

Perspectives on the Economic History of the Antarctic Region

Bjørn L. Basberg

**Economic History Section / Department of Economics
Norwegian School of Economics and Business Administration
5045 Bergen, Norway**

20. September 2005

Discussion Paper 18/2005

Abstract

This paper starts out by indicating how the economic history of the Antarctic could be conceptualized, given the peculiarities of the continent and the region (no permanent population, no sovereignty in a traditional sense, extreme remoteness, rigorous climate etc.). Second, it describes the main industries throughout Antarctic history. Third, it examines the quantitative data available on economic activity in the region, suggests how we should proceed to analyse the economic activity throughout history, and finally ask the question; Is it possible to (re)construct a historical 'national product' of the Antarctica?

Perspectives on the Economic History of the Antarctic Region

Introduction¹

The history of the Antarctic as we often see it, is a history of exploration and adventure. But throughout the entire period of human activity in the region, most of this exploration was motivated by the possibilities for economic or other commercial activity. Several industries developed and prospered.

In this paper I start out by indicating how the economic history of the Antarctic could be conceptualized, given the peculiarities of the continent and the region (no permanent population, no sovereignty in a traditional sense, extreme remoteness, rigorous climate etc.). Second, I describe the main industries throughout Antarctic history. Third, I examine the quantitative data available on economic activity in the region, suggest how we should proceed to analyse the economic activity throughout history, and finally ask the question; Is it possible to (re)construct a historical ‘national product’ of the Antarctica?

Economic history and Antarctica

The history of human activity in the Antarctic is not a very long one, going back to the first explorers in search of *Terra Australis* in the sixteenth and seventeenth centuries.² The exploration and discoveries of the continent and surrounding seas that followed have been well documented in the literature, both through the accounts of the actual explorers, and by historians and writers up to this day. The polar literature is, indeed, a distinct and popular genre.

The vast general literature represents a striking contrast to the sparse literature on economic history. This is not to say, however, that there is no mention of economic factors in the general literature. Antarctica is far from a *Terra Australis Incognita* in economic terms. But most Antarctic literature is principally about scientific research, geographical exploration,

¹ Paper for the *International Commission for Maritime History* sessions, 20th International Congress of Historical Sciences (CISH), Sydney, 3.-9. July 2005.

² A. Gurney, *Below the Convergence. Voyages towards Antarctica 1699 - 1839*, New York (W.W. Norton) 1997. See also G.E. Fogg, *A History of Antarctic Sciences*, Cambridge (Cambridge UP, Studies in Polar Research) 1992.

and adventure. As Headland put it in the introduction to his Antarctic chronology; “A comparatively neglected aspect of Antarctic history is the commercial exploitation of the region”³.

Antarctic economic history is also a neglected topic in the more general economic history literature. To study the economic history of Antarctica or the Antarctic region may, of course, not seem to be the most obvious thing to do. The region has no indigenous population or permanent settlement, and the temporary population has always been insignificant by standards elsewhere. There are no widely accepted sovereign or national states with government and institutions as exist in most of the world. Finally, resource exploitation, a basis for economic and commercial activity, has been very constrained. There have been businesses and industries, as will be described, but in the longer historical perspective the importance, relative to other geographical areas, has been modest. Some resources were obviously in abundance, but the challenges and difficulties in exploiting them have put a limit on the extent of the operations.

Economic history as a discipline usually focuses on the study and analysis of phenomena such as growth, trade, prices, monetary systems, industries and production, employment and labour. These are not phenomena that first comes to ones mind when thinking of Antarctica. The favourite concept of *per capita* would also give little meaning in the Antarctic context.

There are also other obvious reasons that this region does not appear in the general literature on economic history or in the international statistics on the historical development of the world economy. Most economic history, and general history for that matter, take the country (a national state) for its basis - as its unit of analysis. A geographical unit at least has some distinct borders, a population, a government, institutions and currency, and may also be defined as an economic region. Most of these factors are lacking when it comes to Antarctica. Therefore, it does not come as a surprise that the region has had no place in general economic history literature. Even the literature that has a broad international perspective and focuses on continents and other large regions, has seldom (or never) a mention of the Antarctic and the human and economic activity that has been going on in the region throughout more than two

³ R.K. Headland, *Chronological List of Antarctic Expeditions and Related Historical Events*, Cambridge (Cambridge UP, Studies in Polar Research) 1989, p. 28.

centuries.⁴ The same is the case if we look into international historical statistics (both general and economic history).⁵ The large five volume *Oxford Encyclopedia of Economic History* does have entries on whaling in several regions, including the Antarctic. However, the Antarctic as such is not dealt with explicitly, and there are no mention of other Antarctic industries.⁶

One reason that the Antarctic region has not appeared in the general economic history literature, has to do with the obvious fact that Antarctica is placed at the bottom of - or even excluded from - any list ranking economic activity or performance. On the other hand, there *has* been economic and commercial activity throughout history, the performance of which may be explained in just the same way as for several other regions; by 'conquest or settlement of relatively empty areas which had fertile land, new biological resources, or a potential to accommodate transfers of population, crops and livestock' and by innovations in 'maritime technology and navigation'.⁷ The region may further be analysed using the familiar core-periphery perspective and is an extreme version of a 'Resource Frontier Region'⁸. There were discoveries prompted by a mixture of individual, political and economic motives as in other areas where especially the western / European civilization expanded. Southern polar imperialism was in some ways just a special case of more well known imperialism. Territorial claims, to some extent, had to do with potential economic exploitation. However, to wave the flag and add territories to the home country was also prestigious no matter what the financial result. This was, of course, especially evident in Antarctica. Antarctic imperialism could also be easier to justify - since there were no native people who opposed conquest.

⁴ See f.ex. well known broad textbooks like D. Landes, *The Wealth and Poverty of Nations*, New York (W.W. Norton) 1998, or R. Cameron and L. Neal, *A Concise Economic History of the World*, New York (Oxford UP) 2003.

⁵ See f.ex. A. Maddison, *The World Economy: A Millennial Perspective*, OECD 2001, or *International Historical Statistics* (ed. by B.R. Mitchell), London (Macmillan) 1998.

⁶ *The Oxford Encyclopedia of Economic History* (ed. by J. Mokyr), vol. 1-5, Oxford (Oxford UP) 2003.

⁷ A. Maddison, op.cit, pp 18 and 23.

⁸ D. Sugden, *Arctic and Antarctic. A Modern Geographical Synthesis*, Oxford (Blackwell) 1982, pp. 13ff. and 415ff. The concept is used to describe regions that for example export one (or few) economic resources, the investment is foreign, the transport and labour costs are high, and has a special social structure.

Antarctica as an economic region

We will have to define Antarctica as a region to be able to properly analyze our topic. This is not a trivial matter, since there are several possible definitions. Antarctica is obviously, first and foremost, the continent itself, an area of 11 - 13,000,000 km² (depending on how islands and ice shelves are counted) - larger than Europe or Australia. Antarctica is, however, also defined in political and climatic terms which extend the borders further north. The Antarctic Treaty (made in 1959) limited its application to the area south of 60 degrees latitude. By this definition, parts of the vast *Southern Ocean* was included. The border of the Antarctic climatic zone is even further to the north, limited by the *Antarctic Convergence* which circumscribes the globe mainly between 50 and 60 degrees south. This area includes a number of islands, sub-Antarctic ones and others farther south. Some more islands are located north of, but close to the convergence. It is difficult to distinguish them from their close neighbours to the south, and the term *peri-Antarctic islands* has been used to encompass all of them.⁹ If we are interested in a definition of Antarctica that makes sense in an economic history context, we will at least include the area south of the convergence, but preferably also all the peri-Antarctic islands.¹⁰ Economic activities that were based on some of those islands extended further south, and since there for most of the history of human activity in the area were no sovereignty or international jurisdiction, the economic agents of the time moved freely as far south as made sense in their particular trade or industry. In this perspective one could argue for extending the boarder even further north, for example by including the Falkland Islands or Tristan da Cuna, but this is not done here.

The southern 'border' or 'frontier' was, for some industries, represented by the landmass or the extension of the pack ice that moved southwards during the summer, and opened larger areas which could be exploited. The great seasonal changes in light and darkness also had a powerful influence on activities. This was relevant in the age of the sealers and whalers as well as for example in the age of Antarctic fisheries or cruise tourism today.

As a continent, Antarctica is special in many ways. It is by far the most *homogeneous* continent. It is mostly permanently ice covered. There are climatic and temperature variations

⁹ For definitions and the peri-Antarctic islands, see Headland, op.cit., pp. 4 and 12.

¹⁰ The Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) defines the Southern Ocean along such lines, but does not include the islands south of New Zealand (Campbell, Auckland and Macquarie) that, on the other hand, are included in Headland's definition. Other authors include Macquarie Island, but not the two neighbours; K-H Kock, *Antarctic fish and fisheries*, Cambridge (Cambridge UP, Studies in Polar Research) 1992, p. 3.

between the inner regions, the coast and the islands, but generally within more narrow limits than other continents. In terms of resources, the region may also be termed rather homogeneous in the way that the diversity is much smaller than in most other areas.

What are then the natural resources of Antarctica? It is possible to distinguish between the following main categories:

- Marine mammals (seals, whales)
- Penguins and other birds
- Fish, krill and squid
- Terrestrial plants
- Marine plants (kelp, seaweed, plankton)
- Metallic minerals (iron etc.)
- Hydrocarbons (coal, oil, gas)
- Freshwater (as ice)

Our next question is to what extent these resources have been exploited and have formed the bases for commercial activities.

Antarctic industries

We will use the term ‘Antarctic industries’ to designate distinguishable economic or commercial sectors throughout Antarctic history. What were they, how did they develop, what were their economic significance? In this analysis we will also include industries that were planned, but never materialized (like mining). We will also include activities that did not take place to create a profit or exploit a resource, but nevertheless can be considered a sector of the economy (like science). This is what we usually today would term the service sector of the economy.

Below we will go into some more detail in describing their development.

Sealing

Sealing was the earliest Antarctic industry, initiated by the geographical discoveries of the 18th century. Indeed, the sealers themselves discovered islands and coast of the continent throughout the period of their activity. The first recorded visits of British sealers are from the 1780s. The activity that followed is characterized by large fluctuations in hunting results and several shifts from one hunting ground to another as seals were almost exterminated from areas - in this era of absolutely no regulations. The first peak in sealing occurred in the South Shetland Islands around 1820. In that season about 75 vessels were reported in that area.¹¹ The South Shetland grounds never recovered, but the industry moved to other grounds, on other peri-Antarctic islands that experienced short peaks and collapses in hunting during the following decades. Peaks may especially be observed in the Crozet and Prince Edwards Islands (1840s) and in Kerguelen and Heard Islands (1850s). In the 1870s a last, and smaller, peak may be observed in the South Shetlands and South Georgia. A considerable uncertainty is connected to the data and information about sealing activities. Most likely there was an under-reporting due to an interest among the sealers in keeping their grounds secret.

Most sealers (about fifty percent according to Headland's estimates) came from the United States. The industry had its centre in New England, but was clearly distinct from the extensive whaling industry of the time. Britain accounted for around twenty percent, and the Cape Colony (South Africa), New South Wales (Australia) and New Zealand about half of that each. The products were basically of two kinds. Fur seals were the major target, hunted for the fur and skins that were brought to the market all over the world. The larger elephant seals were hunted for the oil that had the same uses as, and were a substitute for, whale oil.

The 19th century sealing industry dwindled because of over-exploitation. The fur-seals were almost made extinct, and only gradually and slowly recovered in population in the latter part of the 20th century. The hunting of elephant seals for oil was not justified in its own right commercially, but some Southern Ocean whalers combined whaling and elephant sealing into the early 20th century after the independent sealing expeditions were gone. Elephant sealing

¹¹ In his 1989 volume R.K. Headland (*op.cit.*, p. 41ff.) recorded 930 sealing voyages to the Antarctic region, distributed on grounds and countries of origins of the expeditions. However, in later revisions, many more voyages has been recorded, adding up so far to a total of about 1200; See R.K. Headland, *A Chronology of Antarctic Exploration*, Unpublished revision, Cambridge 2005. See also G. Deacon, *The Antarctic Circumpolar Ocean*, Cambridge (Cambridge UP, Studies in Polar Research) 1984, p. 15ff.

was also a separate activity (Kerguelen) and undertaken in combination with modern whaling (Grytviken, South Georgia) during that period.

Whaling

In the 19th century, the international whaling industry was dominated by the United States. It was a global industry, hunting in all oceans of the Earth. The U.S. whaling and sealing were, as we have indicated, different industries, undertaken by different people, with different vessels and technology. They were also mainly operating on different grounds. The whalers visited some peri-Antarctic islands, but concentrated on hunting grounds further north. This industry went into a decline after the U.S. Civil War of the 1860s. From then on the Norwegians took over the whaling hegemony. They introduced the so-called modern whaling at the Finnmark coast in Northern Norway, using powerful steam catcher boats and explosive grenade-harpoon cannons.¹² Already in the late 1880s there were signs of depletion of the Norwegian Arctic whale stocks, and the whalers were quick to start their search for new grounds. From the 1890s an explorative phase in the whaling industry started, and reconnaissance expeditions were dispatched all the way south to Antarctica.

After the whaling along the Finnmark coast was prohibited in 1904, the Norwegians led the way in a world-wide expansion of the industry. New grounds were sought throughout the Northern and Southern Hemisphere. Most often the catching grounds became intermezzos with rapid expansion, over-exploitation and decline. The Southern Ocean was the area that attracted the largest number of whalers. During the early years, two grounds there became the centers of activity; South Georgia and the South Shetlands. At South Georgia six shore stations were built. In the South Shetlands so-called floating factory ships were anchored in the sheltered harbours and a shore station was built at Deception Island.

The shore whaling stations at South Georgia (and to a lesser extent at Deception and Kerguelen) in several ways resembled industrial towns or communities, and were thus in a sense an exception from the uninhabited character of the Antarctic region. However, the

¹² I do not intend to review the substantial body of literature that exist on the historical development of Antarctic modern whaling. The standard reference work is J.N. Tønnessen and A.O. Johnsen, *The History of Modern Whaling*, London (C. Hurst & Co. Ltd.) 1982. See also G. Jackson, *The British Whaling Trade*, London (Adam & Charles Black) 1978. Several company histories add valuable insights to the overall perspectives, like W. Vamplew, *Salvesen of Leith*, Edinburgh (Scottish Academic Press Ltd.) 1974, and the recent I.B. Hart, *Pesca. A History of the Pioneer Modern Whaling Company in the Antarctic*, London (Aidan Ellis) 2001.

communities were in many ways different from industrial communities elsewhere. The activity was seasonal and it was a male (with few exceptions) society. Other than the slop chests, there were no shops or other commercial activities or infrastructure. There was no need for money.¹³ The stations were in many ways examples of what sociologists have called ‘total institutions’.¹⁴

In these very active years of establishing an Antarctic whaling industry, several nations took part. The pioneer company at South Georgia was registered in Argentina, but the initiative, the equipment and the whalers mostly came from Norway. This nation, together with Britain, became dominant during this period. Most whalers were recruited in Norway. It was prosperous years for many companies – large catches and large profits.

Entering the 1920s, faced with declining stocks and restrictive British concessions in South Georgia and South Shetland waters, the whalers started to look for new grounds away from coastal waters. The 1920s became a new decade of exploration. The whaling pioneer C.A. Larsen entered the Ross Sea in 1923. In 1925 the stern hauling-up slipway was introduced aboard factory ships, further facilitating the whaling operations offshore. The era of the so-called ‘pelagic whaling’ had started. It was a period of immense expansion and transformation of the whaling industry, and the heyday of the British-Norwegian hegemony of the industry.

The whaling industry experienced the same turmoil as most other industries in the world economy of the early 1930s. The crises implied structural changes. Several shore stations and factory ships were permanently removed from business. New whaling nations also entered the industry, especially Japan and Germany. Japan soon almost equalled the two pioneer nations. Finally, discussions about quotas and regulations of the industry became an important international issue.

After a sudden reduction of whaling during World War II, companies from many nations began or continued Antarctic whaling, attracted by high demand for whale oil. However, the development was not left to the industry itself. *The International Whaling Commission* was

¹³ Grytviken had, as a matter of fact, its local currency between 1909 and 1914. It had no exchange value and was issued to prevent the whalers from buying liquor from visiting ships. Hart, *op.cit.*, p. 199.

¹⁴ B.L. Basberg, “A ship ashore? Organisation and living conditions at South Georgia whaling stations, 1904-1960”, *International Journal of Maritime History*, XIV, 1, 2002.

established in 1946, and took an active role in managing the industry by the introduction of quotas and other regulations.

Most whaling companies finally abandoned Antarctic operations in the early and mid 1960s after years of diminishing catches and returns. After the moratorium on all commercial whaling (1982), only Japan has continued 'scientific whaling' in Antarctic waters.

Fisheries

The development of the fisheries in Antarctic waters was closely connected with the development of the whaling industry. The first commercial fisheries were organised by the whaling companies themselves, while the major expansion of the industry coincided with the end of whaling.¹⁵

The South Georgia pioneer whaling company, Compañía Argentina de Pesca, sent salted fish to Argentina in its first year of operation at the island.¹⁶ Such activities, however, never became more than a small by-product of the company. Other whaling companies at the island also attempted to start fisheries, both in the early years and into the 1950s and -60s, but they all failed. This was not because of lack of resources, but rather connected to a combination of technological and economic considerations. As Kock put it, 'the whaling companies did not wish to divert too much of their effort from the more lucrative whaling and sealing'.¹⁷

The next phase of Antarctic commercial fisheries started in the 1960s and was offshore based - independent of the shore whaling companies at South Georgia. Japanese and Soviet research vessels explored the waters around South Georgia, and in 1969/70 Soviet trawlers started extensive catching in the South Atlantic sector of the Southern Ocean. In the 1970s, the fisheries extended to the South Shetland Islands, and other European nations entered the industry, especially East Germany, Poland and Bulgaria.

In the 1980s, still led by Soviet fishermen, the industry expanded to other grounds, in the Indian Ocean sector (especially around Kerguelen Island) and even further south along the

¹⁵ An extensive review is K-H. Kock, *op.cit.* See also D.J. Agnew, *Fishing South. The History and Management of South Georgia Fisheries*, St. Albans (The Penna Press) 2004.

¹⁶ Kock, *op.cit.*, p. 174 and Hart, *op.cit.*, p. 79.

¹⁷ Kock, *op.cit.*, p.176.

continent itself. Several other nations gradually took part in Antarctic fisheries, the major ones being Japan and Chile.

A number of different species have been targets of the Antarctic fisheries over the forty year period of active catching, the main ones being rockcod, (mackerel) icefish, krill, squid and (Patagonian) toothfish. A common fate, both for krill and finfish, has been over-exploitation and dramatically reduced stocks. This led to international concern, and in 1982 a regulatory regime was developed within the *Convention on the Conservation of Antarctic Marine Living Resources* (CCAMLR). Exclusive economic zones were also introduced around several peri-Antarctic islands.

Exploration and scientific research

Scientific research in the Antarctic is as old as any other human activity in the region. Indeed, the advancement of scientific knowledge was an integral part of the exploration of the continent and the surrounding seas.¹⁸ Adventure, science, and exploration were probably more interrelated in this region than in most other places.

We argued earlier that the history of the Antarctic has focused more on these aspects of the exploration rather than the economic history of the region. We will, however, also deal with science and exploration here, but then seen as an ‘economic sector’ in a wider sense, as it will be included in the service sector of any normal economy today.

In the 1880s, after the sealing industry in Antarctic waters had been in decline for a number of years, the scientific communities, especially in Britain and Germany, but also in Australia, tried to stimulate an interest in Antarctica. In the following years, the Antarctic whaling industry began. Islands and coasts were discovered and the interior of the continent was penetrated all the way to the South Pole. More than twenty expeditions, in addition to many relief expeditions, are recorded within the period. It was years of spectacular and dramatic adventures, triumph and tragedy. It has aptly been termed the ‘Heroic Age’ of Antarctic exploration. During this period, science indeed was an important and integral element of most journeys. Amundsen’s South Pole expedition was more of an exception – a fact that probably in part explained its success.

¹⁸ G.E. Fogg, *op.cit.* A concise account focusing on the exploration and science of the Antarctic seas; G. Deacon, *The Antarctic Circumpolar Ocean*, Cambridge (Cambridge UP, Studies in Polar Research) 1984.

In this period exploration, science, *and* commercial activities were also to some extent interrelated: The sealers and early whalers were explorers. In the ‘Heroic Age’ some of the exploration was organized by the whaling business in search of new grounds. The whaling reconnaissance trips made geographical and scientific discoveries, especially in the South Shetlands, but were first and foremost searching for whales and seals.

From the late 1890s, expeditions with the sole purpose of exploration and science operated in Antarctic waters, penetrating the icy coast around the continent, especially along the Antarctic Peninsula. The exploration of the continental interior was in a sense a logical extension of this activity and the earlier eighteenth and nineteenth century explorers’ efforts to reach as far south as possible. It became first and foremost a British endeavour.

In the early decades of the twentieth century, the Antarctic region was dominated by the expanding whaling industry. The industry provided logistical support for several scientific expeditions. Especially from the 1920s scientific programs were also initiated by the whaling industry itself.¹⁹ The interwar period also experienced important advances in technology that changed the way Antarctic scientific expeditions were organised. Radio-communication was introduced, as was the use of airplanes. These years, as well as the 1940s and 50s, were also characterized by intense national rivalry in Antarctica. More nations were involved, and the first permanent stations were established on the Antarctic continent in 1944. The military were often strongly involved in logistics. What motivated Antarctic expeditions; territorial expansion or scientific advance, was not always clear. To some degree, this dichotomy has been a part of the rationale of national Antarctic expeditions ever since.

Despite national rivalry there was a trend towards more international collaboration in Antarctic affairs. The first truly large-scale international scientific expedition was the Norwegian-British-Swedish Antarctic Expedition (1949-52). A more important event was the *International Geophysical Year* (1957-58). This was a world-wide research programme involving 66 nations. Twelve of these established stations on the continent and on the islands.

¹⁹ Examples are the Norwegian *Norvegia* expeditions (1927-31) and the British *Discovery Investigations* (1925-51); see B.L. Basberg, “Whalers, Explorers and Scientists. Historical Perspectives on the Development of the Antarctic Whaling Industry”, in A. Elzinga et al. (eds.), *Antarctic Challenges. Historical and Current Perspectives on Otto Nordenskjöld’s Antarctic Expedition 1901-1903*, Göteborg (Royal Society of Arts and Sciences) 2004, p. 25ff.

The year marked a shift in many respects regarding science and more generally the governance of Antarctica. One lasting effect was the foundation of the *Special Committee on Antarctic Research* (SCAR) in 1958. It has since then been the main forum for international co-operation in Antarctic science. Another effect was the Antarctic Treaty that established a basis for science and other human activities in the region.

There have been a gradual widening and deepening of the focus of Antarctic science. The early explorers made important observations on the Southern Ocean; currents and temperatures. Soundings and charting were also important. Ashore, rocks, plants, and birds were collected and systematized. For many years one important focus of science was related to potential commercial exploitation of the Antarctic resources (whales, fish, krill, oil and other minerals). Today science within fields like oceanography, marine biology, glaciology, geology, atmospheric science and terrestrial biology is to a large extent focussed on long-term climatic changes, where Antarctica has proven to be an invaluable 'laboratory'. Several thousand scientists and support personnel visit the Antarctica annually, working from ships and more than forty year-around bases, a few with airfields. The 'science industry' has definitely reached Antarctica.

Tourism

Individual tourists (although it is not always obvious how this should be defined and categorized apart from explorers or other occasional visitors) have been observed in the Antarctica since the late 19th century. For many years their appearances were few and infrequent. In the late 1950s the first 'real' tourist ships arrived. In the early and mid 1960s there was no activity, but from 1966 onwards, cruise ship visits have been annual. A tourist industry gradually emerged.²⁰ The numbers of vessels and tourists increased in the early 1970s, then declined and again increased from the mid 1980s until recent years where the annual number of tourist visitors has passed 20000.²¹ The vast majority travelled aboard cruise ships, most of them between southern South America and the Antarctic Peninsula. Other areas of attention were the Ross Sea and the peri-Antarctic islands. Just a small fraction

²⁰ D.J. Enzenbacher, "Tourists in Antarctica: numbers and trends", *Polar Record*, vol. 28, No. 164, 1992 and R.K. Headland, "Historical development of Antarctic tourism", *Annals of Tourism Research*, Vol. 21, No. 2, 1994.

²¹ *International Association of Antarctic Tour Operators* (IAATO); 1992-2205 Antarctic Tourist Trends.

was airborne. New trends in tourism, like so-called adventure tourism, has also reached Antarctica, but still in very small numbers.

The Antarctic tourist industry is indeed an international industry. The vessels involved are owned in many countries, they are registered under numerous flags and employ crews of all nationalities as in international shipping. The passengers are a truly international mix, but with two nations dominating the passenger lists throughout the years: Taking 1994/95 as an example year; 36 % were from the U.S., 18% were from Germany. Other nations are typically what we would consider the wealthier countries of the world, like Switzerland, Canada, U.K., Australia, and Japan - a pattern not very different from global tourism in general.²²

Mineral exploitation

The search for exploitable minerals was part of Antarctic exploration from the very beginning. Geology and mineralogy were important elements of the scientific program of every expedition, and the knowledge gradually accumulated on mineral deposits. The search for minerals in the early days was concentrated in the coastal mountain ranges and the islands. The earliest mining prospects were, due to accessibility, planned at the islands - like South Georgia - as early as in the 1890s.²³

Deposits of many metals and other minerals have been discovered. Most significant are deposits of iron and coal. Since most of the huge and inaccessible continent is ice-covered, the knowledge is, however, still limited. But since, as the scientists gradually learnt, Antarctica was formed by the same geological processes as other continents, and once was part of the super-continent Gondwana, the minerals likely to occur are known types.²⁴ However, commercial exploitation of mineral resources has never taken place in Antarctica. There are two main reasons for this. First, the inaccessibility of the deposits has made them uneconomical to exploit. Some deposits (for example iron in Prince Charles Mountains, coal in Ellsworth Mountains and the Transantarctic Mountains) are of such magnitude that they probably would have been exploited if the locations had been different.

²² Ibid.

²³ Hart, *op.cit.*, p. 65ff on South Georgia Exploration Company Ltd. of which nothing came other than diplomatic complications.

²⁴ M.J. De Wit, *Minerals and Mining in Antarctica. Science and Technology, Economics and Politics*, Oxford (Clarendon Press) 1985.

A second reason is the restrictions against mineral exploitation imposed by the Antarctic Treaty. As technological frontiers moved (as we for example clearly have witnessed in northern hemisphere offshore oil drilling) and mineral deposits in more hospitable areas were depleted, the economic considerations have gradually been changing and the pressure has increased on Antarctic mineral resources. It became an issue in the 1970s, and the environmental concerns were put on the agenda by the Antarctic Treaty countries.²⁵ It became a controversial issue. In 1988 a proposed Convention on the Regulation of Antarctic Mineral Resources Activities was repudiated by France and Australia, and a less restrictive Protocol on Environmental Protection was signed in 1991 by all member countries. It did, however, impose an effective ban on mining, prohibiting such activities for 50 years. De Wit wrote in the mid 1980s that ‘[a]t present there is an underlying spirit of disbelief or scepticism vis-à-vis the technical or economic feasibility of exploration, let alone exploitation, of onshore mineral wealth within the next few decades, given the remoteness of Antarctica, its harsh climate, the amount of ice coverage, the lack of suitable mining-related technology, the over-abundance of minerals elsewhere, and the potential opposition of environmental conservationists’.²⁶ This statement in most respects still seems to be valid.

Transport and shipping

Shipping and maritime transport has always been crucial in any activities in the Antarctic region. Some activities and industries were ship-based as such, and all activities needed vessels for logistical support. This was a natural consequence of the fact that the continent had no permanent settlement, so all people, supplies, and products had to be carried in or out.

Most Antarctic shipping may be considered as an integrated part of the industry or activity it served. Vessels used in the whaling industry were mostly owned by the whaling companies. The whaling ships (factory ships, whale catchers) were obvious “production units”. But also numerous support vessels that were used to carry supplies, products or people were owned by the companies. The same may apply to sealing and fishing and the tourist cruise industry. Although the ship owner and cruise operator might be different companies, they should be

²⁵ For a review of the work and discussions on environmental implications of mineral exploitation in the Antarctic Treaty Scientific Committee (SCAR) in the 1970s and 80s; R.H. Rutford (ed.), *Reports of the SCAR group of specialists on Antarctic environmental implications of possible mineral exploration and exploitation (AEIMEE)*, Cambridge (Scientific Committee on Antarctic Research) 1986. On the complex legal matters involved in mineral exploitation within a “common property” environment, see F. Orrego Vicuña, *Antarctic Mineral Exploitation. The Emerging Legal Exploitation*, Cambridge (Cambridge UP, Studies in Polar Research) 1988.

²⁶ De Wit, op.cit., p. 6.

considered part of the cruise business. In the science industry the case is somewhat different. There is a clearer distinction between the support function of the vessels and the scientific activity. Some support vessels are run by specialized shipping companies with no direct relation to the scientific stations, which typically are government owned. In many cases, however, governments operate their own polar research vessels which are used both as support vessels and for marine scientific research. In this case, they are obviously integrated parts of the science industry.

The navy vessels should also be mentioned. Many such vessels have served as support vessels for scientific operations. Such use has a long tradition from the early days of exploration till this day, corresponding to the involvement of governments in Antarctic operations throughout the history.

Aircrafts have been used in Antarctica since 1928, first in adventurous exploration of the coasts and inner continent, later to assist in transport to scientific bases and to carry tourists across or on to the continent. The use of aircraft to supply bases is increasing, as new airfields have been built. However, a majority of destinations still rely on vessels, due to distances, weather conditions, carrying capacity, or topographical conditions. This is the case at all but one of the peri-Antarctic islands. Aircrafts were to some extent operated by governments and thus integrated with the science industry in the same way as some vessels. There were also several private air companies operating from South America and South Africa, with an industry niche of its own.

Other industries

There were other industries, too, that we can mention more briefly since they were very small in size or just remained as prospects or plans.

Penguins and other birds have been exploited to a small extent. Egg-collecting was part of the additional diet for early explorers, sealers and whalers, but was never commercially exploited. Production of penguin oil in the 19th century has been recorded at some islands, especially

Maquarie Island, probably undertaken as an additional activity by the sealers. As Headland notes, this was a ‘much less developed’ industry.²⁷

At some of the peri-Antarctic islands where climatic conditions were less hostile, animal breeding, especially sheep farming, has been tried. In one way it was an extension to the south of successful industries in places like New Zealand and the Falkland Islands. At Kerguelen, sheep farming took place for many years up until the Second World War.²⁸ At South Georgia plans existed back to the 1890s, both for sheep and cattle farming, but they never materialized.²⁹

As to more recent developments, attention has been devoted to ice or freshwater export as well as offshore oil exploitation. So far, such activities have been investigated experimentally, but never brought further to the commercial phase.

Philately has also become a commercial activity, especially related to the increased tourism, and is today a more than insignificant source of government income for several Antarctic Treaty nations and governments of islands.

A recent link between the Antarctic and shipping is very different from the previous ones. In the 1980s and 90s the traditional open ship registers in Flag of Convenience countries like Panama, Honduras, and Liberia, were challenged by new so-called second registers established by the major shipping nations. One such type of register was the so-called national *offshore or dependency registers*. Britain set up such registers for example in Isle of Man and Bermuda. Of Antarctic relevance was a register at Kerguelen Island, under French jurisdiction. Norway considered to set up such a second register at Bouvet Island (as well as the Arctic ones Jan Mayen and Svalbard), but instead ended up with a Norwegian International Ship Register (NIS), introduced in 1987.³⁰ While this and some other registers became successes, the Kerguelen register has so far been of very limited importance. In 2004,

²⁷ Headland, *op.cit.*, p. 28.

²⁸ P.M. Arnaud and J. Beurois, *The Shipowners of the Dream. The Bossière's leases and the exploitations of the French companies in the Southern Indian Ocean (1893-1939)*, Marseille 1996.

²⁹ Hart, *op.cit.*, p. 65 and 73.

³⁰ The issue was discussed in a Norwegian parliament white paper (Ot.prp. nr. 45 (1986-87):6). See also S. Tenold, *Skipsfartskrisen og utviklingen i norsk skipsfart 1970-91*, Bergen (NHH/SNF) 2001, p. 117.

73 ships (French and foreign-owned) were registered in the island.³¹ It is not known of any other plans to establish dependency ship registers in the Antarctic region. However, in terms of future economic activities in Antarctic, it could be extremely suitable; There are no environmental issues, no physical activities involved - just government income.

A very recent activity which we still do not know where will lead in the future, is so called bio-prospecting. Scientists have throughout the last decades discovered molecules and organisms in Antarctic fish, invertebrates and bacteria that prevent them from freezing. Such organisms may have an industrial use in improving the quality of frozen food (like ice cream). There is obviously also a commercial potential in these organisms, since biotechnology companies both in the US and in Europe already have filed some 150 patents.³² One of the companies is Unilever, a company with a long Antarctic history going back to the days of whaling. Bio-prospecting obviously has minor adverse environmental effects. Nevertheless, such activities (especially when patents are involved) may lead to conflict with the principles of the Antarctic Treaty and the freedom of scientific knowledge exchange.

Long term trends in Antarctic economic and commercial activities

In his Antarctic chronology, Headland distinguished between three so-called exploitative periods in the Antarctic history (sealing, whaling, and fishing). Written in the 1980s, he viewed mineral extraction as a 'potential fourth' and iceberg / fresh water exportation as a 'conceivable fifth'.³³ If we limit the concept of industry to exploitation of resources, sealing, whaling, and fishing are obviously the only ones that so far has been extensively developed. Mineral exploitation has, as we have seen, not been allowed. The export of ice / water has so far been too limited to justify using the term 'period'.

When adopting a wider definition of industries that includes also the non-exploitative industries, the main phases or periods will have to be re-defined. Exploration and science will

³¹ G.S. Sletmo and S. Holste, "Shipping and the competitive advantage of nations: the role of international ship registers", *Maritime Policy Management*, vol. 20, No. 3, 1993, p. 243-255. In 2004, 73 ships (French and foreign-owned) were registered in Kerguelen.

³² Quoted from *The Guardian*, February 2. 2004 (www.guardian.co.uk).

³³ Headland, *op.cit.*, p. 28.

then have to be considered as the first Antarctic industry. It also has had a more or less continuous presence throughout the human history of the region. There have, of course, been phases of development within this long period. In terms of 'industrialisation' the post World War II period with permanent stations and thus a much more extensive logistical activity, is the most obviously distinguishable.

Together with science, tourism has for the last few decades been a growth industry in Antarctica. It is, as is the case with science, a non-exploitative industry, but obviously a commercial industry. We will call it a fifth main development stage or phase, as listed in the following table.

Table 1:
Antarctic industries; Main sectors and chronology

| <i>Sector</i> | <i>Period</i> |
|--|---|
| Exploration and science | 18 th century - present |
| Sealing | 19 th century |
| Whaling | 1904 - 1970s (80s) |
| Fishing | 1960s - present |
| Tourism | 1960s - present |
| Other industries - Animal breeding - Philately - Ship register - Water and ice export - Bio prospecting | 1920s - 20 th century 1980s - present 1990s - 21 st century |

Especially the exploitative industries, sealing, whaling and fisheries, have several similarities. For example, in periods with no regulation, the catching led to over-exploitation and depletion of resources. The industries moved from one area (island, catching ground) to another around the Southern Ocean, and explored deeper and deeper south to hitherto unexploited grounds. One difference may indicate that we might have learnt something about regulations: Sealing was never regulated. Whaling was regulated, probably too late. Fisheries were regulated, time

will show if it was early enough and sufficient. The newer industries (tourism, science) also face strict regulations which clearly limit their operations and expansion.

When it comes to differences, a major shift has obviously been from traditional exploitative to non-exploitative industries, in a way reflecting general trends in many economies from primary to secondary and eventually to service industries. The increased accessibility of the Antarctic region is yet another dramatic trend, affecting how activities and businesses can be undertaken. The major expeditions lasting for months (or years) are increasingly replaced by quick visits.

Economic historians look for numbers. To which extent is it possible to quantify the economic activity that has taken place in the Antarctic throughout history? Historically, the lack of traditional national sovereign states is a problem. There was no statistics collected for the region as such. The industries were operated by businessmen from countries especially in Europe or the United States and the activities (employment, vessels, production, prices, profits) 'disappear' into various national statistics. It also disappeared in a more literal sense; In the 19th century sealing industry there were obvious deficiencies in the reports especially on where the hunting took place. A change occurred only after the introduction of international cooperation and legislation was introduced, which also led to statistical reports on the various activities. This happened first with the whaling industry and later in fisheries and tourism.

A rough indicator, at this point, which tells something about comparative sizes of the different sectors, is to determine the number of vessels and men involved in various activities over time. All kinds of Antarctic industries and activities have, as we have noted, always had a strong maritime component, involving vessels as the basis for the activity or for logistical purposes. Looking at some sample years throughout the Antarctic economic history (1850, 1900, 1950, and 2000), may reveal some differences and development patterns.³⁴

In 1850 nine sealing vessels are recorded (in addition to two navy vessels). With an estimated crew per vessel of about thirty, we are dealing with less than 300 sealers altogether. As we have seen, the sealing industry fluctuated dramatically. In the period 1840-60 many seasons

³⁴ We will rely on the recorded activities published by Headland in his chronology (1989), as well as other sources for the later period.

had between ten and twenty visiting sealing vessels. However, for many years throughout the entire sealing period, the activity was on the 1850 level and even lower. No other years were like the exceptional 1820 season when about 75 vessels were recorded. The number of sealers in that season may have been more than 2000.

The earliest days of exploration were insignificant in terms of visits. Even during the 'Heroic Age' from the 1890s, the numbers were small. In 1900/01 the number was six (four exploration / scientific expeditions, two navy vessels). The crew size varied considerably depending on whether a shore party was included or not, but the annual number of visitors during these years rarely could have reached more than 2-300.

Moving on to the whaling era, the scale of the operations changed. It was a gradual increase, of course, but the annual number of visiting vessels soon outnumbered the past activities. Taking 1950 as a sample year, 279 whaling vessels were recorded. A vast majority were small catcher boats (with a crew of about 20) working for the large factory ships or shore stations. A factory plus its catcher boats constituted a so-called 'expedition'. There were about twenty of them in this season with an estimated average of 300 men, altogether about 7000 men.

Taking another fifty year leap to 2000, whaling was gone, and fishing, tourism and science were the main industries. These were all activities that involved a substantial number of vessels and people. Eighteen tourist ships were recorded in 2000/01 with a crew of 1460 and 12248 passengers. In addition, a number of small sailing yachts were visiting.³⁵ 44 scientific stations were operating.³⁶ Their staff or the number of support-vessels involved is not known, but presumably the number of scientists and support crew did not exceed 2000. The extent of the fishing industry is more difficult to reveal. Data on catches (tons) have been published, but are historically very unreliable, reflecting the participating nations of the pioneer years. Nothing is known systematically about the number of vessels or crew. Indicating the size; About 40 Soviet trawlers were recorded in South Georgia waters in the late 1960s. 77 Soviet trawlers were observed around Kerguelen in 1971/72. 32 were recorded in the South Orkney Islands area in 1977/78, accompanied by a number of support vessels (four tankers, eleven cargo vessels, a tug, and a research vessel). 98 Soviet vessels were scheduled to fish the

³⁵ IAATO; *2000-2001 Summary of Seaborne and Land-based Antarctic tourism.*

³⁶ *SCAR Bulletin*, No. 139, 2000.

Southern Ocean in 1989/90.³⁷ There were other nations too, as we have seen, indicating an industry involving several thousand men.

Such very rough and imprecise figures at least reveal substantial activities in terms of vessels and men over a long period. However, much work remains to be able to make historical comparisons across sectors more confidently. Such comparisons will, of course, also have to take into account the duration of the work period in Antarctica for the various activities. This factor is of special relevance in this region where there is no traditional permanent settlement and most visitors are there for short periods. Over the years most people involved in the industries (sealing, whaling, research) were visiting for a 'season' i.e. the months of Antarctic summer. At one extreme were scientists living on stations for several years at a time. At the other extreme are the tourists usually visiting for between one and a few weeks. Based on such differences, Headland estimated that although the total number of tourists visiting Antarctica in the early 1990s exceeded the number of scientists, their 'effect' or impact measured as man-days were about 0.5 % of the total human presence.³⁸

If we intend to compare different industries and commercial sectors, or sectors of the Antarctic 'economy' in a wider sense, we also need to determine values. We will need data on quantities, prices and employment. Such statistics which are comparable across sectors and industries are not readily available and will have to be established. It will take a major effort. Especially, it will be a challenge to establish consistent and reliable data for the catches and values of the 19th century sealing industry. For newer industries, even for the whaling industry from its beginning in 1904, the available statistical sources are much more satisfactory (*International Whaling Statistics*). This is not, as we have seen, the case with fisheries, where reliable data are only available after control regimes were imposed (CCAMLR). Records of tourism and scientific activities are more reliable within a longer time frame, due to the Antarctic Treaty regime and other organisations that have collected data (IAATO, SCAR).

³⁷ According to Kock, *op.cit.*, p. 207, based on various other sources.

³⁸ Headland, *op.cit.* (1994), p. 279.

The way ahead

The aim of this paper has been to discuss the concept of an economic history of the Antarctic region. How should it be conceptualized and defined. Which industries and commercial activities should be included? Our aim at this point has not been to analyse the statistics. It is a future challenge to establish comparative data, in value terms, across sectors and covering a longer period. In this way we may answer questions about the relative size and importance of the industries. How important was the sealing industry compared to the later whaling industry? How important is tourism today compared to previous Antarctic industries? We have tried to demonstrate how to proceed with this work, which hopefully will also enable us to develop quantitative evidence that may say something about the size and development of a historical 'national product' of Antarctica.