dealing with the formal economy have been taken from national statistical organizations. They were processed to make them rigorously comparable: they were converted into 2001 US\$, and modified to reflect purchasing power differences (which is referred to as PPP, Purchasing Power Parity).
5. The informal economy represents all of the economic activities that are not encompassed in the national accounts. It includes four activity sectors. The *domestic* and *community sector* produces, distributes and consumes goods and services, in the home or in the community, without resorting to monetary transactions. It is characterized by a limited number of intermediaries and a set of tacit rules based on the underlying motivation and ties that unite people involved in a transaction. The *actual informal sector*, is often associated with traditional activities, (C. Godfroy, Thesis, Université Montesquieu-Bordeaux (1997)), the activity of a single producer, or of micro-enterprises involved in the production of goods or services, commerce, transportation or procurement. This sector's transactions are not included in the national accounts; nevertheless, they all employ currency, and hence are legal or simply tolerated (C. Michaud, Thesis (MBA), Laval University (1994)), or encouraged (A. Portes, M. Castells, L. A. Benton, Eds. *The Informal Economy* (Hopkins Univ. Press, Baltimore, 1989)). The *irregular sector* and the *criminal sector* are characterized by the failure to comply with existing state regulations. Because this study is based on available data and is attempting to achieve a systematic analysis, it does not refer to the irregular and criminal sectors of the informal economy. Moreover, it does not focus on all of the activities of the actual informal sector, or the domestic and community sector. Indeed, available data concerning the informal sector and the domestic and community sector generally deal with food-producing activities, the production, distribution and consumption of food associated with hunting, fishing, trapping, breeding and gathering; they only exceptionally concern activities such as women's domestic work, including their role in this food chain. The informal economy data come from a broad range of scientific literature and monographs, since the transactions of the informal economy have not given rise to any systematization on the circumpolar scale.
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