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Stefán Sigurðsson
Abstract

Tourism in Iceland is of great importance and ever-growing. During the period 2000-2008 the share of tourism in GDP was 4.3% to 5.7%. One aspect of the tourist industry is hunting tourism, upon which limited research has been done and only fragmented information exists on the subject. The aim of this thesis is to estimate the economic impact of reindeer hunting on the hunting area. The hunting area is in East Iceland, the only region of the country where those animals can be found. To the author’s best knowledge this is the first time an attempt has been made to investigate this topic. In 2010 a survey was performed amongst Icelandic hunters. The survey was done online and pertained to the year 2009. The emphasis was on monetary expenditure. The Keynesian multiplier and input-output model were used to estimate the economic impacts. The main findings are: using gross output on the one hand and disposable income on the other, that 162 mISK and 62 mISK respectively constitutes the economic impact in the hunting area. Hunters spent on average about 217,000 ISK in total on the hunt which yields about 290 mISK. Out of that amount about 93 mISK was for hunting licences and 72% of the amount was paid to landowners resident in the hunting area, or about 67 mISK. Total spending on other items relating to the hunt was about 197 mISK. It is estimated that reindeer hunting constituted the basis for about 26 jobs in East Iceland in 2009.

Key words: reindeer hunting, hunting tourism, economic impact, Keynesian multiplier, input-output model.
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1 Introduction

The title of this report is: Hunting reindeer in East Iceland, the economic impact. The research question is: What is the economic impact of reindeer hunting on the hunting area?

To the author’s best knowledge this is the first time an attempt has been made to answer such a question.

This research constitutes part of a project called North Hunt. The North Hunt project was a three year international project which was awarded funding by the European Regional Development Fund within the Northern Periphery Programme. It began in January 2008 and was intended to run until December 2010. This program involved a partnership of ten organisations from Finland, Sweden, Iceland, Scotland and Canada. These are governmental agencies, research bodies and industry related organisations along with entrepreneurs in each of these countries. The main emphasis in this programme is on sustainable hunting, a socioeconomic tool for revitalising rural areas. In this North Hunt programme, hunting-related tourism is looked on as an opportunity for rural areas in Iceland (North Hunt, 2010).

In autumn 2004 the author of this report went reindeer hunting for the first time. He and his hunting partner both sent in an application for hunting a reindeer cow in hunting area number six. Two applications were submitted to increase the likelihood of acquiring a hunting licence as, during the past several years, applications had outnumbered issued hunting licences. It was decided that if only one hunting licence was obtained, the lucky hunter would carry out the hunt, but the cost of the licence and all other expenses would be split 50/50, as would be the meat obtained. The author still remembers the surge of adrenalin when he approached the hunt and pulled the trigger and killed the animal. It was a magnificent experience searching for the prey, exploring the natural environment in the hunting area and experiencing the sensation of the final moments of the hunt. Since then the author has, together with a hunting partner, gone on reindeer hunts several times. Sometimes for the hunt itself and sometimes merely for shooting pictures of the hunt. The hunting trip has always been an enjoyment, experiencing the wonderful nature of the hunting area of East Iceland, in partnership
with a good hunting partner and a good guide. The cost of the hunting trips as a whole is always split 50/50. Those experiences led to the author being invited to take part in the North Hunt project. Thus it was possible to combine what was a hobby with a master’s thesis.

1.1 The purpose of the research

The purpose is to estimate the economic impact of hunting reindeer on the area where the hunt takes place, i.e., East Iceland (EI). The hunt probably is of importance to the rural area of EI.

Tourism has increasingly become a significant industry in Iceland’s rural areas and farmers involved with tourism are increasingly providing access to their land for tourist activities (Benediktsson, Júlíusdóttir & Karlsdóttir 2008)

During the past two decades, tourism has had considerable economic impact in Iceland and has been the main growth industry in rural areas where other employment opportunities have declined. Hunting tourism is thought to provide considerable income to rural economies during the hunting season. However, there is little information on the actual economic impact of hunting tourism in Iceland, and decisions in the hunting tourism sector seem to be largely based on educated guesses. Data on hunting statistics are fragmented and, in many cases, outdated (Jóhannesdóttir, Blöndal & Snæbjörnsson, 2006)

1.1.1 The significance of natural resources for Iceland

Iceland differs from other Western countries in many ways; it seems, for example to contain more natural resources than most of them. Iceland has no mining and no oil or gas. But the country controls rich fishing-grounds which are among the cornerstones of the economy. The country also possesses many renewable natural resources, streams and rivers and geothermal areas, all of which produce electricity for use both in industry and for domestic households.

For a long time, fisheries were the most important export activity in Iceland. In 1969 the first aluminium factory was established and since then the production of aluminium has increased considerably. In the past decades, the share of fisheries in export has decreased, whereas power-intensive industry and the service sector (tourism included) have taken on an increasingly significant role. An examination of the development in
value of export of goods and service for the past four decades reveals that the proportional importance of fisheries has significantly declined, whereas the share of aluminium has increased. Since 1969 the share of aluminium has almost quintupled, but the share of fisheries has been almost halved. In 2008 the proportional export value of aluminium for the first time exceeded that of fisheries. That year the ratio of aluminium was 27.8, the ratio of the service sector was 28.7 and that of the fisheries was 26.2. This clearly reveals the growing importance of the service sector (Hagfræðistofnun Háskóla Íslands, 2011).

Fisheries are more important in Iceland, and power intensive industry based on domestic energizers plays a larger role than in many other countries in the world. Tourism is to a greater extent based upon the nature of the country. Direct consumption of natural resources is also an important factor. Icelandic consumers enjoy readier access to unspoiled natural resources than is common in other Western countries. The water and air is generally cleaner, the landscape is more diverse and there is more variety in natural relics. The country presents vast views of impressive mountain regions and yet there is significant habitable land in green and sheltered valleys. Probably these boons of nature are of great importance to the inhabitants. The value of this direct consumption and, therefore, the natural qualities it is based on, is not included in the aggregate National Accounts but could indeed, by most methods of calculation, come to an exceedingly high amount (Árnason, 2004).

1.1.2 The importance of tourism

In 2008 the share of tourism in gross domestic product (GDP) was 4.6%. Total internal tourism consumption in 2008 was 171 billion ISK or 11.5% of GDP. Inbound tourism consumption was 93.5 billion ISK. Total domestic tourism consumption was 77 billion ISK, household consumption was 67.5 billion ISK and business and government tourism consumption was 9.5 billion ISK. It is estimated that in 2008 about 9,000 people were employed in tourism which is about 5% of total employment.
During the period 2000-2008 the share of tourism in GDP was 4.3% to 5.7% as may be gathered from Figure 1.1. In recent years the tourism sector has increased more rapidly than the economy as a whole (Statistics Iceland, 2011).

In 2011 it is anticipated that the increase in tourist arrivals will be 75,000-100,000 compared to 2010. Added foreign currency income is supposed to be about 30 billion ISK. This is the highest growth in tourism since its quantification began (Viðskiptablaðið, 2011)

### 1.1.3 Hunting Tourism

Hunting is one of the oldest ways of utilising natural resources and as such it has an influence on animals and plant species, as well on ecosystems. Hunting tourism falls under the category of consumptive wildlife tourism, a small special sector of tourism which panders to a well-defined market segment. But consumptive wildlife tourism can be defined as “a form of leisure travel undertaken for the purpose of hunting or shooting game animals, or fishing for sports, either in natural sites or in areas created for these purposes” (Lovelock, 2008 p. 4). He also claims that consumptive wildlife tourism is multi-dimensional, apart from the hunting experience itself. It is also culturally embedded; an adventure and an ecotourism experience (Lovelock, 2008).

Hunting tourism is conducted by hunters who may travel considerable distances from their home and/or own hunting grounds in order to hunt, and often abroad. These
hunters differ from those who most commonly hunt in the area where they physically reside and have hunting rights (resident hunting). The motivation for hunting by such tourists – i.e. long distance hunters - may place greater emphasis on adventures and souvenirs (e.g. trophies). This can motivate payment of significant sums of money to intermediaries (hunting tour operators) that organise and facilitate their hunting experience, but resident hunters usually do not require the services of hunting tour operators (Brainerd, 2007).

Ever since the settlement of Iceland the fauna has been exploited. Until early in the last century the hunt was an integral aspect of surviving in the country. But nowadays hunting is looked on as recreation, serving the purpose of consumption of game as a delicacy.

Hunting activities mainly take place in the shoulder of the season, and off season, to regular tourism. Therefore, initiatives of hunting tourism could help to expand the tourist season in Iceland. Traditionally, hunting in Iceland is seen more as a recreation than a business opportunity. Iceland has a short history of hunting tourism and activities related to the sector are scattered. Nevertheless, hunting tourism is considered to have great potential in Iceland. In the past few years, a number of hunting tourism companies has been set up. Many of those companies also provide other kinds of tourism products e.g. fishing tourism. A recent study among those companies shows that entrepreneurs consider both domestic and foreign hunters to be potential costumers for hunting tourism products. When this survey was conducted, the foreign hunters in Iceland were only about 1% of all active hunters, but they were considered to spend more money on the hunting experience than domestic hunters. Some entrepreneurs had at that time detected a growing interest among domestic hunters to use the services available. This indicates that hunting tourism is going to evolve and be profitable in the times to come (Matilainen, n.d.).

1.1.4 Land use and migration

In the past century Iceland evolved from being a rural country which depended more or less on agriculture. The agricultural community had evolved comparatively slowly through the centuries but in the 20th century, the community changed from rural to urban chiefly as a result of rapid technological changes, parallel to this evolvement followed a migration from the countryside to densely populated coastal areas, mostly to
the larger townships, such as the capital area of Reykjavík. Younger people saw more opportunities in the urban areas which led to a general drift from the countryside into coastal towns and villages, which offered higher wages and more educational opportunities. That led to a reduced population in rural areas and the declining use of land for farming. One consequence of this migration was that personal income in the urban areas became higher than in the countryside (Afmæliskveðja til Háskóla Íslands, 2003, pp. 157-173).

1.1.5 New hunting areas and increasing land use

Undoubtedly, there are many locations in the rural areas of Iceland, besides East Iceland, where reindeer can prosper. Now and then debates emerge regarding the migration of those animals to new locations in Iceland. Lately, interested parties in the rural southern part of the Westfjords, such as those involved in tourism, employment committees, and Skotveiðifélag Íslands (SKOTVÍS, Icelandic Hunting and Shooting Association) have discussed the possibility of transferring a small herd of reindeer from East Iceland to the southern part of the Westfjords. Such a move would undoubtedly reinforce the local economy in this area where traditional sheep farming has been on the decline. The climatic and geographical conditions here are also similar to some reindeer habitats in East Iceland.

The Icelandic Food and Veterinary Authority and local sheep farmers are, however, averse to this, saying that reindeer could carry diseases such as scrapie ("Lagst gegn", 2011).

It is the opinion of the author of this thesis that such an opportunity should be carefully examined with an open mind since there are significant interests at stake both for the local communities in question and the hunters.

In the year 2000, 286 farmers were producing lamb and mutton in the Westfjords (Hagþjónusta Landbúnaðarins, 2011), but in 2010 their number had fallen to 175 (Sigurðardóttir verbal source, October 18. 2011). This is a decrease of 39% in only 11 years. As a result of this development, land use has decreased. If reindeer were imported into this area, better use would be made of the land.

In the Westfjords, about 70 parties were running tourism enterprises and in the southern region about 30 (Westfjords - Another Iceland, 2011). Thus, the investment is already
available and probably the only new investment that has to be made is a facility for slaughtering the reindeer. This would extend the tourist season at the time when it is starting to fade. If the animals were imported to the area, this would undoubtedly strengthen the local economy in the long run.

1.2 The research questions
The aim of this study is to provide objective information on the impact of reindeer hunting on the relevant local economies in East Iceland. Also, there are considerations with regard to the effect of increasing the distribution area of these animals or introducing them to new areas and the potential effect on tourism in new areas.

In this research, the economic value of reindeer hunting will be estimated by identifying the economic effect on the hunting area of reindeer in East Iceland. In 2009 the hunting quota of reindeer was 1,333 animals and the number of applications was 3,260 or about 2.4 applications per licence, see Appendix II. It is likely that often two hunters share a licence so the actual numbers of applications are probably fewer than 3,260. The number of hunters resident in the hunting area was 194. The number of hunters resident abroad was 72. The hunting season begins 15th July and ends 15th September. Usually a significant number of hunters join the hunt late in the season. Therefore, these hunters are an important addition to the tourist business as they come in when the traditional season has declined. The total amount paid for hunting licences was 93.2 million Icelandic krónur (mISK). The hunters must hire a professional guide for the hunt about 80% of whom live in the hunting area (Umhverfisstofnun, n.d.). The total expenditure of hunters regarding the reindeer hunt will be examined and the proportion of the expenditure in the hunting area will also be estimated. The income from licences will be examined and its distribution. Part of the amount is used to pay the cost of hunting control which is supervised by the Department of Natural Resources (DNR). Another part is paid to the East Iceland Institute of Natural History (NA) which is in charge of researching the reindeer population, this constituting the basis for hunting control. The remainder goes to the landowners in areas where the animals are hunted.
The research question is:

*What is the economic impact of reindeer hunting on the hunting area?*

To answer this question, multiply effects will be calculated, using both Keynesian multipliers, and also Input-output analysis. The larger the multiplier, the stronger the economic impact.

Sub-questions are as follows:

*What is the proportion of the hunting licence in the total cost of a hunting trip?*

*Is the transportation of reindeer into new areas likely to reinforce tourism and also increase land use in those areas?*

The answers to these questions could help those parties who are interested in transporting reindeers into new areas and also official institutions concerned with decision-making.

The structure of the thesis is as follows: First, hunting in general will be discussed. Second, the reindeer and the hunting area will be discussed. Third, theories regarding multiply effects will studied, both pros and cons. Forth, a literature review regarding hunting and fishing will be included, both domestic and foreign. Fifth, models regarding multiply effects will discussed and the research methodology will be explained. Sixth, data obtained from the survey will then be used to estimate the economic impact of hunting on the area and conclusions drawn. Seventh, economic impacts will be estimated. Eighth, discussion about how the information drawn from the survey can be used to further increase the impact of reindeer hunting. Finally, conclusions from the research will be presented.
2 The Subject

In the beginning of this chapter, sport fishing will be discussed briefly, but this has a much longer story in Iceland as a sport than hunting. Some research has been conducted to estimate the economic value of this activity and the results will be shown.

2.1 The beginning

Fishing in rivers and lakes had, without any doubt, been taken up as soon as the first settlers came to Iceland. Local names like Laxá and Urriðaá imply this. The first law about fishing rights was made in the year 930, the purpose of which was to ensure equal rights and to prevent conflict and aggression. Clauses about fishing rights can also be found in old law books like Járnþiða and Jónsþók. No trustworthy sources about fishing with rods can be found from the early ages and it has to be assumed that nets and other techniques must have been used. But fishing with rods did not become widespread until in 19th century. Since then sport fishing has become an increasingly popular hobby and in the year 2003 it was estimated that 55,000-61,000 Icelandic anglers aged 18-75 years did some fishing in their leisure time, making this one of the most popular hobbies in Iceland (Hagfræðistofnun Háskóla Íslands, 2004).

In the latter part of 19th century British anglers came for the first time to Iceland for sport fishing. Initially they visited the Borgarfjörður area, probably Grímsá river and Langá river, and then moved on to Laxá river in the valley of Aðaldalur in the northeast of Iceland. Subsequently, some Icelanders became aware of how to catch salmon and trout by means of fishing rods. The number of British anglers increased steadily until the Second World War began, whereas in the fourth decade of last century the number of Icelandic anglers started to grow (Kolbeinsson & Guðjónsdóttir, 1989)

2.2 Freshwater resources and species

Atlantic salmon and other freshwater species are valuable natural resources in Iceland and many people have an income from a variety of activities related to both rod and net fishing in fresh waters in Iceland. Fishing licences for stream waters and lakes belong to the adjoining land, and the holders of a fishing licence are obliged to organize partnerships regarding mutual fishing zones. The species which can be caught on fishing rods in fresh water in Iceland are Atlantic salmon, trout and Arctic char. There
are both sea-run and stationary populations of trout and Arctic char. Of these species salmon is of the greatest economic importance. The fishing takes place in both rivers and lakes. There are about 90 rivers where Atlantic salmon can be caught and most of them are located in the west and north of Iceland. Trout and Arctic char can be found in many more streams all over Iceland and in a large proportion of the country’s 1,800 lakes (Hagfræðistofnun Háskóla Íslands, 2004).

Sport fishing can be divided in two price categories; salmon fishing and trout fishing. Salmon fishing takes place in rivers and trout fishing is carried on both in rivers and lakes. The price for fishing for salmon is higher than fishing for trout, and always has been. The popularity of salmon fishing has increased over the years and this has led to price increases. During the period 2005-2007 the price of fishing licences for salmon rose in step with the value of, for example, securities, or about 173% (Ólafsson, 2009).

As a result, many Icelandic anglers switched to trout fishing which, in turn, also drove up the price of licences in that category.

The next chapter contains a brief summary of the story of hunting in Iceland, what can be hunted, information about the species and numbers hunted in 2008.

2.3 Hunting in olden times

When the first settlers came to Iceland they started to exploit the fauna as much as they could. But here the number of species was not as rich as in the countries from which they came. They did not, however, have to fear any large predators, because the only predator in Iceland was the arctic fox. Only now and then polar bears popped up during hard winters and springs when pack ice came close to the coastline or drifted ashore.

Formerly, hunting both birds and mammals was an inevitable part of surviving in Iceland. Hunting was either a profession, to provide food for the household or to eliminate vermin which endangered the livestock. The population hunted everything that could be eaten or sold, to the utmost of their ability, with whatever crude hunting techniques they possessed. Most of the time they did not care or had no knowledge of whether their hunting might destroy the entire stock of some species of fauna. This inevitably caused the extermination or near-extirpation of many species of fauna in parts of Iceland. The last great auk in the world was killed on Eldey island in the year 1844. But there is no reason to blame those who, in the olden times, tried to survive in
the rugged nature of Iceland. The only way to do so was to exploit everything nature offered. In some locations of the country hunting was a necessary means for survival. The hunting of seabirds and seals was particularly important, and in most parts of the country this catch was an important factor in getting by in Iceland in those times. It was not, however, until the middle of the 18th century that firearms were first mentioned in relation to hunting in Iceland (Friðriksson, 1996).

In Iceland there are few species of game compared with the neighbouring countries; the number being only about half compared to the Nordic countries. This is mostly because in the Nordic countries it is permissible to hunt many species of birds which cannot be legally hunted in Iceland. For example, many species of ducks are protected in Iceland, and nowadays, it is not allowed to hunt wading birds and passerines. Many species of the order Galliformes are also popular game in the Nordic countries, but in Iceland the ptarmigan is the only game fowl of this order, being also one of the most popular game birds and much sought after by Icelandic hunters. Besides, the Nordic countries offer a variety of deer for hunting, but in Iceland only reindeer can be found. According to Icelandic law, 39 species can be hunted, although the number depends on legislation at any given time. Weighing against this paucity of species of game is the multitude of individuals of each species. As a matter of fact, it can be said that most stocks probably can tolerate the hunting effort practised here, and from the hunters’ perspective some species are even under-exploited. This applies to some species of seabirds as the traditional utility of those species (hunting in nets, snares, picking eggs) has decreased and the stock of graylag and pink-footed geese has also increased considerably: all this despite growing interest in the hunting of those species. Some stocks of ducks are also large, but are under-exploited, and the same is now beginning to apply to seals. From this standpoint everything indicates that in the future the nature of Iceland can become more generous than in the neighbouring countries, where results of overharvesting appear in the form of quotas and preservation laws (Friðriksson, 1996).

Here in Iceland hunters have, however, also experienced this in the last few years in relation to ptarmigan hunting.

2.3.1 Species of game that can be hunted

In this research, when talking about hunting birds, this refers to the use of firearms and the hunting of prey for food with some exceptions, see Table 2.2 below. Hunting in
Iceland is mostly small game, i.e. hunting of birds and small mammals. The small mammals are arctic fox and mink. The only big game, or large mammal for hunting in Iceland, is the reindeer. On Table 2.1 are the species of game that can be hunted in Iceland and also the hunting periods for each species.

**Table 2.1. The hunting periods of game in Iceland. Source: DNR, 2010, Veiðidagbók**

<table>
<thead>
<tr>
<th>Species</th>
<th>January</th>
<th>February</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
<th>November</th>
<th>December</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mink</td>
<td>All year</td>
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<td>All year</td>
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<tr>
<td>Arctic fox</td>
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<td>Seals</td>
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<tr>
<td>Greater Black-backed Gull</td>
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<td></td>
<td></td>
<td>All year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lesser Black-backed Gull</td>
<td>All year</td>
<td>All year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>All year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Herring Gull</td>
<td>All year</td>
<td>All year</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>All year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common Shag</td>
<td>All year</td>
<td>All year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>All year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brünnich’s Guillemot</td>
<td>All year</td>
<td>All year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>All year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black Guillemot</td>
<td>All year</td>
<td>All year</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>All year</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atlantic Puffin</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rock Phalarope</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Arctic Skua****</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reindeer*****</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

The green colour displays the period when the relevant species can be hunted and the red colour indicates when the relevant species is protected. As can be seen there are 7 species that can be hunted all the year around. They are looked on as vermin. Those species are mink, arctic fox, seals and four species of birds: the great black-backed gull, lesser black-backed gull, herring gull and common raven.

Table 2.2 shows the numbers of hunted mammals and birds in 2008, but the figure for hunted seals is not available.
Table 2.2. Amount of hunted game in 2008. Reference: DNR, 2010, Veðidagbók

<table>
<thead>
<tr>
<th>Bird</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Puffin *</td>
<td>58,487</td>
</tr>
<tr>
<td>Rock Ptarmigan *</td>
<td>52,050</td>
</tr>
<tr>
<td>Greylag Goose *</td>
<td>45,414</td>
</tr>
<tr>
<td>Lesser Black-backed Gull **</td>
<td>27,744</td>
</tr>
<tr>
<td>Common Guillemot *</td>
<td>27,526</td>
</tr>
<tr>
<td>Razorbill *</td>
<td>15,553</td>
</tr>
<tr>
<td>Pink-footed Goose *</td>
<td>15,020</td>
</tr>
<tr>
<td>Great Black-backed Gull **</td>
<td>12,056</td>
</tr>
<tr>
<td>Mallard *</td>
<td>11,165</td>
</tr>
<tr>
<td>Arctic Fox</td>
<td>7,914</td>
</tr>
<tr>
<td>Brunnich’s Guillemot *</td>
<td>7,903</td>
</tr>
<tr>
<td>Mink</td>
<td>6,641</td>
</tr>
<tr>
<td>Fulmar *</td>
<td>4,068</td>
</tr>
<tr>
<td>Herring Gull **</td>
<td>3,804</td>
</tr>
<tr>
<td>Common Raven **</td>
<td>3,275</td>
</tr>
<tr>
<td>Shag *</td>
<td>2,399</td>
</tr>
<tr>
<td>Cormorant *</td>
<td>2,300</td>
</tr>
<tr>
<td>Glaucous Gull **</td>
<td>1,688</td>
</tr>
<tr>
<td>Barnacle Goose *</td>
<td>1,533</td>
</tr>
<tr>
<td>Reindeer</td>
<td>1,529</td>
</tr>
<tr>
<td>Teal *</td>
<td>1,508</td>
</tr>
<tr>
<td>Wigeon *</td>
<td>1,180</td>
</tr>
<tr>
<td>Long-tailed Duck *</td>
<td>1,153</td>
</tr>
<tr>
<td>Black-headed Gull **</td>
<td>1,008</td>
</tr>
<tr>
<td>Arctic Skua **</td>
<td>758</td>
</tr>
<tr>
<td>Kittiwake **</td>
<td>732</td>
</tr>
<tr>
<td>Read-breasted Merganser *</td>
<td>627</td>
</tr>
<tr>
<td>White-fronted Goose ***</td>
<td>266</td>
</tr>
<tr>
<td>Scaup *</td>
<td>146</td>
</tr>
<tr>
<td>Tufted Duck *</td>
<td>126</td>
</tr>
</tbody>
</table>

Birds marked with * are hunted for utility and birds marked with ** are looked on as vermin. The proportion of birds hunted for utility is therefore about 70%. The hunting of the white-fronted goose is not allowed. Arctic fox and mink are regarded as vermin.

The most commonly caught bird in 2008 was the puffin. The hunting of puffin takes place in special benefit areas where it is caught in nets.

The second is the ptarmigan. Hunting takes place in open fields, moors, in the mountains and in the wilderness. Hunters must have permission from the landowner when hunting on private land. But there are quite a number of public areas where anyone resident in Iceland with a valid hunting licence can go hunting. As in hunting for geese, it is becoming increasingly common that privately owned land is hired out by landowners. The ptarmigan is seen as a delicacy among many Icelanders and traditional on the dinner table during the celebration of Christmas and New Year. That is probably an important reason for the popularity of this game, which is so great that most hunters generally go for ptarmigan. It should not come as a surprise, therefore, that in 2003 and 2004 hunting of ptarmigan was banned because of a sharp decline in the stock. Since then hunters have been asked to exercise moderation when hunting ptarmigan and the great majority of hunters obey that request. After the hunt was allowed again in 2005, the actual hunting season was cut to only 18 days, a far cry from the 69 days allowed before the ban.
In third place is the graylag goose. The species of geese that can be hunted in addition to the greylag goose are the pink-footed goose and barnacle goose. In 2008 the total number of hunted geese was about 62,000. The hunt takes places both on privately owned land and in common areas. When hunting on private land the hunters have to have the landowner’s permission and increasingly landowners are willing to hire out the right to hunt on their land. Seabirds are popular game, hunted at sea by boat. Several species are hunted: common guillemot, razorbill, Brunnich’s guillemot and black guillemot.

Ducks are also very popular game and often hunted at the same time as geese as they frequently feed in the same places, especially late in the autumn. There are several species of ducks that hunters are allowed to kill. The most commonly hunted duck is the mallard. Other species that are also hunted are teal, wigeon, scaup, tufted duck, long-tailed duck and red-breasted merganser. In total about 16,000 ducks were hunted in 2008 and great majority, or 11,000 of them, were mallards. The hunt takes places both on privately owned land and also on common ground.

There is no quota on game in Iceland, except on reindeer hunting. Each year a new quota is issued, based on the size of the reindeer population. Through 2003 the hunting season of ptarmigan was from 15 October until 22 December, or 69 days (Pálsson, 2003).

In 2011, when the author of this thesis was completing his work, the hunting season was shortened to only 9 days. And hunters were asked to hunt in moderation (Pálsson, 2009). This was done because of the poor condition of ptarmigan stocks. It is estimated that about 5,000 hunters go ptarmigan hunting, and in 2011 they were asked to limit themselves to only 6 ptarmigan per hunter. This was because it was estimated that the ptarmigan population in 2011 was about 350,000 birds and could therefore only tolerate the hunting of about 31,000 birds (Náttúrufræðistofnun Íslands, 2011). It is most likely that not all hunters hunt all types of game, nor do they have the same taste for the meat of the game. Besides, not all hunters enjoy hunting all kinds of game. Different kinds of game need different methods. For example, an effective morning hunt of geese requires some kind of tackle, such as decoys and most often takes place on privately owned land, whereas the ptarmigan hunt often takes place in area that is open to the public. Ptarmigan hunting has also a long tradition in Iceland. Some may only catch puffin and
to do that a firearms licence is not required. The author knows hunters who only hunt arctic fox and mink. Hunting seabirds must be done by boat and not all hunters have access to boats. The condition of some species of seabirds is poor, possible because of changes in climate and in the environment which have resulted in a lack of food in the sea and these factors may therefore necessitate changes in the arrangement of the hunt (Umhverfisráðuneytið, 2011). It is, therefore, most likely that unlimited hunting of more species than ptarmigan will soon become a thing of the past.

In the next chapter, the story of reindeer in Iceland will briefly be discussed; where they can be found, the arrangement of the hunt and, finally, requirements necessary in order to obtain firearm and hunting licences.

2.4 Hunting licence

All hunting related issues are regulated by the Department of Natural Resources (DNR) in the Environment Agency of Iceland and the department controls all game management, shooting and hunting courses, licences, hunting cards and data collection (e.g. bag statistics) and management (Lög um vernd, friðun og veiðar á villtum fuglum og villtum spendýrum nr. 64/1994).

In Iceland hunting is generally seen as a common right, available to everyone interested in hunting and the holder of relevant permits. The current system of regulating hunting, demands that all hunters in Iceland obtain a firearms licence and a hunting card issued by the DNR, after having completed the relevant training courses and passed the required tests. Those who intend to hunt birds and small mammals are required to obtain a firearms licence and a hunting licence which is valid for the period of one year. For reindeer hunting, however, a licence for each bagged animal is required. If the hunter wishes to renew the hunting licence, he must issue a bag report for all hunted species and he has to report in which area the game was caught. Iceland is divided into six hunting areas, as can be seen in Figure 2.1 i.e. VE, VF, NV, NE, AU and SU. Hunting in Iceland takes place both on public and private land. All Icelandic hunters, who have a valid hunting card and a firearms licence, are permitted to hunt on common ground (Lög um vernd, friðun og veiðar á villtum fuglum og villtum spendýrum). For hunting on privately owned land the landowner’s permission is needed. Foreign hunters are only allowed to hunt on private land (Reglugerð um veiðikort og hæfnispróf veiðínanna nr. 291/1995) and need to obtain a short-term hunting licence from the National
Commissioner of the Icelandic Police, a short-term hunting card from the DNR before the hunting trip, and must hold a valid hunting card/licence in their home country where relevant (Lög um vernd, friðun og veiðar á villtum fuglum og villtum spendýrum).

![Division of Iceland into hunting areas](image)

**Figure 2.1. Division of Iceland into hunting areas. Source: DNR, 2010. Modifications made by the author of the thesis.**

In Figure 2.1 postcodes in Iceland can also be seen, because in this thesis, respondents’ residences are often divided according to postcode areas. Rough locations of postcodes in the hunting areas are as follows: 100-299 and 300-399 are in area VE. 400-499 are in area VF, 500-599 is in area NV and also 600-630. In area NA are 640-699. In area AU is 700-799 and in area SU is 800-900. Reykjavík, the capital city of Iceland and the most populated municipalities, except Akureyri, are in postcode area 100-299. Akureyri is located in postcode area 600-699. The reindeer hunting area is in postcode area 700-799.

### 2.5 The Reindeer

The story of reindeer in Iceland is not so old. The first specimens, 13 in all, were brought from Finnmark in Norway in 1771. They were first released in the islands of Vestmannaeyjar, but soon brought to the mainland, in Landeyjar on the south coast. In 1777, 30 animals were put ashore in Hafnarfjörður in the south west. In 1783, 30-35 animals were brought to Eyjafjörður in the north. And the last group, 35 animals, arrived in 1787. These animals were transported to Vopnafjörður in the north east. All
these animals were half-tamed and the idea was to teach Icelandic farmers to raise them as domestic animals. This was on the initiative of local officials. But the preparation seems to have been inefficient and there appeared to be no interest among locals to try this kind of farming. When the animals came ashore they were released and therefore soon became wild. The conditions in Iceland were ideal for reindeer and in the next decades they multiplied. Soon farmers saw them as competitors to domestic animals, especially sheep, because they grazed in the same areas, especially during hard winters. This led to the relentless hunting of reindeer and in many locations they were exterminated. In 1939 the total number of reindeer in Iceland was only about 100. These animals were located in Kringilsárrani, an isolated area in the highlands, north of the Vatnajökull glacier. The area is surrounded by the glacier and by enormous glacier rivers. Then the animals were protected for some time (Valtýsson, 1945).

Since then the reindeer stock has multiplied, a quota has been set and controlled hunting has been allowed. In the past few years the number of reindeer has been anticipated to reach about 6,000 during the summer (Þórisson, 2010).

Reindeer hunting is a popular big game sport in Iceland. The meat is one of Icelandic nature’s greatest delicacies and this is probably one of the reasons for the popularity of this kind of hunting. This is the only game in Iceland that has been allocated a quota. Until the year 2003 all those who applied for a licence were successful. In the year 2003, however, the number of applications exceeded the quota and has increased since then, see Appendix III. But that same year and the next the hunting of ptarmigan was banned because of the bad condition of the ptarmigan stock. It is believed that some hunters who used to hunt ptarmigan for Xmas and the New Year, turned to hunting reindeer instead and having once experienced this kind of game some of them have taken it up on a long-term basis. This year was also the first one when hunters could apply for a reindeer licence on the internet, in the same way as they used to turn in a bag report and apply for a new hunting licence. It is the author’s opinion that this option could have played a significant role in the increase of applications for reindeer licences. Since then the number of applications has always exceeded the quota on offer. In 2009 the quota was 1,333 animals but the number of applications was 3,260, so only a minority of those who applied for licences were lucky. The reindeer hunt takes place in
East Iceland as this is the only part of the island where the animals can be found, as has been mentioned above.

2.6 Reindeer hunting

Reindeer are only located in East Iceland. During the hunting season, which usually extends from 15th July till 15th September, the reindeer are found on the heath and moorlands of the highland interior. Access to these remote hunting grounds is by 4x4 vehicles, helicopter or on foot. The reindeer seek lower grasslands in winter. Figure 2.2 shows the territory where they are located. It extends from Vopnafjörður in the north to Suðursveit in the south east. The numbers show how the region is divided into 9 hunting areas, see Figure 2.2. The reason for this is that the reindeer population is divided roughly into 9 main herds and the hunting area is divided up on that basis (Þórisson, 2010).
Reindeer hunting is the only game hunting in Iceland that has been allotted a hunting quota. The animals are counted twice a year. This is done to estimate stock size. The information gained is also used to decide the size of the hunting quota. The size of the quota is determined bearing in mind the load the land is estimated to be able to sustain.
In 2009 the quota was about 20% of the stock. The reindeer hunt could be defined as self sustainable (Þórisson & Þórarinsdóttir, 2008).

Table 2.3. The quota 2009 and number of applications. Reference: UST, 2010.

<table>
<thead>
<tr>
<th>Hunting area</th>
<th>Quota 2009</th>
<th>Number of applications</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cows</td>
<td>Bulls</td>
</tr>
<tr>
<td>1 and 2</td>
<td>547 (11)</td>
<td>200 (66)</td>
</tr>
<tr>
<td>3</td>
<td>40</td>
<td>20</td>
</tr>
<tr>
<td>4</td>
<td>27</td>
<td>13</td>
</tr>
<tr>
<td>5</td>
<td>83</td>
<td>40</td>
</tr>
<tr>
<td>6</td>
<td>10</td>
<td>25</td>
</tr>
<tr>
<td>7</td>
<td>100</td>
<td>60</td>
</tr>
<tr>
<td>8</td>
<td>91</td>
<td>35</td>
</tr>
<tr>
<td>9</td>
<td>27</td>
<td>15</td>
</tr>
<tr>
<td><strong>Total:</strong></td>
<td>925</td>
<td>408</td>
</tr>
</tbody>
</table>

All those who plan to hunt reindeer must apply for a reindeer hunting licence from The Reindeer Committee of Iceland. The Minister for the Environment sets an annual quota for reindeer hunting in January each year, after consulting the East Iceland Institute of Natural History (NA) and the Department of Natural Resources (DNR). The annual quota for 2009 was 1,333 animals. The licences are allocated by a random draw of applications in February each year – one reindeer per hunter. The draw is considered a simple system where all hunters who apply have an equal chance to obtain a licence. In Table 2.3 the quota and the number of applications for 2009 can be seen. The number of applications per available licence was approximately 2.4, see Appendix II. The price of the licence for a reindeer bull in 2009 was for hunting area 1 and 2, 120,000 ISK and for other areas 80,000 ISK. The price for the licence for a cow in area 1 and 2 was 65,000 ISK and for other areas 45,000 ISK. The average price is therefore about 70,000 ISK, see Appendix II.

All hunters must hire a guide, who helps them in the hunt and has a statutory responsibility to monitor the habitat and animals (Reglugerð um stjórn hreindýraveiða nr. 486/2003). There are currently 85 licensed guides, but not all are active every year. A great majority live in the hunting area. Some guides will guide many hunters during the season while others will only take a few individuals each season. Each guide is allowed to take a maximum of three hunters on any one hunting trip. The duration of hunting trips varies from only a day to up to a week, but almost always ends with a kill.
The guides have to know the hunting area well, monitor the location of animals, and liaise with other guides in the area to organise hunts with minimal disturbance to other hunting parties. For each licence issued it is estimated that each licensed guide is employed for at least one full day. The service of the guides distributed among the number of active guides equates to a significant level of employment (Þróunarfélag Austurlands, 2005).

2.7 Types of hunters
It is the author’s opinion, after several years’ experience of reindeer hunting, that reindeer hunters could be classified into two types, A and B. Type A are hunters, who try to minimize the total cost of the hunt. They apply for a hunting licence jointly, two or more, to increase the possibility of success. If more than one is lucky enough to obtain a licence, one or two may accept the licence. Then they go hunting together, enjoy the trip, the companionship and split the total cost and all meat acquired. Type A probably also sell some of the meat to minimize cost. Type B are hunters for whom cost is not an issue; they may try to hunt as large a bull as possible for a trophy and the meat is not the bottom line. However, no confirmed information is available regarding this opinion.

2.8 Egilsstaðir
Egilsstaðir is the largest municipality in the hunting region, located in its heart, so to speak, and could therefore be crowned with the title “capital of reindeer hunting in Iceland”. Areas 1 and 2 have the biggest quota, as may be seen in Table 2.3. Areas 1-4 are close to the town of Egilsstaðir as shown in Figure 2.3. The quota of animals in these areas in 2009 was 847 or 64% of the total allocated quota.
Figure 2.3. Iceland. Reference: www.lmi.is

Figure 2.3 shows map of Iceland with local names mentioned above.

2.9 Travel method

Hunters from abroad must also travel to Egilsstaðir from Reykjavík where the international airport (Keflavík) is located. To travel from Reykjavík to Egilsstaðir, the hunter can take a bus, drive in his own or rented car, or use the service of the domestic airline Flugfélag Íslands which flies there on a daily basis. The distance by road from the international airport in the capital, Reykjavík, South West Iceland, to Egilsstaðir is about 652 km (Vegagerðin, 2010).

A considerable number of applicants live in the Reykjavik area or in other regions of Iceland far from the hunting grounds, and must therefore travel a long distance to the hunting zone, spending several days on the hunting trip. This entails considerable cost in travel and accommodation. Reindeer hunters are obliged to use the service of professional guides, as mentioned before. As the hunt very often takes place in the remote mountains, specially equipped vehicles are needed and many guides own such modes of transport. Often the hunters must hire these vehicles along with the service of
the guides. The total cost of this game can, therefore, be considerable, making this type of hunting probably the most expensive in Iceland.

The indirect economic impact on the hunting area is felt to be considerable. In this survey the economic impact on the hunting area will be estimated, both direct and indirect.

To the best of the author’s knowledge of this paper, no complete research with regard to the local economic impact of reindeer hunting has been carried out. In 2009, however, Skotveiðifélag Íslands (SKOTVÍS) looked into this matter and their conclusion was that in 2008 about 92.1 million ISK was paid to landowners and municipalities in the form of fees for felled animals and in dividends. Indirect fees were also estimated to reach a considerable sum or about 100 million ISK (Skotveiðifélag Íslands, 2010).

In the next chapter theories regarding multiply effects will be discussed.
3  Theories about multiply effects

In this chapter, theories about multiply effects will be discussed, what they are and what causes multiply effects in economic systems. The higher the multiplier the stronger are the multiply effects. Subsequently multiply models and sensitive variables within them will be outlined. There will be a discussion regarding the employment multiplier and the income multiplier will be dealt with further. The purpose here is to help answer the research question, which pertains to the economic effect of reindeer hunting in East Iceland. The Keynesian multipliers are used to calculate gross output and disposable incomes and also the base expenditure multiplier.

3.1 The multipliers

The multiplier describes how much output changes after a shift in aggregate demand. The multiplier is greater than one because a change in independent demand sets off further changes in consumption demand (Begg, Fischer, & Dornbusch, 2009).

The assumption of the multiplier, which embodies the idea of growth, is fundamental to an understanding of the cumulative process of development. A simple explanation, for example, could be assuming that the initial trigger for development at a particular location in a previously little-developed area is generated from outside the area. In such cases, it is the external demand for a specific good which is the predominant cause of economic growth, in the early stages. If an increase or growth occurs in a local region, it can be maintained that a direct effect on this development involves a calculation of the base multiplier, so called employment multiplier. If, in a hypothetical region the labour force comprises a total of 1,000 workers and 400 of these are employed in the export base sector and 600 in the residentiary sector.

“Export base sector: this includes all those activities for which the effective demand is external to the region itself. That is, their level is set by forces outside the region. This section consists of the region’s export activities” (LLoyd & Dicken, 1978, p. 390).

“Residentiary sector: This includes all those activities for which the effective demand is internal to the region itself, those production systems supplying the day-to-day needs of resident population” (LLoyd & Dicken, 1978, p. 390).
This means that for every two jobs in the export base sector there are three jobs in the residiary sector. This simple example shows only the direct effect on employment of an increase in the export industry. The direct effect is followed by a series of induced effects in a chain-like sequence, as expansion induced in one sector has after-effects on other sectors, also creating jobs, but the impact is reduced with increasing distance from the original stimulus. Although the relationship, in terms of employment can be seen, the true basis for the changes which take place down the line of the multiplier is income. This is derived from the increase in demand for goods and services which in turn pulls in the full range of production factors. Labour is only one of these factors, but it is often the only one which can be given any real numerical basis. One of the most useful explanations of the income multiplier was set forth by Charles M. Tiebout, an economist and geographer. He was concerned with it as a tool for predicting short-term economic changes. He makes a basic distinction between short-term and long-term perspectives. In the short term, by way of simplification, a local economy consists of three sectors: exports, local consumption and local investment. The population of the area derives income from each of these. In the short term, income from both local investment and export sectors depends directly upon external forces while income from the local consumption sector is determined by local spending from income generated in the two other sectors (Lloyd & Dicken, 1978).

3.1.1 Marginal propensity to consume locally

Here are two definitions used later in this chapter: “GDP or gross domestic product is the market value of all the final goods and services produced within a country in a given time period usually a year” (Parkin, Powell, & Matthews, 2008, p. 470).

Gross National Product (GNP) is the total value of all final goods and services produced within a nation in a particular year, plus income earned by its citizens (including the income of those located abroad), minus the income of non-residents located in that country (InvestorWords.com, n.d.).

Households supply labour to companies and receive earnings in return. They use those earnings mostly to buy goods and services from companies. Private consumption spending $C$, is a flow from households to companies. The amount of income households have available to spend on consumption is called disposable income; that is, aggregate income minus taxes plus transfer payments. The higher the disposable income, the
greater is the quantity of consumption goods and services that households plan to buy and the stronger is aggregate demand (Parkin et al., 2008). When households’ disposable income increases, the tendency is for their private consumption to rise. The fraction of an increase in disposable income that households spend is the marginal propensity to consume c (Colander & Gamber, 2002).

The Keynesian model is:

\[ Y = C + I + G + X - M \]  

(3.1)

Y is gross area product, (GAP), the buying by households of goods and services on a daily basis is defined as private consumption C, investment by individuals and government is defined as investment I, government expenditure is G, export is X and import is M.

The private consumption model which is a multiply of gross local production, marginal propensity to consume C and wage rate b is symbolised as \( C = bcY \). The consumption function is therefore:

\[ C = \bar{C} + bcY. \]  

(3.2)

where \( \bar{C} \) is an autonomous component of the buying by households of goods and services on a daily basis, independent of income, and is therefore a fixed coefficient. Marginal propensity to consume is an important variable in Keynesian multiplier. See later, Equation (3.4). It is highly sensitive to changes, rising rather rapidly as the marginal propensity to consume C locally produced goods increases. Several factors are likely to affect this process. The first is the size of the region; import leakages are likely to be large for a small region, as regards population, because many inputs needed, will most likely not be produced locally. Second, a region’s marginal propensity to consume local products will be affected by its industry mix. More highly specialized regions will depend heavily on imports because of their specialization. For example, in areas where agriculture is the main industry, building materials, fertilizer and equipment for farming must be imported. Third, the location of the region may affect its marginal propensity to import, especially in relation to other local labour markets. If commuting is frequent due to the nearness of the region to other labour market areas, this will lead to a smaller multiplier; for example, when a town is surrounded by other towns. This is because commuters will tend to spend their salaries in the region where they live rather than in
the region where they work which will lead to rise in a region’s marginal propensity to import. The geographical location of a region will also impact the propensity of its residents to spend locally. The absence of shopping facilities in nearby regions, for example, will encourage local shopping and therefore reduce the marginal propensity to import (Armstrong & Taylor, 2000).

Armstrong and Taylor (2000) emphasise the critical role of leakages from regional expenditure which occur after the initial expenditure injection. In practical applications of the multiplier it is found that the impact of an expenditure injection is far more likely to be influenced by leakages from the initial expenditure injection itself (see chapter 3.1.4.). According to Armstrong and Taylor, it is extremely important to find out how much of the initial expenditure injection actually stays inside the local region. The import content in the initial expenditure injection must be estimated in order to calculate the influence of this on the local regional economy through the multiplier process. There are two reasons why it is important to measure the first-round leakages as accurately as possible. Firstly, the first round of expenditure is often large relative to the second and following rounds of expenditure, and secondly, the leakages from the first round may be relatively large compared to the size of the first expenditure injection. The authors take an example of the latter where the impact of nuclear power plant stations in two Scottish towns, Dounreay and Torness, is estimated. For example, at the Dounreay plant 57% of the inputs needed to operate the plant each year were imported from other regions. The leakages in the construction phase were even larger, 90% of the inputs were imported into the region of Torness. Therefore, it is important to allow for those leakages when estimating the first round of the multiplier (Armstrong & Taylor, 2000).

In a study by Sinclair and Sutcliffe (1978): *The first round of the Keynesian regional income multiplier*, they confirmed the logic discussed above. They say that former studies utilising the Keynesian regional income multiplier have paid too little attention to the estimation of the income generation which occurs during the first round of the multiplier process. They also point out, as the income in the first round is more massive than in the following rounds, that it is of a great importance to estimate the impact of the first round correctly. A number of different definitions are possible; those most commonly used are regional gross domestic product (GDP), household disposable income and regional gross national product (GNP). These income factors induce
unequal quantity leakages as a result of the investments of a certain local region and are therefore of great importance to decide in the beginning which factors to use when estimating the income multiplier effects of the local region (Sinclair & Sutcliffè, 1978).

### 3.1.2 Employment multiplier

The employment multiplier deals with alterations in total employment of a local regional economy resulting from changes in the number employed in a given segment of that particular economy. When applying this method, it is assumed that total employment in this local region can be separated into a locally oriented and export oriented variety. It is assumed, furthermore, that there is a close functional relationship between total employment and export oriented employment. As export expands requirements for locally oriented industries are enhanced, so that total local employment is increased by a multiple of the growth in export industry (Sasaki, 1963.)

### 3.1.3 Direct, indirect and induced economic impacts

This chapter is based on the article: *Assessing the Community Economic Impact of Microfinance Institutions* by Woller and Parson (2002).

The multiply effects originating in local region stemming from a new export-oriented industry have been categorised into direct, indirect and induced effects. The direct impacts are the initial economic activities induced by a project (e.g. a new aluminium plant). The direct impacts connected with the development coincide with the first round of spending in the economy. For example, the new aluminium factory pays salaries of 100 mISK, purchases from local suppliers for 15 mISK and pays property taxes of 10 mISK and thus contributes 125 mISK directly to the local economy. The indirect impacts are the production, employment and income changes occurring in other industries / businesses in the community which supply inputs to the aluminium factory. The induced impacts are the effects of spending by households in the local economy as a result of direct and indirect effects emanating from the new aluminium plant. The induced effects arise when the employees working in the aluminium plant spend their new income in the community, see Figure 3.1
Figure 3.1 Direct, indirect and induced impacts. Ref. http://www.reddi.gov.on.ca/guide_ecimpactassessment.htm

This spending sets off a chain of secondary expenditures filtering throughout the local economy thereby increasing total spending which exceeds initial spending. Such increases are known as income multipliers. The definition of income multiplier is the total change in income earned by all employees in the local economy resulting from an exogenous change in consumption, investment, expenditures, government spending and so forth (Woller & Parson, 2002).

In other words, if the income of the export-oriented industry increases by 1,000 ISK, how much will flow into service industry as a consequence of this increase.

3.1.4 The Keynesian multipliers

A simple clarification of the way in which a new production activity can be expected to affect the local region will be presented here. The new activity requires labour. This may be obtained in various ways: by attracting existing workers from other professions in the local region, by employing unemployed workers, seeking workers from other localities and inducing persons not currently in the labour force to join it. The impact of this new activity spreads to other local industries, both through direct purchases from other industries in the region and through additional purchases of locally produced goods and services, resulting from the increase in income and employment. Further impacts occur due to feedback effects\(^1\). Let us assume that a new aluminium plant is built in a particular region. The impacts of this new plant spread to other industries in the region, for the reasons outlined above. Further impacts occur due to feedback effects, which can be explained as the return to input of part of the output of a machine,

\(^1\) The partial reversion of the effects of a process to its source or to a preceding stage.
system or process. Local industries producing for regional consumption require more labour and inputs from the construction industry in order to expand capacity to meet the extra demand for their own output. Thus, this multiplier process continues until the initial injection has worked its way through the local economy (Armstrong & Taylor, 2000).

3.1.5 The Keynesian Income Multiplier

When dealing with income multiplier effects and their calculations, the origins of the calculations must first be looked at. The Keynesian income multiplier used to estimate the local economy is virtually identical to the simplest version of the Keynesian income-expenditure model, the only difference being that all expenditure variables refer to the local economy instead of the whole nation (Armstrong & Taylor, 2000, p. 8).

Embedding $C = \bar{C} + bcY$ into Eq. (3.1) results in:

$$Y = \bar{C} + bcY + I + G + X - M$$  \hspace{1cm} (3.3)

Equation (3.3) solved for $Y$ step by step:

Subtracting $bcY$ on both sides (3.3) yields the following:

$$Y - bcY = \bar{C} + I + G + X - M$$

In order to isolate $Y$, the left side is rewritten in the following terms:

$$Y(1 - bc) = \bar{C} + I + G + X - M$$

Multiplying both sides by $1/(1-bc)$ yields the following:

$$Y = \left(\frac{1}{1-(bc)}\right)[\bar{C} + I + G + X - M]$$

Finally the multiply effects (income multiplier) may be determined by taking the partial derivative of export with respect to Gross Area Product, $Y$:

$$k = \left(\frac{1}{1-(bc)}\right)$$ \hspace{1cm} (3.4)

If the process is studied in the long term, it is found to change where there is a rising need for investments from local residents. Investments are subject to the remainder of wages after savings have been made. When wages increase, local residents use their savings to invest in assets, for example within the local region. This proportion can be
determined and is known by the term: local propensity to invest (Karlsson, 2007a). Therefore, a function for investment becomes:

\[ I = \bar{I} - bdY \]  

(3.5)

Embedding Eq. (3.5) into Eq. (3.3) yields the following:

\[ Y = \bar{C} + bcY + \bar{I} - bdY + G + X - M \]  

(3.6)

If \( bcY - bdY \) is moved to the left side of the equation following returns:

\[ Y - bcY + bdY = \bar{C} + \bar{I} + G + X - M \]

the next step is to set \( Y - bcY + bdY = Y(1 - (bc) + (bd)) \) following returns:

\[ Y(1 - (bc) + (bd)) = \bar{C} + \bar{I} + G + X - M \]

To solve \( Y \), the right side of the equation is divided by \( (1 - (bc) + (bd)) \) then following returns:

\[ Y = \frac{1}{1 - ((bc) + (bd))} [\bar{C} + \bar{I} + G + X - M] \]

Now the long-term multiply effects may be determined if wages rise in the local export industry.

\[ k = \frac{1}{1 - ((bc) + (bd))} I_{ex} \]  

(3.7)

Equation (3.7) reveals the multiplier of total income growth in the export industry \( I_{ex} \). Whereas \( c \) stands for propensity to consume locally, \( b \) is the local wage rate and \( d \) stands for local propensity to invest locally. In the long term, \( k \) is the increase in total income or the multiplier (Karlsson, 2007a)

Income from local consumption is based on two steps. First, locals spend some of their income on local services and goods. Many variables influence how much of it is spent in this way. An example might help to explain this. Suppose that, on average, locals spend 50 percent of their income on local services and goods and therefore the propensity to consume locally is 0.5. If it is assumed that local income from export industry increases by 100 ISK, it might be supposed that 50 ISK out of this amount will remain as local income through spending in the local consumption sector. But is this so? No, because a second step must be taken into account. Only a portion of the 50 ISK will
remain within the area to become local income. In other words, part of the 50 ISK will be used to pay for inputs which originate outside of the local economy. Part of the 50 ISK, however, will certainly remain as local income; profits, local wages and so on. Again, suppose that the average proportion which remains locally can be measured, and turns out to be 40 percent. By the same terminology as before, it can be said that the income propensity of the local sales is 0.4.

\[ k = \frac{1}{1 - (bc)} \]  

(3.8)

Now equation (3.8) can be used:

\[ k = \left( \frac{1}{1 - (0.5 * 0.4)} \right) * 100 = 125 \]

Thus the multiplier effect of increasing income by 100 ISK is to increase total income to 125 ISK through spending in the local consumption sector.

Now the long-term multiply effects will be examined. In such an analysis it might be expected that local investment will be less dependent on external forces and more influenced by local income. Increases in income from export industry and local consumption sectors will, for example, stimulate the need for plant, equipment and housing and so on. Therefore, the propensity to invest in local capital goods must be considered. If, for the sake of simplicity, it is assumed that such a propensity can be calculated and it is 0.2, i.e. 20 ISK out of each 100 ISK of local income is spent on local investment and that the income created per 100 ISK of local investment sales is 0.5, i.e. half of the expenditure on local investments remains in the local area. Then equation (3.7) can be used to calculate the total multiplier effects of this increase:

\[ k = \left( \frac{1}{1 - ((0.5 * 0.4) + (0.2 * 0.5))} \right) * 100 = 143 \]

Thus, when both the local investment and local consumption sectors promote local income the multiplier value is increased (LLoyd & Dicken, 1978).

Armstrong and Taylor say that the magnitude of the regional multiplier will vary according to the characteristics of each region or locality which is being estimated. According to them, there is no single numerical value which can be used for all regions
or localities. Each case is unique and should be treated as such. Therefore, estimates of the regional multipliers are region specific. Different projects in the same locality may well have different multiplier consequences in relation to differences in the magnitude of the projects (Armstrong & Taylor, 2000).

### 3.2 Weaknesses of regional multiplier analysis

Despite the popularity and the widespread use of regional multiplier analysis, this approach to measuring economic effects does have several major weaknesses that will be further discussed (Armstrong & Taylor, 2000).

- Regional multiplier analysis does not take capacity constraints into account. If a local economy faces capacity constraints, such as low unemployment or lack of funds, an expenditure injection may have little, if any, effect on local income. Producers’ response to increased demand may be price rises rather than an increase in output, or they may contract out the extra work to firms in other locations. In the long run, the existence of production bottlenecks will urge further investment in order to expand the region’s productive capacity.

- Regional multiplier analysis has been criticized for failing to allow for interregional feedback effects. According to the regional multiplier model, an increase in local income will result in increased imports. Since these imports are another locality’s exports, this will lead to a rise in income in other locations, which in turn will increase their own imports. In the regional multiplier analysis, such interregional feedbacks are not allowed. In the case of small regions, this will not matter, since feedback effects will be quite insignificant.

- It has been argued that insufficient attention has been paid to estimating the timing of income changes resulting from expenditure injection. The calculation of multiplier effects would, therefore, be more useful if it were recognised that the multiplier effects of a certain expenditure injection occur over time, and that it may take several years for the full multiplier effects to work through the local economy.
- Regional multipliers analysis provides only a very aggregative picture of the impact of expenditure injections. Policy makers and planners need to know the effect of these injections, not only on the output and employment of the local economy as a whole, but also on particular industries.

- The effects of expanding firms will depend heavily on the extent to which individual firms purchase inputs from within the region rather than importing them from other regions. This will vary among firms for many reasons, such as the ability of the region to supply the necessary inputs and the location of the region in relation to other potential suppliers.

Apart from some notable exceptions, money has largely been ignored in regional modelling. More often than not, regional models do not include any reference to the monetary effects on the regional economy. It is usually assumed that money is neutral so that regional economic analysis is controlled entirely in terms of real variables. Monetary changes are assumed to have no real impact on variables of central importance, such as employment and output. But this assumption is controversial. One of the reasons why money has been ignored is the lack of regional monetary data. This lack of data has probably been instrumental in diverting the attention of regional economists away from the role of money as a determinant of regional activity. Regions are very open economies and money and goods flow freely across regional boundaries without any constraints. Therefore, the money supply is assumed to respond to money demand at regional level. This is the reason why regional models of economic growth and income determination have traditionally excluded monetary variables and focused almost exclusively on real variables.
4 Literature review

This chapter contains a literature review: Firstly there are two researches on the economic effect of sport fishing in Iceland which reveal that sport has a significant economic impact. Secondly, several foreign research projects are studied, with regard to both hunting and fishing, since there is no hunting related research available in Iceland.

4.1 Researches on the economic effects of sport fishing in Iceland

In the year 2004 the Fresh Water Institute asked the Faculty of Economics of the University of Iceland to estimate the economic effect of salmon and trout fishing in Iceland. The value of both species caught on rods and also in nets was estimated. In the year 2002, research was carried out on the economic value of catching salmon in nets and on fishing rods. This revealed that the net income in 2001 for holders of the fishing licence was on average 18,000 ISK. for each salmon caught on a fishing rod but only 1,200 ISK. for each salmon caught in a net, or only 7% of the value of each salmon caught on fishing rod. It is obvious that more emphasis should be on catching salmon on fishing rods where possible. In this report, the economic impact that can be attributed to sport fishing (fishing on rods) is estimated. An attempt is made to estimate both the income to the lessors of the rivers, (the owners) as well as to the lessees, and the effect of this on other activity in the Icelandic economy as a whole. In addition, the economic effects of both Icelandic and foreign anglers are discussed. The report reveals that it is estimated that on a yearly basis an Icelandic angler spends on average 42,000 ISK on various types of expenditure related to sport fishing, the fishing licences themselves being the largest expense item, or about 43%. The conclusions of this report imply that sport fishing contributed much more to the Icelandic national economy than previously thought. The direct impact is estimated to be 1.7-2.1 billion ISK. And the indirect and derivative effects are estimated to be 6.1-7 billion. From these conclusions, it can be seen that income for the lessors and lessees only represents a fraction of the economic impact of sport fishing in Iceland or about 13% (Hagfræðistofnun Háskóla Íslands, 2004).
In the year 2009, an MS. thesis was completed by Ólafsson. The main objective of his research was to estimate the economic value of Icelandic sport fishing areas in monetary terms. This was done by calculating the total benefits from the area’s fishing licences. His data sample consisted of 38 salmon and trout fishing areas rented by the Angling Club of Reykjavík during the years 2005-2008. These areas are located all over Iceland. The conclusions are that the average consumer surplus for sport fishers per individual salmon licence is 13,346 ISK. compared to 2,975 ISK. per trout licence, based on 2006 price levels. The consumer surplus of Icelandic fishing licences is higher, compared to results of comparable foreign researches, but in the thesis the difference is not explained (Ólafsson, 2009).

“Consumer surplus is the amount a buyer is willing to pay for a good, minus the amount the buyer actually pays for it” (Mankiw & Taylor, 2006, p. 132).

4.2 Foreign economic researches of fishing and hunting

In the past decades, outdoor relaxation has become a fast growing activity. This is due to a rise in income, allowing people more leisure time and the great outdoors has become more accessible (Scallan, 2008, p. 2). This has led to a growing interest among economists in assessing the demand for and value of outdoor recreation activities. The term economic value is the amount of money people are willing to exchange for a commodity or service.

During the past three decades, many studies have been undertaken throughout the world examining the economic values of hunting. The motivations for undertaking such research vary. In North America, several studies have been undertaken to examine the economic value of hunting to enhance decision-makers’ awareness of the value of natural resources, and to assist in developing management philosophies and guiding decisions on where to focus resources (Scallan, 2008, p. 2).

The majority of monetary studies on hunting reveal a high economic value, although there is considerable variation in the methodologies used (Lovelock, 2008). The economic impacts of recreation, in general, can be classified as being either primary or secondary in nature (Archer, 1984). Primary or direct impacts, are those which are direct consequence of the participants’ spending. Secondary impacts may be described as either induced or indirect; these are the indirect effects of inter-industry trade within
the region and the induced effects of household consumption originating from employment tied to the direct and indirect activities (Grado, Kaminski, Munn, & Tullos, 2001, p. 849).

In North America, the U.S. Fish and Wildlife Service have, every fifth year since 1955, conducted the National Survey of Fishing, Hunting and Wildlife-Associated Recreation. In 2000 it was estimated that hunting contributed $67 billion to the U.S. economy and over one million jobs were involved (Scallan, 2008, p. 3). This number of jobs is equivalent to approximately 0.9% of the labour force (population 16 years and over) in the US that year (U.S. Census Bureau, n.d.).

In this chapter, four foreign research programmes on economic value will be discussed. The first research is by Steinback (1999) named: *Regional Economic Impact Assessments of Recreational Fisheries: An Application of the IMPLAN Modeling System to Marine Party and Charter boat fishing in Maine.*

The second one is a research project done by Gardo et al. (1998) named: *Economic impacts of waterfowl hunting on public lands and at private lodges in the Mississippi Delta.*

The third is research by Boman et al. (2007) named: *Moose hunting in Sweden now and two decades ago: the Swedish hunters revisited.*

Finally, there is the research by Scallan (2008), named: “Neglected Rural Opportunities” – *What Place for Hunting in Rural Ireland?*

The oldest research is discussed at the beginning and most recent at the end.

**4.2.1 Regional Economic Impact Assessments of Recreational Fisheries: An Application of the IMPLAN Modelling System to Marine Party and Charter boat fishing in Maine.**

This section recaps this particular research. In this paper, Steinback (Steinback, 1999) is discussing recreational fisheries and the use of Regional Economic Impact Assessments (EIAs) to assess how anglers’ expenditures affect economic activities, such as sales, income, and employment in Maine. According to Steinback, unfortunately, most EIA studies report only the final impacts of the EIA, without describing the economic interdependencies that produced the impacts or how the results should and should not be used to guide management decisions. Steinback says that this is particularly
troublesome because most resource managers only vaguely understand how the EIA model works and how to interpret the results in a fisheries management framework. The purpose of this paper was, therefore, to provide a starting point toward establishing consistent and defensible techniques for conducting regional EIAs of recreational fisheries and to explore the appropriate uses of EIA outputs as they relate to the growing needs of natural resource managers. An EIA was controlled by the IMPLAN (Impact analysis for Planning) input-output system.

Historically, the execution of I/O analysis is expensive and time consuming. The need for a large amount of primary data on production functions, distribution characteristics, and trade relationships make I/O modelling impractical in many cases (Probst & Gavrilis, 1987).

After data collection, economic impact and Benefit-Cost Analysis (BCA) was conducted. The three levels of economic impacts from purchases by party and charter fishermen were (1) direct, (2) indirect, and (3) induced. Direct impacts are the income, sales, and employment generated from initial purchases by anglers (e.g., party and charter access fees paid to owners of hired boats). Indirect impacts are the income, sales, and employment of industries that supply the directly affected industries (e.g., the owners of hire boats must purchase bait from suppliers, oil from service stations and acquire bank loans). Finally, induced impacts represent the income, sales, and employment resulting from expenditures by employees of both the direct and indirect sectors (e.g. deckhands on rental boats purchase groceries and incur real estate loans). The total impacts are the summation of direct, indirect and induced impacts. The total impacts of recreational fishing are not equivalent to total net economic value. BCA measures the present value of the difference between total economic value and total cost. But EIAs seek to portray economic activity at a single point in time.

The expenditure of the anglers was analyzed separately for Maine residents and non-residents, as the spending of the latter is generally considered as new money to the local economy, whereas spending by residents is usually considered as only a redistribution of existing wealth (Storey & Allen, 1993). As such, only non-resident recreational expenditure is typically included in regional input-output models.

Two types of multipliers are reported in this paper: ratio multipliers and Keynesian multipliers. Ratio multipliers are defined as the ratio of total impacts to direct impacts,
where total impacts are the sum of the direct, indirect and induced impacts. That is, ratio multipliers provide an indication of the backward linkages of the economy under study, whereas Keynesian multipliers, can be used in conjunction with expected changes in final expenditures to determine overall economic impacts. For example, the sales ratio multiplier for non-residents of 1.6052 resulting from $1,037 million in total sales indicates that $646 thousand was directly created by spending of non-resident anglers and $391 thousand in additional sales was generated through indirect and induced effects, see Table 4.1. That is, the ratio multipliers provide an indication of the backward linkages of the economy under study.

Table 4.1. Ratio and Keynesian multipliers by resident category.

<table>
<thead>
<tr>
<th>Multiplier type</th>
<th>Ratio multiplier</th>
<th>Keynesian multiplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales</td>
<td>1.6052</td>
<td>0.9285</td>
</tr>
</tbody>
</table>

On the other hand, Keynesian multipliers can be used in conjunction with anticipated changes in final expenditures to determine overall economic impacts (Archer, 1984). These multipliers are defined as the ratio of total impacts to final expenditures. Ratio multipliers provide useful information to relate the direct, indirect and induced impacts to total impacts. But Keynesian multipliers commit the amount of income, sales and employment generated in a region by an additional dollar of spending and are used in conjunction with final expenditures to determine total economic impacts. In the case of the non-resident sales, for example, an increase of $10 thousand in expenditure by non-residents party and charter boat anglers will yield a total increase in state sales of approximately $9.3 thousand; ($10,000 * 0.9285). This figure represents the combined direct, indirect and induced effects that remain within the region.

The results of the economic impact assessments in this study were that in 1996 non-residents spent a total of $1.12 million and residents spent $273 thousand.

4.2.2 Economic impacts of waterfowl hunting in the Mississippi Delta.

In the USA, waterfowl hunters traditionally support waterfowl conservation. This support is provided largely in the form of hunting and non-consumptive uses of waterfowl, contributions to waterfowl conservation organizations and hunting stamps.
(Miller, 1989; Sparrowe & Babcock, 1989; Heimlich, Wibe, Classen, Gadsby, & House, 1998). The following section recaps this research.

In the year 1998 Grado et al. (Grado et al., 2001) performed a survey with the title *Economic impacts of waterfowl hunting on public lands and at private lodges in the Mississippi delta.*

The study area consisted of 6 counties in western Mississippi. These areas were selected because of their important waterfowl habitat and public and private hunting areas. The authors used face to face interviews with hunters at survey sites to achieve high response rates and reliability of data. The response rate was 97%.

In this research, the authors estimated economics impacts of waterfowl hunters who used both public lands and private lodges in the Mississippi Delta. According to the authors, one method to estimate monetary benefits from waterfowl is analyzing expenditures by the hunters. Using this approach requires a determination of participants’ expenditures on travel, licences, food, clothing, equipment, leases and other associated costs (Davis & Johnson, 1987). The authors stated that an input-output system can be used to analyze environmentally related expenditure (Rose & Miernyk, 1989). Such a system can be used in analyzing environmentally related expenditures (Johnson & Moore, 1993; Grado, Hurst, & Godwin, 1997). These models provide a measure of monetary values, both to a local and regional economy and are not a reflection of personal value for the recreationist. The survey instrument included questions about hunter’ residence, hunting related expenditures and hunting habitats throughout the year. But residency, an important aspect of estimating economic impact by hunters, was uniquely addressed in this research. It is traditional to consider non-residents to have greater economic impact than residents because their expenditure represents an inflow of new money to an economy. In theory, resident expenditure is typically excluded from economic impacts because residents would spend money in lieu of the activity of concern in another way.

Each individual was asked to provide his or her on-site, trip-related and equipment expenditures regardless of where the goods or services were purchased. The in-state expenses were catalogued by amount and location, preferably by county. For out-of-state expenses only the state location of the purchase was documented. By using this strategy an attempt was made to minimize recall errors.
In this research Impact Analysis for Planning (IMPLAN) input-output system was used to model economic impacts of waterfowl hunting. But IMPLAN was developed originally by the United States Department of Agricultural Forest Service. The IMPLAN model relies on a 528 sector input-output transactions table, based upon the Bureau of Economic Analysis’ I-O table.

The authors of this paper built an IMPLAN model of the region to identify direct and secondary impacts resulting from in-region hunter expenditures. Direct impacts represent the proportion of expenditures retained by an in-region economic entity in the operation of its business. For example, direct sales impacts from retail goods purchased by hunters, such as ammunition, may originate almost entirely from groceries outside the area. Secondary impacts are the indirect effects of inter-industry trade within the region, for example, local grocery store buying from a wholesaler in the region and the induced effects of household consumption resulting from employment tied to the direct and indirect activities, for example, buying of furniture from a local business. Additionally, economic multipliers were derived from this analysis and used to evaluate the short-term incremental contribution to the regional economy from per-unit changes in final demand. Multipliers derived from economic impact analyses can be used to assess relationships in a local or regional economy (Loomis & Walsh, 1997; Steinback, 1999).

Multipliers are used to capture the secondary effects of visitor spending in a region. There are two basic kinds of secondary effects: indirect effects and induced effects. Indirect effects are the changes in jobs, income and sales, within backward-linked industries in the region, i.e., businesses that supply goods and services to tourism-related firms. For example, hotels purchase a variety of goods and services in the regional area in order to produce a night of accommodation. Each business that provides goods or services to hotels benefits indirectly from visitor spending in hotels. Type I multipliers capture these indirect effects. These indirect effects are captured by:

\[
\text{Type I sales multiplier} = \frac{\text{direct sales} + \text{indirect sales}}{\text{direct sales}}.
\]

Induced effects are the changes in jobs, income and sales, in the region resulting from household spending of income earned either directly or indirectly from visitor spending. Employees in tourism firms and backward
linked industries spend their income in the local region, creating additional sales and economic activity.

Type II multipliers capture both indirect and induced effects.

\[
\text{Type II sales multiplier} = \frac{\text{direct sales} + \text{indirect sales} + \text{induced sales}}{\text{direct sales}}.
\]

(Michigan State University, n.d.)

In this research, Type II multipliers were examined, and the results were 1.33, indicating that for each dollar spent in the region there was an additional $0.33 of economic impact.

The results are that total direct sales incurred from the 1998-1999 waterfowl hunting season in the area were $540,245, stimulating secondary sales of $178,771 or total sales of $719,016, also supporting 13.4 full time jobs.

Assuming that economic data from Mississippi Delta reflect similar patterns in expenditures for waterfowl hunting throughout the state of Mississippi, the estimated economic impact is $27.4 million in total sales, supporting 512 employees in full or part-time jobs. This includes $15.7 million in value added impacts, consisting in part of $8.9 million in employee income.

The difference between these two methods is that Type I multiplier captures direct sales + indirect sales, whereas Type II multiplier also captures induced sales.

### 4.2.3 Moose hunting values in Sweden.

In 2007 Boman *et al.*, (Boman, Mattson, Ericson & Kriström, 2007) published a research paper entitled *Moose hunting values in Sweden now and two decades ago: The Swedish hunters revisited*. The following section recaps this research.

Their paper was based on two national empirical valuation studies which dealt with the extent and economic values of hunting in Sweden. The first valuation was conducted in 1987 and the second in 2006 and was performed by Boman *et al*. An important objective of the latter study was to repeat relevant parts of the former research, which allowed the authors to carry out inter-temporal valuation comparisons covering a long time span.
Hunting in Sweden is an important leisure activity and widely accepted by the public (Heberlein & Ericsson, 2005). The number of Swedish hunters is almost 5% of the population aged between 18-75 years. The average hunter spends more than 20 days hunting annually, and apart from the aspect of recreation, the meat obtained plays a role in many households (Mattsson, Boman, & Ericsson, 2008; Ericsson et al., 2005). Although a majority of the hunters hunt moose as well as other game, e.g. roe deer, hare and game birds, the moose is undoubtedly the dominant game species in most respects (Mattsson et al., 2008).

In this research, the focus was on the economic value of hunting. The value of hunting is not fully reflected in market prices, due to non-market priced components of the hunting. The aims of the study were thus to quantify the hunting value in 2005/06, to compare with former research and to make a corresponding comparison with regard to determinants of the value of hunting. Moose hunting was chosen because of the great importance of this game species in Swedish hunting.

In both of these studies, the data was collected through mail questionnaires that were sent to 2,500 hunters throughout the country. The questionnaires included questions about, for example: where the hunter is living; location and areal extent of the hunting ground; what kind of game species the hunting included; total number of days spent hunting; quantity of meat obtained from different game species; cost of the hunting of different game species; attitude and socioeconomic characteristics. The participants were randomly selected from a national register of people paying the compulsory annual fee to be allowed to hunt at all. The response rate in 2006 was 71%.

For studying the economic value of non-market priced goods, there are different methods available (Garrod & Willis, 1999). The conclusion was that the contingent valuation model (CVM) was the most appropriate method for the study in 1987 and for the 2005/06 study as well. The contingent valuation method is used to estimate economic values for all kinds of ecosystem and environmental services. The main reason for this was that the study should cover the hunting value, in terms of recreation as well as meat, of many different kinds of hunting in all parts of Sweden. This made, for example, the travel cost method (Clawson & Knetsch, 1966) or the hedonic pricing method (Field, 2001) inappropriate.
The Travel-Cost Method (TMC) uses the cost of travelling to a non-priced recreation site as a means of inferring the recreational benefits which that site offers. To collect data on the number of visits that an individual makes to a site and also on the cost of gaining access, questionnaire surveys are used. Such estimates can be used to infer the demand for a recreation site because in economic terms they are weakly complementary to on-site recreation. The TCM has been used in a wide variety of circumstances to value the recreational benefits of a range of environmental goods. But within the hierarchy of benefit estimations techniques it has limited interest in that it can only estimate recreational use values and is not capable of examining the benefits of a full range of environmental goods and services, unlike Contingent Valuation Methods. Furthermore, TCM measures the benefits of the total recreational experience of a trip and is not specific to the site of interest. Therefore, a considerable effort must be expended to estimate benefits for a particular site (Garrod & Willis, 1999).

The Hedonic Pricing Method (HPM) is used when estimating economic values for environmental services that directly affect market prices or for ecosystems. It is most commonly used to assess variations in housing prices that reflect the value of local environmental attributes. The basic premise of the HPM is that the price of a marketed good is related to the service it provides or to its characteristics. But it has limitations because it is related to housing prices and the method will only capture people’s willingness to pay for perceived differences in environmental attributes, their direct consequences (Ecosystem Valuation, n.d.).

In valuing moose hunting, the use of CVM was in the form of an equivalent variation (EV) type of willingness-to-pay (WTP) question which is a measure of how much more money a consumer would pay before a price increase turned him away from the relevant service/product. The theoretical model of WTP for moose hunting follows the general principles laid out by Johansson et al. (1998). According to this, moose hunting is assumed non-essential and WTP increases in proportion to the number of moose killed by the hunter and hunting team. Total EV WTP is then a solution to (Johansson, Kriström, & Mattsson, 1988):

\[ V(P, p, y + pq - EV, T - l_m, z, H|B, F, l_0) = V(P, p, y, T, 0, 0|B, F, l_0) \] (4.1)
$P$ is the price of composite private good, $p$ is the price of moose meat, $y$ is household income after tax and $q$ is amount of moose meat obtained from the hunt. $T$ is total time and $l_m$ is leisure time for moose hunting, while $z$ is a vector $(z_1, \ldots, z_k)$ representing recreational components of the hunt (e.g. from harvesting a moose). $H$ is a discrete indicator that takes on the value 1 if the individual derives other benefits from being a moose hunter, otherwise 0. There are three final exogenous arguments of the utility function: $B(B_1, \ldots, B_k)$ is a vector of socioeconomic and attitude characteristics; $F$ is actual expenditures on moose hunting, thus reflecting that the expenditures required to obtain a specific extent of moose hunting vary across the country; $l_o$ is leisure time used for hunting other game than moose, reflecting differences across the country in moose hunting as a share of all hunting. A linearization of $V(*)$ was made in the 1986/87 analyses, and the individual hunter’s EV WTP for a conditional moose hunt then becomes a function of $pq$, $l_m$, $z$ and $H$ conditional on exogenous arguments $B$, $F$ and $l_o$.

$$EV = \frac{\alpha}{\beta} H + pq - \frac{\gamma}{\beta} l_m + \frac{\delta}{\beta} z | B, F, l_o$$ (4.2)

where $\frac{\alpha}{\beta}$, $\frac{\gamma}{\beta}$ and $\frac{\delta}{\beta}$ are parameters to be estimated with $\beta$ being the marginal utility of income. The authors used Ordinary Least Squares Regression (OLS) model to find these parameters. Effectively $\frac{\alpha}{\beta} H$ becomes a constant in (4.2), which should be significant if there are substantial other benefits from the hunt, otherwise not. The coefficient on $pq$ is expected to be equal to unity. Since information on the market price for moose meat is lacking, the effect is measured directly through $q$, implying that the coefficient on $q$ will be an estimate of $p$. (Boman et. al., 2007).

Table 4.2 shows descriptive statistics on moose hunting value and its explanatory variables, 1986/87 study and 2005/06 study:
Table 4.2. Descriptive statistics on moose hunting value and its explanatory variables, 1986/87 study and 2005/06 study.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean 1986/87</th>
<th>Mean 2005/06</th>
</tr>
</thead>
<tbody>
<tr>
<td>WTP for moose hunting in SEK 2006 monetary values: EV</td>
<td>$6,277^{a}$</td>
<td>$7,035.40$</td>
</tr>
<tr>
<td></td>
<td>(6,547.47-7,523.33)</td>
<td>[1,191]</td>
</tr>
<tr>
<td>Quantity of moose meat obtained in kg: $q$</td>
<td>$54^{b}$</td>
<td>$39.77$</td>
</tr>
<tr>
<td></td>
<td>(36.52-43.02)</td>
<td>[1,240]</td>
</tr>
<tr>
<td>Number of moose hunting days: $l_m$</td>
<td>$9.5^{b}$</td>
<td>$10.54$</td>
</tr>
<tr>
<td></td>
<td>(9.96-11.12)</td>
<td>[1,239]</td>
</tr>
<tr>
<td>Number of adult moose brought down by the hunter: $z$</td>
<td>$0.33^{c}$</td>
<td>$0.61$</td>
</tr>
<tr>
<td></td>
<td>(0.51-0.70)</td>
<td>[1,184]</td>
</tr>
<tr>
<td>Members within the household: $B$</td>
<td>NA</td>
<td>$2.57$</td>
</tr>
<tr>
<td></td>
<td>(2.50-2.63)</td>
<td>[1,301]</td>
</tr>
<tr>
<td>Disposable annual income of the household in SEK 2006 monetary value: $B$</td>
<td>NA</td>
<td>$298,206$</td>
</tr>
<tr>
<td></td>
<td>(291,064-305,348)</td>
<td>[1,238]</td>
</tr>
<tr>
<td>Actual moose hunting costs in SEK 2006 monetary value: $F$</td>
<td>$2,995^{b}$</td>
<td>$2,244.24$</td>
</tr>
<tr>
<td></td>
<td>(2,053.15-2,435.33)</td>
<td>[754]</td>
</tr>
<tr>
<td>Number of days spent for hunting other species: $l_o$</td>
<td>$15.2^{b}$</td>
<td>$16.65$</td>
</tr>
<tr>
<td></td>
<td>(15.37-17.93)</td>
<td>[1,217]</td>
</tr>
</tbody>
</table>

Note: Corresponding notation from equation (2) given for each variable description; confidence intervals (95%) given in parentheses; number of observations given in square brackets; NA = not available.

Some important conclusions could be drawn regarding moose hunting values in Sweden based on Table 4.2. The latter study reveals that WTP increases 12%, although quantity of meat obtained in kg. decreases by about 26%. The number of moose hunting days increases by about 11% and the number of adult moose brought down almost doubles. This indicates a potential over reporting of moose brought down in the latter study, since the harvest of moose decreased during the past decades according to official statistics. Actual moose hunting cost decreased by about 25% in the latter study. For the
vast majority of hunters the effect of hunting days was positive, suggesting that time for the hunting was not just an alternative cost of time that could be spent on other things (work or other leisure activities). The time spent on hunting appears to be seen as a positive and important factor contributing to the value of hunting. Moose hunters, in the latter study, appear to put an intrinsic value on being a moose hunter, independent of the outcome or extent of the hunt. Time spent on moose hunting has, during the two decades, changed to become a significant determinant of moose hunting value, and in 2005/06 a larger share of the hunters wanted to hunt more than they actually did. Also, the hunters in 2005/06 put a value on harvesting moose, independent of whether they were adult or calves, whereas the hunters in 1986/87 had a greater preference for killing adult moose. In 2005/06 the hunters also put a large value on getting closer to their harvesting quota. The number of days for hunting other species also increased from 15.2 days to 16.65 days or about 9%.

4.2.4 Hunting in rural Ireland

In the year 2008 Scallan, conducted a research programme he named “Neglected Rural Opportunities” – What Place for Hunting in Rural Ireland? The motivation was that Ireland, like many other countries around the world, is experiencing a transition from productivism to post-productivism. A number of authors, in response to the changes within Irish rural development policy, have attempted to promote countryside recreation as a means of stimulating the rural economy and environment through support for land management e.g. (Butler, Hall, & Jenkins, 1998; Roberts & Hall, 2001; Cregan & Murphy, 2006). The following section recaps this research.

In his research, Scallan mainly employed quantitative methods of research and analysis to examine the economic and habitat conservation impacts of hunting activities in Ireland. The method Scallan used to estimate the principal monetary benefits from hunting, involved analyzing the various expenditures by the participants (Giles, 1978; Southwick, 1994; Grado et al., 2001). Using this approach requires a determination of participants’ total expenditure on fees, clothing, equipment, transport and other associated costs.

The generated data was evaluated using a combination of the statistical software SPSS and Microsoft Excel to manage, sort and analyze quantitative evidence in order to reach useful conclusions from the information accumulated.
However, in his research and many other studies focusing on the role of countryside recreation, hunting activities are rarely mentioned alongside issues of land use, recreation or diversification. This may reflect researchers’ lack of interest or shortage of readily available information. For a variety of reasons, hunting has remained controversial for centuries, but mainly because hunting involves the killing of animal. In this research, Scallan examines the economic and habitat conservation effects of two hunting activities, game shooting and hunting with hounds. His research also aims to investigate the reasons why hunting activities are neglected in contemporary Irish rural policies.

The term “game shooting” can be divided into three categories; rough shooting, deer shooting and driven shooting. Rough shooting is the most popular type of game. The majority of rough shooting participants walk up to game birds that are flushed up by trained gun dogs.

Due to confidentiality and security issues, surveying for rough shooting, at the outset of the study, appeared to be a challenging task. But to solve the problem, Scallan utilized a number of strategies in his attempt to develop an adequate sampling result.

The results for rough shooting participant expenditure in 2007 amounted to €41,730,304 ± €2,450,756.

Deer shooting in Ireland involves the stalking and shooting of deer species using a high-powered rifle. The participants of deer shooting were surveyed through their respective shooting organizations. The total expenditure associated with deer shooting for 2007 was estimated to be €8,901,600 ± €787,200.

Hunting with hounds, in Ireland, is defined as the pursuit of an animal (foxes, hares, minks and stags) by a pack of hounds that follows its scent. All hunts received postal questionnaires which requested information, among other things, on the numbers of people involved in the hunting and the frequency of the hunting activity.

In 2007, participant expenditure in total annual hunting with hounds amounted to €34,209,331 ± €2,198,144.

This means that these hunting activities contribute almost €85 million per annum to the rural economy of Ireland and enhance a variety of habitats necessary for hunting. This figure, however, can be regarded as conservative, because indirect expenditure or
multiplier effects of participants’ expenditures have not been incorporated into Scallan’s analysis.

This research considers the wider political and controversial nature of hunting within rural policy and politics. Since 2007, as a result of the introduction of the Green Party, hunting activities have come under increasing pressure. The Green Party is the only political party to have a specific animal welfare policy which incorporates a dedicated (blood sports) section. They aim, when in government, to introduce legislation to end blood sports in Ireland. To date, a Minister from the Green Party has attempted to restrict hunting and shooting activities in a number of ways since his introduction into government. But aside from the Green Party’s attempts to restrict hunting, this research argues that there are a number of broader issues which prohibit the inclusion of hunting sports in rural planning objectives. Interviews with rural policy makers showed this. The interviewees agreed that hunting was an activity which was completely excluded from current rural policy objectives. Current debates on multifunctional land use and diversification in Ireland, and similar activities abroad, may, however, benefit from considering their usefulness as economic incentives which also conserve additional habitat on private land.

4.2.5 Comparison between US and Icelandic hunters

A survey, carried out by Skotveisfélág Íslands (SKOTVÍS), among its members in 2001, revealed that on average hunters spent 18 days per hunting annually. However, the great majority of the members are eager hunters. This number of days was more than hunters in Iceland’s neighbouring countries spent hunting at this time. It was assumed that among the reasons for this was nearness to the hunting areas and also that hunting was cheaper than in most of the neighbouring countries (Skotveisfélág Íslands, 2001). To be conservative, the author assumes that the average Icelandic hunter spends 70% of the time found in the survey or 12.6 days hunting annually. In 2009, the Department of Natural Resources issued 12,227 hunting licences to Icelandic hunters. Thus, in that year, hunters spent 154,060 days hunting. In the US in 2006, hunters hunted 220 million days (U.S. Fish & Wildlife Service, n.d.). When the population of the US, 313.2 million (Central Intelligence Agency, n.d.) is compared to, that of Iceland 318,000 in 2011 (Statistics Iceland) it appears that the population of US is 1,000 times larger than the Icelandic population. If the number of hunting days in Iceland is
multiplied by 1,000 the results are 154 million days of hunting in Iceland or 70%, compared with the US.

4.2.6 Summary

The conclusions of this chapter are that the monetary studies on recreational hunting and sport fishing reveal the high economic value of those activities. The economic impacts can be classified as being either primary by nature (recreation and prestige), or secondary (selling obtained meat). The motivations for undertaking such researches are varied, but they do manifest a high economic significance.

The two Icelandic researches of sport fishing indicate that the direct economic impact is 1.7 – 2.1 billion ISK while the indirect impact is much higher, or 6.1 – 7 billion ISK. And the consumer surplus of Icelandic fishing licences, is larger compared to results of comparable foreign research.

The research of charter boat fishing in Maine reveals, with regard to economic impacts in 1996, that non-residents spent $1.12 million and residents spent $273 thousand.

If the findings relating to the economic impacts of waterfowl hunting in the Mississippi Delta are true, the estimated economic impact of waterfowl hunting for the state of Mississippi is $27.4 million in total sales, supporting 512 full- or part-time jobs.

The research into moose hunting values in Sweden is a study of economic value of non-market priced goods. The research was based on two national empirical valuation studies. The main conclusions of the latter study were that moose hunters appear to put an intrinsic value on being involved in this activity; time spent on moose hunting has changed to become a significant determinant of moose hunting value, and the hunters in 2005/06 valued harvesting moose, independent of whether they were adult or calves, whereas the hunters in 1986/87 had a greater preference for killing adult moose.

The research of hunting in Ireland reveals that hunting activities contribute almost €85 million per annum to the country’s rural economy and enhance a variety of habitats necessary for hunting. The methods used in these researches vary. The first research used Impact analysis for planning input-output system. The second used the same method, the third used the Contingent valuation model and the last one analysed the various expenditures by the participants involved.
5 Questinaries

In this chapter multiply effects will be discussed with special emphasis on the Keynesian income multiplier. Then the input-output models will be discussed. Models are used to evaluate the obtained data. Finally the construction of the questionnaire will be dealt with.

5.1 Regional multiply effects: Overview of theories and researches

In Karlsson working paper (2007) named *Local multiplier effects: Overview of theories and researches*, he discusses the consequences of a large scale investment on the east coast of Iceland, as this attracted interest with regard to the methods of evaluating its impacts.

In his paper, he discusses three different methods of estimating multipliers. Firstly, he looks at the Economic Base Model which analyses the effects of regional export industry on local service industry and is therefore a good indicator of the impact of export industries on aggregate demand in a region. The Economic Base Model can focus on man-years and thus provides the employment multiplier, i.e. how each job in export industry creates many new jobs in the local service industry. Secondly, there is the Keynesian Regional Multiplier. With regard to regional economic impacts, certain activities have only been discussed in connection with the employment multiplier. The employment multiplier shows, however, only part of the total impact on a region when activities increase in some field of an export industry. In most cases all aspects of production will be influenced in such circumstances, the workforce only being one part of the picture. The income multiplier rather catches the total regional economic effects. The Keynesian Regional Multiplier is particularly suitable for analysing the income multiplier although some other models also come under consideration. The third approach is the input-output analysis. In the two above-mentioned methods, all industries are broken down into two large groups, service and export industries. When the input-output analysis is used, the service and export industries are broken down further into smaller industry groups and the multiply effects of each group can be measured. The total effects are also distinguishable. A large amount of data is essential to use this method for an entire region and the scarcity of data often makes this method
impossible to use. The Economic Base Model and the Keynesian Regional Multiplier result in a rougher estimate than the input-output analysis. The last mentioned method, however, is more difficult, more time consuming and costlier in practice because a large amount of data is needed for its use. The data can be difficult to provide for entire regions and this particularly applies in Iceland where local data can be difficult to obtain. His conclusion is that since local data in Iceland, especially with regard to municipalities, are insufficient, the Keynesian regional multiplier is the one he recommends to gauge the multiplier effects in rural Iceland (Karlsson, 2007a).

5.1.1 The industry multipliers of the Shetland economy

In a paper named: Estimating regional Industry Multipliers - Alternative techniques, McNicoll (1981) said: “The estimation of industry multipliers is of importance to regional planners in identifying key local sectors, in impact analysis and in assessing the regional effects of differential industry growth rates” (McNicoll, 1981, p. 80). Three techniques have been most commonly used in the estimation of such multipliers: namely input-output, economic base and Keynesian multiplier. The region he used for comparison was Shetland which was virtually an ideal area for such a comparison since the existence of a recent (1976) survey based input-output table provided a common database for the implementation of each methodology. Furthermore, Shetland met the small region requirement, having a population of 19,000 at the time of the input-output study. According to his paper, it is generally acknowledged that input-output provides the most accurate estimate of an industry multiplier, but it has frequently been argued that alternative techniques can provide multiplier values sufficiently close to those of input-output, particularly in small regions, justifying their utilisation on grounds of cost-effectiveness since they normally require less information input.

His findings in this paper are that input-output is generally accepted as providing a more comprehensive coverage of secondary effects than the other two methodologies and thus yielding a more accurate estimate of industry multiplier values. However, in calculating a multiplier for a single industry, input-output requires more costly information. His conclusion is that the three techniques cannot be regarded as providing the same estimates of industry multipliers, even in such a small region as Shetland, where it has been argued in the literature that their similarities should be greatest. However, in certain practical applications, the loss in relative accuracy of the economic
base and Keynesian models may be felt to be more than offset by their cost-saving advantages (McNicoll, 1981).

5.1.2 Increased tourist expenditure in Malaga

*Keynesian income multipliers with first and second round effects: An application to tourist expenditure* is the name of a paper by Sinclair and Sutcliffe (1982) where the authors estimate the expenditure of tourists in the Spanish province of Malaga.

This technique has frequently been used in many empirical studies practised at regional or sub-regional levels of analysis. The authors say that the advantage of using this technique lies in the fact that it is well known and there are usually sufficient data available to permit it to be applied. The purpose of their paper was to develop and clarify a multiplier methodology appropriate at regional or sub-regional levels of analysis. They emphasise that sufficient information should be available. Their objective was to show the importance in the process of the multiplier when estimating the first and second round separately. They say that the first round of the multiplier process is especially important and should be estimated separately if sufficient data are available as they explained in earlier research (1978). This is due to the fact that the withdrawals which happen during the first round are often distinguishable, depending upon the nature of the original change in injections into the area and the definition of the income which is being measured (i.e. the multiplicand). The definition of the first round is the process by which the change in injection into the area under consideration results in an initial adjustment in the defined form of income. It is important to define the origin of the income under consideration i.e. is the intention to measure a change in disposable income, a change in the area’s gross national product (defined as GAP: the gross area product) or in its gross domestic product (GDP). Sinclair and Sutcliffe estimated changes in multiplier values for disposable income and GAP in four different types of tourist expenditure in the Spanish province of Malaga between 1970 and 1975. These types are: the accommodation sector, the food, drink and entertainment sector, expenditure by tourists staying in flats and villas and miscellaneous items. Two main conclusions were reached; first, the income multiplier was considerable higher if GAP was used instead of disposable income. For each £1 spent by tourists, the GAP rose up by £0.72 whilst disposable income rose by £0.54. It also turned out that the multiply effects varied significantly, depending on how the money was spent. For example, when
tourists stayed in flats or villas the multiply effects were lowest, because the rent leaks out of the area to owners living in other parts of the country. Second, the authors discovered that the impact of tourist expenditure takes more than 4 years to work its way through the economy. This sheds light on the importance of the time factor in the multiplier process (Sinclair & Sutcliffe, 1982).

**5.1.3 What does a University add to its local economy?**

This chapter is based on a paper named *What does a University add to its local economy*, by Bleaney et. al. (Bleaney, Binks, Greenaway, Reed, & Whynes, 1992), where they estimated the local effects of the University of Nottingham, which is one of the largest employers in the region, as universities are often significant economic units, both in terms of income/expenditure flows, and employment. This chapter is more or less a recapitulation of this article.

Universities contribute to their local economies both directly and indirectly. The direct impact relates to the increase of local income associated with the university’s productive activities. The indirect impacts operate through an upgrading of human capital stock, “atmospheric benefits”, Science Park activities and a variety of other externalities. The latter are, according to the authors, extremely difficult to calibrate. The former, whilst posing problems, can be evaluated using Keynesian analysis.

Before the model was formulated, the authors had to resolve some important theoretical and practical issues. A brief discussion of these is in order.

1. **The extent of the local area.** The city of Nottingham and the Nottingham travel area had the population of around 650,000 which was about 1% of the UK population.

2. **Definition of the question.** An earlier study of the impact of Stirling University included the construction aspect. In this case this approach did not seem appropriate as most of the construction took place a long time ago.

3. **Induced investment.** Apart from the usual multiplier effects, it could be argued that increased expenditure induces investment, or, conversely, that reduced expenditure deters investment that would otherwise have occurred (in leisure facilities, in new shopping centres and so on). Estimates of these effects, however, would be extremely speculative and are ignored in the calculations.
4. **Definition of income.** This is an issue of some importance. If income is defined as GNP (Gross Nottingham Product), the total value of additional educational and other services accruing to the area as a consequence of the University’s presence has to be included, and the same would apply to multiplier effects. Thus, the University’s impact on gross output would have been measured. But a large slice of this money has no local effects, since it simply flows back to the government as national insurance contributions and income tax. One might, therefore, wish to work instead with the impact on total disposable income, which would equal additional gross output, less additional taxes, plus additional subsidies and transfer payments. The subtraction of taxes net of transfers and the addition of subsidies means that it does not correspond directly to any measures of output. Implicitly it is a measure of the welfare of impact on local residents. The study by Sinclair and Sutcliffe does not deal with the possibility that some of the jobs created may be filled by migrants who are employed in other regions. In such a case, some part of this increase in local disposable income is merely a transfer from elsewhere, and does not represent an increase in the welfare of any particular group of individuals resident in Nottingham (whether the University exists or not). This is an important distinction, since in this particular study it is assumed that, if the University did not exist, equivalent posts would exist in other universities. It seems reasonable to assume that the academic and academic-related staff participate in a national labour market and live in Nottingham only because the University is there. In that case their salaries do not add to the disposable income of pre-existing Nottingham residents.

Given this background, the questions to be answered in the research are:

1. What is the impact of the University on the gross output of the area?
2. What is the impact of the University on the disposable incomes of the inhabitants of the area, who would have been there anyway?

The latter question would relate to some measure of the impact on the welfare of the local populations. In this study, the authors presented estimates in response to both of the questions. The following abbreviations and interpretations of them can be seen in Table 12.1 in Appendix.

The procedure is as follows: \( L \) is the labour service bought by the University, \( G \) is the goods and services bought from outside by the University, \( h \) is the proportion generated...
locally and $A$ represents the additional incomes of University employees. The expenditure base $E$, is defined as

$$E = L + G$$  \hspace{1cm} (5.1)$$

This base figure $E$ is not the same as the first-round additional gross output $Y_1$ of the Nottingham area, because some of the goods and services are imported from outside, and also because the additional incomes of the University employees must be added to their salaries giving

$$Y_1 = L + A + hG$$  \hspace{1cm} (5.2)$$

The letters of equation (5.2) are explained above. This is measured at market price. To calculate the first round impact on the disposable income of the residents of Nottingham, $D_1$, an indirect tax rate $i$ must be applied to the last term and immigrants’ incomes subtracted, $M$. Then a tax rate $t$ is to be applied to the remainder reflecting reduced unemployment and other social security benefits as well as direct taxation, so that

$$D_1 = (1 - t)(Y_1 - M - hiG)$$  \hspace{1cm} (5.3)$$

Neither Equation (5.2) nor (5.3) gives the multiplicand for calculating multiplier effects. For this, student expenditures $Z$ must be taken into account as well. The proportion of student expenditures spent on local gross output is $v$ and the proportion of University employees’ disposable income is $w$. The authors assume that a proportion $c$ of disposable income is consumed. Thus, the second-round increase in local gross output would be (at market prices)

$$Y_2 = vZ + wcD_1 + wc(1-t^*)M$$  \hspace{1cm} (5.4)$$

Here the first term represents students’ local expenditure; the second is additional local expenditure by residents whose increased income is a result of the University’s presence; the third term reflects additional local expenditure by immigrants, taxed at a rate $t^*$ which ignores the impact of benefits since their income is assumed to be unchanged in quantity and also allows for a higher rate of employers’ pension and national insurance contributions. The authors assume that this second round would generate no immigration, and then the impact on local residents’ disposable income is given by:
\[
D_2 = (1-t)(1-i)Y_2
\]  
(5.5)

By multiplying \(D_2\) with \(w\) (University employees’ disposable income) and \(c\) (proportion of disposable income), which equals multiplying \(w\) and \(c\) with 1 minus \(t\) (the tax rate) and 1 minus \(i\) (the indirect tax rate). This gives a third round expenditure:

\[
Y_3 = wcD_2 = wc(1-t)(1-i)Y_2
\]  
(5.6)

\[
D_3 = (1-t)(1-i)Y_3 = wc(1-t)(1-i)D_2
\]  
(5.7)

The process is assumed to converge to final increments to gross output and disposable income of \(Y_f\) and \(D_f\) respectively. The gross output multiplier is then defined as:

\[
\frac{Y_f}{Y_1} = \frac{(Y_1+Y_2+Y_3+...)/Y_1}{1+Y_2/[1-wc(1-t)(1-i)]Y_1}
\]  
(5.8)

In the final formula they set for residents’ disposable income, the multiplier is:

\[
\frac{D_f}{D_1} = \frac{(D_1+D_2+D_3 +...)/D_1}{1+(1-t)(1-t)(1-wc(1-t)(1-i) + ...)Y_2/D_1}
\]  
(5.9)

Since \(D_1 < (1-t)(1-i)Y_1\) the multiplier is larger for disposable income, but the total impact is less because this is more than cancelled out by the smaller first-round effects. These are multipliers in the normal Keynesian sense, calculated as the ratio of the final to the first-round increment. What might be termed “base expenditure” multipliers for the University, are also calculated, being the ratios \(Y_f/E\) and \(D_f/E\).

The conclusions were that the Keynesian multiplier for gross output for the local region was 1.259 and the Keynesian multiplier for disposable income was 1.561.

Estimating the model. The initial data input was the University Accounts for 1988-99, providing a starting point. Expenditures were divided on the basis of information given in the accounts, together with supplementary details of salaries, \(S\), wages, \(W\) and expenditure on goods and services, \(G\). Information on the proportion of expenditure on goods and services spent locally, \(h\), was estimated \(h = 0.3586\). In order to estimate the additional income of University employees other than their salaries and wages recorded in the accounts, a questionnaire was sent to all staff members. The non-immigrants’
incomes, based on this information, were equal to wage payments, \( W \), whereas migrants’ incomes were indicated by

\[
M = 1.15 \, S
\]

Thus Equation (5.2) can be written as

\[
Y_1 = 1.15 \, S + W + 0.3586 \, G = 55,240
\]

This represents the first-round impact on the gross output of the local economy at market prices. In order to estimate the first-round impact on the disposable income of Nottingham residents excluding migrants, \( D_1 \), the migrants’ incomes, \( M \), have to be subtracted, and rates of indirect and direct taxes applied. The indirect tax rate, \( i \), was estimated as the ratio of total taxes on expenditure of the personal sector compared to consumers’ expenditures. The data were taken from *Economical Trends Annual Supplement 1990*, and yielded an estimate of \( i = 0.1637 \). The estimate of direct taxes \( t \) for non-migrants was 0.6685 and for migrants, \( t^* \), was 0.410. Substitution into Equation (5.3) yielded

\[
D_1 = (1-t)(W + (1-i)hG)
\]

\[
= 0.3315*(13,395 + 0.8373 * 0.3586 * 26,649)
\]

\[
= 7,093
\]

In order to proceed to the next step, the authors needed figures for the marginal propensity to consume, \( c \), student expenditures, \( Z \), and the local proportion in total expenditure of students, \( v \), and employees, \( w \). The marginal propensity to consume was assumed 0.90. Student expenditures were calculated by multiplying the number of full-time students registered in 1988-99 by an estimated average expenditure per student. Estimates of the local component of expenditure were calculated by applying plausible coefficients to each category of a breakdown of average expenditure for employees and students. For employees the information was taken from the data of all households as given in the *Family Expenditure Survey*. For students the information came from Annex B of the DES publication, *Top-up Loan for students*. From this information, Equation (5.4) is derived to obtain

\[
Y_2= 0.4285 \times 19,363 + 0.2223 \times 0.90 \times 7,093 + 0.2223 \times 0.90 \times 0.590 \times 32,289 = 13,528
\]
From Equation (5.5)

\[ D_2 = 0.3315 \times 0.8373 \times 13,528 = 3,755 \]

From Equations (5.7) and (5.8)

\[ Y_f = 69,593 \]

\[ D_f = 11,069 \]

Which yield the following multipliers:

Base expenditure multiplier for gross output = \( Y_f / E \) = 1.021. Base expenditure multiplier for disposable income \( D_f / E \) = 0.162.

Keynesian multiplier for gross output = \( Y_f / Y_1 \) = 1.259.

Keynesian multiplier for disposable income = \( D_f / D_1 \) = 1.561.

Basic Keynesian multiplier = \( [1-wc(1-t)(1-i)^{-1}] \) = 1.059.

The authors also found out that the multipliers were sensitive to changes in the marginal propensity to consume. If the marginal propensity to consume increased by 10% the multiplier for gross output would be 1.351 and the multiplier for disposable income would be 1.758. If the marginal propensity to consume, on the other hand, decreased by 10%, the multiplier for gross output would be 1.173 and the multiplier for disposable income would be 1.373. Very roughly, therefore, the gross output multiplier increases by 0.01 for every 0.01 added to the percentage of consumption that is spent on local value added, whilst the disposable income multiplier increases by about twice as much. Clearly, then, estimates of local economy multipliers are sensitive to variations in these parameters (Bleaney, Binks, Greenaway, Reed, & Whynes, 1992).

In the next chapter the input-output model will be discussed.

### 5.2 The input-output model

In this chapter, the input-output approach to modelling a regional economy will be discussed and some researches using this approach will be looked at. Appendix contains Table 12.1 which reveals abbreviations and interpretations of the theme.

A useful multiplier that can be derived from the input-output model is the Type II employment multiplier. The multiplier is very easy to calculate from the output/employment ratios, once the outputs themselves have been calculated. The
multiplier converts the extra income received by the households into direct jobs \( D_j \), indirect jobs \( I_j \) created and then expresses these extra jobs as a ratio of the jobs created in the industry (factory) experiencing the initial increase in final demand, and induced (derivative) jobs \( I_{Dj} \). Direct jobs are employees working in a factory, indirect jobs are those which originate due to selling goods and services by other companies to the factory and induced jobs are those jobs created when employees and institutions spend the money the factory pays in the form of salary. The formula is as follows:

\[
\text{Type II employment multiplier} = \frac{D_j + I_j + I_{Dj}}{D_j} \quad (5.10)
\]

Armstrong and Taylor says that this multiplier is particular useful since it provides an estimate of the number of jobs likely to be generated in the region as a whole as a consequences of extra jobs being created in a particular industry (Armstrong & Taylor, 1993).

### 5.2.1 The method


A major requirement of this model is a dataset which spans a number of years, preferably one or two decades. The input-output method is based on the fundamental notion that the production of outputs requires inputs. These inputs may be in the form of raw materials or semi-manufactured goods, as well as inputs of services supplied by the government or by households. A wide range of inputs is needed to produce an equally wide range of outputs.

The authors use a condensed transaction table (or transaction matrix) which records all the production flows occurring within the regional economy of Scotland during 1994. This table is based on the 123-industry model constructed for the economy of Scotland. Their findings are that this transaction table provides information regarding the infrastructure of an economy over any given period of time. It illustrates where each industry’s inputs come from and where its outputs go. Information about the relative importance of linkages not only within the economy itself, but also between the economy and other economies is also provided. They also notice that gross output exactly equals the gross input of each industry. This is because the transaction table is
constructed on the principle of the double entry book-keeping. Therefore the transaction table provides exact information where the inputs of an industry come from and where its outputs go to. The reason for the construction of a transaction table for a regional economy is not simply to describe input-output flows. The purpose is also to predict the consequences of an exogenous demand shock. When the interdependencies between sectors have been quantified, it becomes possible to estimate the effect of changes in final demand on the entire economy. But a few critical assumptions must be taken into consideration before doing that. Firstly, it is assumed that the production technology is one of fixed proportions, meaning that an industry must double its inputs in order to double its outputs. Secondly, there are no constraints on productive capacity and the supply of factor inputs is assumed to be perfectly elastic.

When using input-output models they are constructed primarily because they provide a detailed breakdown of the effects of the predicted changes in output. Sometimes it is useful, however, to provide a summary statement of these predictions. This can be done by constructing sectoral output multipliers and household income multipliers.

Sectoral output multipliers are obtained by calculating the inverse matrix which shows exactly how the output of each sector will be affected when the final demand for a region’s output is increased by £1.

Output multipliers are not the only types of multiplier that can be calculated from the input-output model. For example, income multipliers for households can be calculated. These household income multipliers differ from sectoral output multipliers, since the former refer only to the effect of output changes on the income of the household sector, whereas the latter refer to the direct and indirect effects on the output of the processing sector. The calculation of household income multipliers denotes valuable information obtained from input-output models.

Another useful multiplier that can be derived from the input-output model is the employment multiplier. This multiplier converts the extra income received by the households into direct and indirect jobs. The multiplier is very useful since it provides an estimate of the number of jobs likely to be formed in a region as a whole as a consequence of additional jobs being created in a specific industry.
5.2.2 Some limitations of the input-output approach

One serious obstacle is the high cost. The collection of necessary data to construct the transaction matrix is both time consuming and, furthermore, a large quantity of data is needed, especially for large regions. Another problem is that the technical relationship between industries assumes that they all exhibit constant returns to scale. This assumption is constrictive, but necessary in the absence of information on the returns to scale in individual industries. Finally, the existence of supply constraints is usually ignored in input-output models (Armstrong & Taylor, 2000).

5.2.3 Input-output survey

In November 2005, a survey named “The population and need for accommodations in East Iceland in 2008” was published. In the survey, an estimate of the consequences of building a new aluminium plant (ALCOA) in the area of in Reyðarfjörður town in East Iceland (EI) was carried out. The author, Heiðarsson, used two methods for this purpose, the input-output analysis and the base multiplier. By using the input-output method, the money the aluminium factor will pay out was traced.

The multiplier for derivative jobs, $I_{Dj}$, is based on numbers of new direct jobs due to the new investment. The number of direct jobs, $D_j$, 414, is based on information from ALCOA.

The following equations will be used for calculating these effects.

The formula for the multiplier for derivative jobs (induced jobs) is found by:

$$M_{IDj} = I_{Dj} / D_j$$  \hspace{1cm} (5.11)

That is, the number of derivative jobs divided by the number of direct jobs.

The formula for the multiplier for backward linkage effects is found by:

$$M_{Ij} = I_j / D_j$$ \hspace{1cm} (5.12)

That is, the number of indirect jobs divided by the number of direct jobs.

Forward linkage effects, $F_{le}$, are assumed to be equal to zero. The formula for the multiplier is found by:

$$M_{Fl} = F_{le} / D_j$$ \hspace{1cm} (5.13)

That is, the number of jobs created by forward linkage effects divided by direct jobs.
The multiplier for crowding out effects, $C_{oe}$, is not calculated in this thesis, as this was estimated very hard to calculate, but is an estimate of -0.2.

The formula for the multiplier for crowding out effects is found by:

$$M_{Coe} = \frac{C_{oe}}{D_j} \quad (5.14)$$

That is, crowding out effects divided by direct jobs.

Accordingly, the total multiplier effects are the sum of equations (5.11) to (5.14):

$$T_{me} = M_{fl} + M_{IDj} + M_{Fel} + M_{Coe} \quad (5.15)$$

That is the sum of multiply effects of derivative jobs, indirect jobs, forward jobs and crowding out jobs.

The difference between Equation (5.15) and Equation (5.10) (see chapter 5.2) is that in the former the crowding effects are allowed for, whereas in the latter they are not. This results in a higher multiplier when using Equation (5.10).

First, as for consumption linkage effects, here the expenditure of the money paid out in the form of salary was looked at. The effects explain how many jobs are created when employees and institutions spend the money the aluminium factory pays in the form of salary. The average cost of salary per employee was estimated and the proportion of this cost spent in the area was estimated as 1/3 of it. It was assumed that local tax was all spent locally, that all the income tax was spent outside the area that 50% of the trade union fees were spent locally and that 2/3 of the employees’ consumption was spent locally. In the survey it was a given (according to ALCOA) that the number of direct jobs would be 414. The survey estimated that the cost of employees was 2.030 mISK per year. It was also estimated that 1.145 mISK was spent in EI. Out of this amount 361 mISK was assumed to be spent on salaries and with average salaries in the service sector of 2.378 mISK, this would create 152 derivative jobs ($D_j$) (361/2,378). Using Equation (5.11) the multiplier for derivative jobs was therefore $= \frac{152}{414} = 0.37$.

Second, backward linkage effects $B_{le}$, which describe the impact of buying inputs for production. Here the expenditure of money in inputs to the aluminium factory is studied. It was estimated that ALCOA would purchase from the private sector for about 3,000 mISK. Out of this amount, 750 mISK would be in the form of salary in EI. Using the same average salary per employee, or 2.378 mISK, this would mean 315 jobs
(3,000/2.378). By using consumption linkage effects, these 315 jobs would become 378 (315*1.2). Here these effects are estimated somewhat lower than 0.37, or 0.2. To run the aluminium factory, a power plant was built (Kárahnjúkavirkjun). According to Landsvirkjun which runs the power plant, 15 jobs would be created there; multiplying with 1.37 gives 21 jobs. In total this comes to 378 + 21 or 399 jobs. The backward linkage multiplier was, therefore, according to Equation (5.12) = 399 / 414 = 0.96.

Third, forward linkage effects \( F_{le} \), which describe the impact of the operation of the factory. Here the output is examined and how it works through the economy and how many jobs are created. Aluminium, however, is not processed further domestically, but exported direct from the factory. Therefore no jobs are assumed in the survey, \( F_{le} = 0 \).

Fourth, crowding out effects, \( C_{oe} \), which describe the impact of competition from the factory, on other industry in the area. When 414 jobs are created in EI it is possible that some jobs will vanish because of competition for labour. The jobs that are most likely to vanish are those that are assumed to be “worst”. Those include, low salary jobs, tedious ones or whatever else makes them repulsive. Those effects were hard to account for. However, the multiplier of crowding out effects \( C_{oe} \) in the survey, was estimated -0.2.

Equation (5.15) is used for calculations of the total multiplier effects \( T_{me} \): 0.37 + 0.96 + 0 – 0.2 = 1.13. Now \( T_{me} \) can be used to calculate the total number of jobs in East Iceland, total number of direct jobs plus total number of direct jobs multiplied by: \( T_{me} = 414 + 414 * 1.13 = 882 \) jobs.

When using Equation (5.10) to calculate the multiplier effects, the multiplier is: (414 + 152 + 399) / 414 = 2.33. Using the multiplier on direct jobs in ALCOA, the number of total jobs in EI is: 414 * 2.33 = 965, instead of 882, according to Equation (5.15). The difference is caused by the crowding out effects which are not considered in Equation (5.10) (Heiðarsson, 2005).

5.2.4 The income multiplier

In 2004, Knútsdóttir, wrote a B.Sc. thesis in which she explores the anticipated income multiplier effects on local municipalities of a new aluminium factory (ALCOA) located in Reyðarfjörður town in East Iceland. In her paper, Knútsdóttir discusses, among other things, the unemployment rate, demographic developments, the service industry and the export industry. Data were collected by means of a mail questionnaire. The Keynesian
income multiplier model was used to calculate the income multiplier for the area. The findings are that the estimated income multiplier is 1.24. The marginal propensity to consume was found to be 0.73, which describes the proportion of local consumption by the population of the area under discussion. It was found, furthermore, that the proportion of import of local service companies was 0.4 (Knútsdóttir, 2004).

5.2.5 Conclusions
Table 5.1 below reveals the main findings in this chapter.

5.1 The main findings

<table>
<thead>
<tr>
<th>Authors</th>
<th>Methods studied</th>
<th>Main findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Karlsson</td>
<td>Economic Base Model, Keynesian Regional Multiplier,</td>
<td>The Keynesian Regional Multiplier is appropriate to gauge the multiplier</td>
</tr>
<tr>
<td></td>
<td>Input-output analysis</td>
<td>effects in rural Iceland</td>
</tr>
<tr>
<td>McNicoll</td>
<td>Input-output analysis, Economic Base Model, Keynesian</td>
<td>Input-output analysis provides a more comprehensive coverage of secondary</td>
</tr>
<tr>
<td></td>
<td>Multiplier</td>
<td>effects</td>
</tr>
<tr>
<td>Sinclair and Sutcliffe</td>
<td>Keynesian Multipliers</td>
<td>Appropriate method to estimate the expenditure of tourists</td>
</tr>
<tr>
<td>Bleaney et al.</td>
<td>Keynesian analysis</td>
<td>Keynesian analysis is appropriate to evaluate income/expenditure flows</td>
</tr>
<tr>
<td>Armstrong and Taylor</td>
<td>Input-output analysis</td>
<td>Useful method to find employment multiplier</td>
</tr>
<tr>
<td>Heiðarsson</td>
<td>Input-output analysis and Base Multiplier</td>
<td>Useful to estimate number of jobs created</td>
</tr>
<tr>
<td>Knútsdóttir</td>
<td>Keynesian Multiplier</td>
<td>Useful to estimate income multiplier</td>
</tr>
</tbody>
</table>

According to Karlsson, Sinclair and Sutcliffe, Bleaney et al. and Knútsdóttir, the Keynesian multipliers are useful to estimate the multiplier effects in rural Iceland and the expenditure of tourists, evaluation of income/expenditure flows and income
multiplier. According to McNicoll, Armstrong and Taylor and Heiðarsson, input-output analysis is useful for the purpose of estimating secondary effects as well as determining the employment multiplier and the number of jobs created.

5.3 The Survey

So far in this thesis, the author has determined that Keynesian methods and input – output models could be used to answer the research question. This chapter comprises a discussion regarding the survey, the construction of the questionnaire (the appropriate questions have to verbalised in order to obtain the relevant information), data collection, ethical considerations, limitations of the survey and its pros and cons.

As Robson points out, the survey strategy is a tradition of empirical work outside the laboratory which aspires to quantitative rigour comparable to the experimentation (Robson, 1993, p. 4).

The putting of carefully standardized questions to a thoughtfully chosen set of people is central to surveys. But in most surveys it is not possible to reach whole populations. The population in this research comprises all hunters who have valid hunting licences. To reach them all would have been forbiddingly difficult and time consuming. Therefore, it was necessary to conduct a sampling of the hunters.

As stated in the introduction, the main aim of this research is to study the economic impact of reindeer hunting in the East Iceland. It was important to ask the appropriate questions, focusing on the necessary information, to be able answer the research question.

In most surveys questionnaires or interviews are used. As Collins and Hussey point out: a questionnaire is a list of carefully structured questions, which are chosen after considerable testing, with a view to eliciting reliable responses from a chosen sample (Collis & Hussey, 2003). Surveys that are carefully designed and administrated are the method of choice for answering certain types of descriptive research questions, particularly of the “how many” and “how much” variety.

In this research, two methods were considered feasible to get the necessary information needed from the hunters, interviews and questionnaires. The interview method means a face to face meeting with the interlocutor. There are problems when using an interview; It is time consuming and the researcher might have to travel extensively to meet the
respondents, as they can be located all over Iceland. This is, therefore, a more expensive method than the questionnaire. Consequently, only a small sample could be used and one could not be sure whether the sample was typical for the population. The presence of the interviewer may also be a problem. “Characteristics of the interviewers, such as their age, appearance, race and social class, have been shown by researchers to have an effect on the preparedness of respondents to answer questions in the interview situation and on the nature of the answers they provide” (Sudman & Bradburn, 1974, p. 26). This problem is not present in a questionnaire, so such errors can be eliminated.

A significant advantage of using questionnaires is that a large number of hunters could be reached by sending a questionnaire to them by mail or e-mail with less cost and thus increasing the likelihood that the sample would be typical for the population of hunters and thus probably strengthening the validity of the survey.

5.3.1 The questionnaire

The analysis this research is based on was designed by part of the Icelandic North Hunt team and was conducted through a survey of 39 questions and a number of sub-questions. As the purpose of this research was, *inter alia*, to estimate economic effects, relevant information had to be obtained from the hunters. This included, among other things, expenditure on hunting equipment, travel cost, lodging, food and beverages, guidance, the handling of the prey, and other monetary expenditure. Questions needed to be presented as to where, what was most hunted, how often, how long the hunting trips were, what kind of accommodation used when staying overnight, with whom hunted and so on. But the emphasis was on monetary expenditure. Furthermore, as in most surveys, background questions were asked. Part of the questionnaire pertained to those hunters that went reindeer hunting and answers to these questions are used in this thesis. With regard to questions concerning cost in terms of cash, a price interval was set, but “the standard deviation obtained from frequency distribution can be only an approximate value” (Sanders & Smidt, 2000, p. 95).

The author carried out some preliminary research using the internet and it appeared that several foreign studies regarding the economic effects of hunting have been carried out for a number of years. As a result of this research, four articles were taken into special consideration, as was discussed in the literature review. When designing the questionnaire those articles were kept in mind.
After the first version of the questionnaire was ready, a pilot test was performed. “A pilot test is conducted to detect weaknesses in design and instrumentation and to provide proxy data for selection of a probability sample” (Blumberg, Cooper, & Scindler, 2005, p. 68). The size of the pilot group was five hunters. After the test, several adjustments were made and the questionnaire was sent back to the same group. After that only minor adjustments were needed, and then the questionnaire was estimated to be ready for the survey. This pilot test was an important procedure in the research, as it revealed some flaws, and suggestions from the respondents were used to improve the questionnaire, thus preventing it from being poorly focused and awkward in use. Thus, the pilot test, improved the questionnaire and, consequently, the quality of the research. The questionnaire is a so called self-administered questionnaire, which means that the responder has two choices; answering the questionnaire or not. The questionnaire can be seen in Appendix VII.

5.3.2 Data collection
In this research an online survey was used. The questionnaire was self-administered. There are several advantages in using a questionnaire:

Firstly the cost. A questionnaire is invariably cheaper than interviews, especially when there is large number of respondents and they are geographically dispersed as in this research. Secondly, questionnaires are usually quicker than interviews as they can be distributed en masse. There are also disadvantages, however, and problems may arise in connection with questionnaires: Firstly, there is the importance of making the questions clear and unambiguous. This is essential, since there is no interviewer to help the respondent if a question is not properly understood.

Secondly, respondents can read the whole questionnaire before starting to answer the first question, so that answers to early questions may be influenced by the knowledge of later ones, possibly making answers more consistent than they would otherwise be (Blumberg, Cooper, & Scindler, 2005, p. 69).

The objective of this research was to obtain responses from as many hunters with valid hunting licences as possible. The more answers, the better, as this would probably increase the possibility that the respondents were typical of the hunter population and thus enhance the validity of the research.
When considering which way to reach to the hunters, some possibilities were reviewed. First, send the questionnaire by mail, second, send the questionnaire by e-mail. To do this the addresses of the hunters, or their e-mail addresses, had to be available. The author got in touch with the divisional manager of the DNR and asked him whether it was possible to get access to this information. The response was that for ethical reasons the institute would not provide such data. Also, that the hunters might be annoyed if someone outside the institute could gain access to their home addresses or e-mail addresses. From the institute’s point of view this might have negative impact on the reputation of the institution.

After some discussions with the divisional manager, a solution was found. At the end of the web link, where the hunters can apply for a new hunting licence and return their bag report, a page was inserted where the hunter was asked to participate in the survey. Icelandic hunters can access this link once a year. On this page: https://www.veidistjori.is/fmi/iwp/cgi?-db=veidikort&-loadframes a direct link to the survey was inserted. Thus, all hunters who used the web to apply for a new hunting licence had an opportunity to participate in the survey. By this method, a large majority of hunters could be reached and they had an opportunity to participate in the survey. The cost was also minimised, compared to the cost of sending the survey by mail. The web link at the DNR opened 19\textsuperscript{th} January 2010 and the link to the survey became accessible at the same time. The link remained open until 1\textsuperscript{st} of April. According to DNR about 90\% of hunters apply for hunting licences and return bag reports before 1\textsuperscript{st} of April (Pálsson verbal source, April 10, 2011). This time frame should, therefore, be long enough for the survey.

5.3.3 Ethical considerations of the study

When planning research, it is important to realise from the beginning how the study might impact upon the respondents and thus it is important to ensure the safety, anonymity and confidentiality of the respondent. The use of self-administered questionnaires should prevent any impact from the researcher. When a hunter participated in the survey, he was randomly allocated a user name. This meant that the answers could not be attributed to the respondent. It is the author’s opinion that using this method in the survey ensured that there was no impact on the respondent and confidentiality and anonymity were secured.
5.3.4 Limitation of the study

There were some limitations to the survey, but from the author’s point of view, they were minor and didn’t have a significant impact.

One is the lag in time. The web link at the DNR opened 19th January 2010 and the link to the survey opened at the same time. The link was open until 1st April. This time frame was, therefore, considered to be long enough for the survey. The reindeer hunting season started 15th July and the ptarmigan hunting season ended 6th December. Thus it was possible when a respondent answered the questionnaire that figures related to cost and other important information might not be precise and even forgotten.

Two, anyone could go to the web link http://www.north-hunt.org/is/page/konnum and answer the questionnaire. But it was considered that this risk was minimal and should not have any significant impact on the survey. Why should anyone who is not a hunter be interested in answering this questionnaire?

Three, when the respondent was assigned a username, when he/she signed in for the first time to the survey, the survey could be answered over and over again.

Four, when hunters were assigned a username but didn’t answer the survey it was impossible to send them an email to encourage them to do so as they were anonymous. It was also impossible to know who had answered the questionnaire and who had not.

Five, the respondents are very similar to the holders of hunting licences with regard to residency, age and gender, according to information from the DNR. But it is impossible to know whether those who answered the survey are typical of the population of Icelandic hunters.

5.3.5 Pros and cons of the study

There are both pros and cons when using an online survey. Among the pros is the cost. There is no postage and printing cost and no involvement of interviewers. Large scale surveys do not require greater financial resources than small surveys. There is instant access to a wide audience, irrespective of their geographical location. An online survey is appropriate for a wide audience, where all the visitors to the website have an equal chance to enter the survey. Short response time is one of the advantages of online surveys. Such surveys allow messages to be delivered instantly to the recipient. The questionnaires can be programmed so that responses feed automatically into data
analysis software. This means time saving advantages and also avoids data input and associated transcription errors. The cons, among other things, relate to the fact that respondents may not be representative of the population. In this case they are representative of the hunting population, but then another problem arises; an online survey can be answered over and over again (Ilieva, Baron & Healey, 2001).

5.3.6 The follow up
In beginning of March 2010, the author estimated the number of participants of the survey as too low. Therefore, an email was written to attract hunters’ attention to the survey. The email was sent to various hunting clubs and they were asked to distribute it among their members. In addition, the email was distributed to individual hunters and they were asked to forward it to their hunting partners. This was done to try to increase the number of participants of the survey. Before the email was sent the amount of respondents was 234. At the end of the survey 31 March, the number of respondents was 491.

5.3.7 Which method should be used?
The question, the author of this thesis was faced with was: Which method should be used to evaluate the generated data? In the four articles discussed in the literature review, different methods were used to analyse the data received.

In the paper *Regional assessments of recreational fisheries*, the IMPLAN model was used to illustrate economic impacts of recreational fisheries in Maine.

In the Mississippi Delta paper, *Economic impacts of waterfowl hunting on public lands and at private lodges in the Mississippi delta*, the IMPLAN model was used to analyze the environmentally related expenditure. In the Moose hunting paper, *Moose hunting values in Sweden now and two decades ago: The Swedish hunters revisited*, the CVM was estimated the most appropriate method as it had been used in earlier research and comparison was an important part of the 2006 study.

In the paper about hunting in Ireland, “*Neglected Rural Opportunities” – What Place for Hunting in Rural Ireland?* the author mainly employed a quantitative method of research and analysis to examine the economic and habitat conservation impacts of hunting activities.
As the purpose of this research is to evaluate the economic effect of reindeer hunting, the multiply effect is the impact to be estimated. The multiply effect is based on the obvious but fundamental notation that one person’s expenditure becomes another person’s income. Since consumption usually increases with income, any extra expenditure feeds through into further expenditure and in smaller and smaller amounts each time around (Armstrong & Taylor, 2000).

The data generated in this survey was evaluated using a combination of the statistical software SPSS and Microsoft Excel to manage, sort and analyze quantitative evidence. This information was then used in the Keynesian multiplier and input-output model to estimate the economic impact.
6 Data

This chapter addresses the information collected in the survey and needed to answer the research question. The first part deals with data regarding issued hunting cards in 2009, data on those who participated in the survey in general, and also data relating to those who went hunting for reindeer in 2009. A statistical method will be applied to see if those who participated in the survey are typical of the hunter population.
6.1 The population

As mentioned earlier in the report, hunters were asked questions regarding hunting in general. Part of the questionnaire was also intended for those who went hunting for reindeer in 2009. When the survey ended, the number of respondents was 491 or 5% of the population. Table 6.1 shows the background information of those that participated in the survey in general.

6.1 Background information of respondents of the survey in general

<table>
<thead>
<tr>
<th>Gender</th>
<th>Number</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>461</td>
<td>96.2%</td>
</tr>
<tr>
<td>Female</td>
<td>18</td>
<td>3.8%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>Number</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-29</td>
<td>64</td>
<td>13.1%</td>
</tr>
<tr>
<td>30-39</td>
<td>150</td>
<td>30.7%</td>
</tr>
<tr>
<td>40-49</td>
<td>160</td>
<td>32.8%</td>
</tr>
<tr>
<td>50-59</td>
<td>85</td>
<td>17.4%</td>
</tr>
<tr>
<td>≥60</td>
<td>29</td>
<td>5.9%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Marital status</th>
<th>Number</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single/divorced</td>
<td>62</td>
<td>13.0%</td>
</tr>
<tr>
<td>Widow/widower</td>
<td>62</td>
<td>13.0%</td>
</tr>
<tr>
<td>Married</td>
<td>414</td>
<td>87.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Education</th>
<th>Number</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary education</td>
<td>83</td>
<td>17.3%</td>
</tr>
<tr>
<td>Vocational education</td>
<td>121</td>
<td>25.2%</td>
</tr>
<tr>
<td>Grammar school</td>
<td>31</td>
<td>6.5%</td>
</tr>
<tr>
<td>University degree</td>
<td>199</td>
<td>41.5%</td>
</tr>
<tr>
<td>Other</td>
<td>46</td>
<td>9.6%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Residence</th>
<th>Number</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Postc. 100-299</td>
<td>302</td>
<td>61.9%</td>
</tr>
<tr>
<td>Postc. 300-399</td>
<td>25</td>
<td>5.7%</td>
</tr>
<tr>
<td>Postc. 400-499</td>
<td>12</td>
<td>2.5%</td>
</tr>
<tr>
<td>Postc. 500-599</td>
<td>16</td>
<td>3.3%</td>
</tr>
<tr>
<td>Postc. 600-699</td>
<td>63</td>
<td>12.9%</td>
</tr>
<tr>
<td>Postc. 700-799</td>
<td>46</td>
<td>9.4%</td>
</tr>
<tr>
<td>Postc. 800-900</td>
<td>24</td>
<td>4.9%</td>
</tr>
</tbody>
</table>

Male respondents are in great majority, or 96%. The age group 40-49 is the largest one and the next age group is 30-39. The smallest age group is ≥60. A great majority of respondents are married. The most common education is a university degree followed by vocational education. The largest residence group is in postcode area 100-299 followed by postcode area 600-699.

In the next section, a comparison between the population of hunters and the sample will be made.
6.1.1 The population and the sample in the survey

Table 6.2 shows the number of residents, the proportion of respondents in the survey, and the number of hunters with valid hunting licences in 2009, sorted according to Icelandic postcodes.

Table 6.2. Number of residents in regions of Iceland and number of hunters with valid hunting licences in 2009. Ref: Statistics Iceland and DNR

<table>
<thead>
<tr>
<th>Postcode</th>
<th>Residents ≥20</th>
<th>Proportion</th>
<th>Proportion in the survey</th>
<th>Number of hunting cards</th>
<th>Proportion</th>
</tr>
</thead>
<tbody>
<tr>
<td>100-299</td>
<td>160,769</td>
<td>70.23%</td>
<td>61.90%</td>
<td>6,915</td>
<td>57%</td>
</tr>
<tr>
<td>300-399</td>
<td>10,986</td>
<td>4.80%</td>
<td>5.70%</td>
<td>670</td>
<td>5%</td>
</tr>
<tr>
<td>400-499</td>
<td>5,260</td>
<td>2.30%</td>
<td>2.50%</td>
<td>388</td>
<td>3%</td>
</tr>
<tr>
<td>500-599</td>
<td>5,273</td>
<td>2.30%</td>
<td>3.30%</td>
<td>558</td>
<td>5%</td>
</tr>
<tr>
<td>600-699</td>
<td>20,424</td>
<td>8.92%</td>
<td>12.90%</td>
<td>1,755</td>
<td>14%</td>
</tr>
<tr>
<td>700-799</td>
<td>9,285</td>
<td>4.06%</td>
<td>9.40%</td>
<td>1,151</td>
<td>9%</td>
</tr>
<tr>
<td>800-900</td>
<td>16,911</td>
<td>7.39%</td>
<td>4.90%</td>
<td>790</td>
<td>6%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>228,908</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
<td><strong>12,227</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Column 1 is the postcode areas. Column 2 shows the number of residents, aged 20 and older, in different regions of Iceland classified by postcodes, to obtain a firearms card, one must be aged 20 or over (Sýslumenn á Íslandi, 2011).

Column 3 reveals the proportion of residents in each postcode area. Postcode area 100-299 is the Reykjavík capital area and surrounding municipalities. This area is home to about 70% of the Icelandic population ≥20. Postcode area 600-699 is closest to the main hunting location of reindeer, which is area 700-799. This also includes the largest municipality outside the capital area, Akureyri (postcode 600, 603), and it is the second most populated, or about 9% of the total population. Areas 400-499 and 500-599 have the smallest population, about 2%. Postcode area 700-799 is the hunting region of reindeer, with a population of about 4%. Column 4 indicates the proportion of respondents in each area. Column 5 indicates the number of hunting licences issued in 2009 by the Department of Natural Resources (DNR) in 2009. That year, 12,425 hunters had a valid hunting licence. Of them, 12,227 were resident in Iceland. Outside area 100-299 it is more common that residents have hunting cards. In areas 500-599 and 700-799 the rate of issued hunting cards is about twice the rate of the population. In area 600-699 the rate is about 1.6. The reason could be that in the areas outside the capital city of Reykjavík, there is a longer tradition for hunting; this could indeed be the reason for the high rate in area 700-799. The final column indicates the proportion of issued hunting cards in each area.
In 2009 a great majority of the hunters, or about 81%, used the web to turn in a bag report for the year 2008 and to apply for a new hunting licence for 2009 (Pálsson B. verbal source, April 9. 2011). The population in this research is therefore considered to be these hunters. The size of the population is calculated as about 80% of hunters with valid hunting licences in 2009 and residency in Iceland. The size based on this premise is, therefore, about 9,800 hunters.

Comparison between issued hunting cards and participation in the survey. The rate in postcode area 100-299 is lower than the population in that area. The rate in the other areas is similar to the rate of issued hunting cards, see Table 6.2. But are those who participated in the survey typical of the population of hunters with issued hunting card in 2009?

### 6.1.2 The Goodness-of-Fit test

The statistical method to estimate this is the goodness-of-fit test. “A goodness-of-fit test is one that’s used to see if the distribution of the observed outcomes of the sample trials supports a hypothesized population distribution”(Sanders & Smidt, 2000, p. 480). The rule is, if calculated value is > than critical value and/or if p-value is < than α, the sample does not demonstrate the population.

First, the age of the population and the ages of those in the sample were looked at, to discover whether they were typical of the population. Column two shows information from the DNR (the population) and column three presents data from the survey (the sample) Table 6.3.

#### Table 6.3. Age of the hunters.

<table>
<thead>
<tr>
<th>Age</th>
<th>Population</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-29</td>
<td>1751</td>
<td>64</td>
</tr>
<tr>
<td>30-39</td>
<td>3001</td>
<td>150</td>
</tr>
<tr>
<td>40-49</td>
<td>3466</td>
<td>160</td>
</tr>
<tr>
<td>50-59</td>
<td>2517</td>
<td>85</td>
</tr>
<tr>
<td>≥60</td>
<td>1684</td>
<td>29</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>12419</strong></td>
<td><strong>488</strong></td>
</tr>
</tbody>
</table>

P-value = 0.011

Here, the distribution of the sample is supposed to be the same as that of the population as a whole. According to a chi-square table with 4 degrees of freedom and α = 0.05 the critical value is 7.81. The calculated chi-square value is 13.16 and the p-value is 0.011.
As the calculated chi-square is > than the critical and the p-value is < 0.05 (α), the conclusions are that the sample does not demonstrate the age spread of the population. This is because in the age group ≥ 60, the rate of respondents is lower than the rate of issued hunting cards, and the rates in age groups 30-39, and 40-49 are higher than the rates of issued hunting cards for these groups.

Next, the residence of the population and the sample are compared to see whether the sample demonstrates the population, Table 6.4. Here the distribution of the sample is supposed to correspond to that of the population.

Table 6.4. Residence of the hunters.

<table>
<thead>
<tr>
<th>Postcode</th>
<th>Population</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>100-299</td>
<td>6915</td>
<td>302</td>
</tr>
<tr>
<td>300-399</td>
<td>670</td>
<td>25</td>
</tr>
<tr>
<td>400-499</td>
<td>388</td>
<td>12</td>
</tr>
<tr>
<td>500-599</td>
<td>558</td>
<td>16</td>
</tr>
<tr>
<td>600-699</td>
<td>1755</td>
<td>63</td>
</tr>
<tr>
<td>700-799</td>
<td>1151</td>
<td>46</td>
</tr>
<tr>
<td>800-900</td>
<td>790</td>
<td>24</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>12227</strong></td>
<td><strong>488</strong></td>
</tr>
</tbody>
</table>

Goodness of fit. Chi-square = 7.62. df = 6. P-value =0.055

Column two reveals information from the DNR (the population) and column three, presents survey data (the sample). The critical value from a chi-square table with 6 degrees of freedom and α = 0.05 is 12.59. The calculated chi-square is 7.62, degrees of freedom are 6 and the p-value is 0.055. As the calculated value 7.76 is < critical value of 12.59 and p-value of 0.055 > 0.05 (α), the sample demonstrates the geographical spread of the population quite well.

6.1.3 The population and the sample of reindeer hunters

In 2009 1,333 hunting licences for reindeer hunting were issued. According to information from UST, the postcode and the age of 1,262 hunters were available. 71 had either foreign residence or the information regarding residence was not available in the data base of the Department of Natural Resources (DNR) (Beck verbal source, January 6, 2011). These 1,262 hunters constitute the population in this survey. As mentioned above in the report, only 163 hunters replied that they went hunting reindeer in 2009, or
about 13% of the population of reindeer hunters. These hunters answered the questions regarding reindeer hunting.

**Table 6.5. Background information of respondents of reindeer hunting.**

<table>
<thead>
<tr>
<th></th>
<th>Number</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>155</td>
<td>98,1%</td>
</tr>
<tr>
<td>Female</td>
<td>3</td>
<td>1,9%</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-29</td>
<td>11</td>
<td>6,7%</td>
</tr>
<tr>
<td>30-39</td>
<td>50</td>
<td>30,7%</td>
</tr>
<tr>
<td>40-49</td>
<td>67</td>
<td>41,1%</td>
</tr>
<tr>
<td>50-59</td>
<td>27</td>
<td>16,6%</td>
</tr>
<tr>
<td>≥ 60</td>
<td>8</td>
<td>4,9%</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single/divorced / widow/widower</td>
<td>20</td>
<td>12,6%</td>
</tr>
<tr>
<td>Married</td>
<td>139</td>
<td>87,4%</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Secondary education</td>
<td>24</td>
<td>14,9%</td>
</tr>
<tr>
<td>Vocational education</td>
<td>45</td>
<td>28,0%</td>
</tr>
<tr>
<td>Grammar school</td>
<td>10</td>
<td>6,2%</td>
</tr>
<tr>
<td>University degree</td>
<td>67</td>
<td>41,6%</td>
</tr>
<tr>
<td>Other</td>
<td>15</td>
<td>9,3%</td>
</tr>
<tr>
<td><strong>Residence</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postc. 100-299</td>
<td>106</td>
<td>65,0%</td>
</tr>
<tr>
<td>Postc. 300-399</td>
<td>4</td>
<td>2,5%</td>
</tr>
<tr>
<td>Postc. 400-499</td>
<td>1</td>
<td>0,6%</td>
</tr>
<tr>
<td>Postc. 500-599</td>
<td>4</td>
<td>2,5%</td>
</tr>
<tr>
<td>Postc. 600-699</td>
<td>21</td>
<td>12,9%</td>
</tr>
<tr>
<td>Postc. 700-799</td>
<td>24</td>
<td>14,7%</td>
</tr>
<tr>
<td>Postc. 800-900</td>
<td>3</td>
<td>1,8%</td>
</tr>
</tbody>
</table>

When comparing the rate of those who went hunting reindeer and the rate of issued hunting cards, according to postcode areas, it can be seen that the rate is higher among residents in postcode area 100-299 than the rate of issued hunting cards. The rate among residents living in postcode area 700-799 (the hunting area) is also higher than the rate of issued hunting cards in this area. The reason is probably a long tradition of reindeer hunting in the area. The rate in postcode area 600-699 is similar. Elsewhere the rate is lower than the rate of issued hunting cards, see Table 6.5.
Are those who went hunting for reindeer in 2009 and participated in the survey typical of the population, i.e. all hunters who went hunting for reindeer in 2009? The statistical method to estimate this is, as before, the goodness-of-fit test as shown in Table 6.6.

**Table 6.6. The age of the reindeer hunters.**

<table>
<thead>
<tr>
<th>Age</th>
<th>Population</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-29</td>
<td>78</td>
<td>11</td>
</tr>
<tr>
<td>30-39</td>
<td>302</td>
<td>50</td>
</tr>
<tr>
<td>40-49</td>
<td>449</td>
<td>67</td>
</tr>
<tr>
<td>50-59</td>
<td>294</td>
<td>27</td>
</tr>
<tr>
<td>≥60</td>
<td>138</td>
<td>8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1261</strong></td>
<td><strong>163</strong></td>
</tr>
</tbody>
</table>

Goodness of fit. Chi-square = 13.16. df = 4. P-value = 0.011

First, the age of the population and the survey are compared. Column two contains information from the DNR and column three presents data from the survey. Here the critical value according to Chi-square table is 9.49 and α is 0.05. The chi-square is 13.16, degrees of freedom are 4 and the p-value is 0.011. As calculated, chi-square is > than the critical value and also the p-value is < 0.05. The results are therefore the same as in the comparison of age above. The sample does not demonstrate the age-spread of the population.

Then the residence of those who went hunting for reindeer is compared to the sample to see whether the sample demonstrates the population.

**Table 6.7. Residence of the hunters.**

<table>
<thead>
<tr>
<th>Postcode</th>
<th>DNR</th>
<th>Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>100-299</td>
<td>748</td>
<td>106</td>
</tr>
<tr>
<td>600-699</td>
<td>146</td>
<td>21</td>
</tr>
<tr>
<td>700-799</td>
<td>194</td>
<td>24</td>
</tr>
<tr>
<td>Other</td>
<td>173</td>
<td>12</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1261</strong></td>
<td><strong>163</strong></td>
</tr>
</tbody>
</table>

Goodness of fit. Chi-square = 5.98. df = 3. P-value = 0.112

In Table 6.7 the residence is split into four areas; 100-299, 600-699, 700-799 and others. The reason for placing the rest of the areas in one group is that each group must contain at least 5 according to the goodness-of-fit test. Column two shows information from the DNR and column three contains survey data. The critical value here is 7.81 according to
Chi-square table and also $\alpha = 0.05$. The chi-square is $5.98 < 7.81$ and the p-value is $0.112 > 0.05$. According to the goodness-of-fit test, the sample demonstrates the geographical spread of the population (all hunters who went hunting for reindeer in 2009) quite successfully.

### 6.2 Results of the survey

In this part, the main findings from the survey in connection with the reindeer hunt are introduced.

![Figure 6.1. Did you go hunting for reindeer in 2009?](image)

Figure 6.1 shows that 34% (163) of the survey respondents went hunting reindeer 2009, so 12.2% of those who went hunting for reindeer that year participated in the survey. In 2009 the hunting quota was 1,333 animals, as mentioned earlier. The hunters were asked to estimate how much they spent on the hunting trip in total.

**Table 6.8. Please estimate truthfully how much you spent in relation for your hunting expedition.**

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean</th>
<th>St. Dev.</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food, beverages, catering</td>
<td>15,443</td>
<td>15,282</td>
<td>175</td>
</tr>
<tr>
<td>Accommodation</td>
<td>8,908</td>
<td>12,006</td>
<td>158</td>
</tr>
<tr>
<td>Fuel / gasoline</td>
<td>23,229</td>
<td>17,790</td>
<td>168</td>
</tr>
<tr>
<td>Transport by air / bus</td>
<td>5,336</td>
<td>15,524</td>
<td>119</td>
</tr>
<tr>
<td>Rented equipment (Car, All-Terrain Vehicles)</td>
<td>8,564</td>
<td>17,056</td>
<td>141</td>
</tr>
<tr>
<td>Hunting licence</td>
<td>67,444</td>
<td>32,006</td>
<td>177</td>
</tr>
<tr>
<td>Hunting equipment</td>
<td>34,906</td>
<td>47,925</td>
<td>160</td>
</tr>
<tr>
<td>Clothing</td>
<td>17,101</td>
<td>28,350</td>
<td>144</td>
</tr>
<tr>
<td>Guidance</td>
<td>23,772</td>
<td>16,559</td>
<td>169</td>
</tr>
<tr>
<td>Souvenirs</td>
<td>1,752</td>
<td>8,086</td>
<td>137</td>
</tr>
<tr>
<td>First aid kit</td>
<td>907</td>
<td>3,168</td>
<td>135</td>
</tr>
<tr>
<td>Recreation( hot pot, swimming, nature watching)</td>
<td>2,247</td>
<td>5,049</td>
<td>148</td>
</tr>
<tr>
<td>Other</td>
<td>7,887</td>
<td>11,670</td>
<td>142</td>
</tr>
<tr>
<td>Total</td>
<td>217,497</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 6.8 shows the average amount reindeer hunters spent on each listed item. Most is spent on the reindeer hunting licence, 67,444 ISK. This amount is very similar to the average amount, according to information from the DNR, which was 69,921 ISK. On hunting equipment the respondents spent 34,906 ISK, on guidance, 23,772 ISK, on fuel 23,229 ISK, on clothing 17,101 ISK, on food, beverages and catering 15,443 ISK, on accommodation, 8,908 ISK and on rented equipment 8,564 ISK. Least is spent on items like souvenirs, a first aid kit and recreation. As Table 6.8 shows, the total expenditure was 217,497 ISK. Here, the respondents answered in price intervals. The lowest amount was zero and then 1-25,000, 25,001-50,000, 50,001-75,000, 75,001-100,000, 100,001-125,000, and > 150,000. Because of this large price interval, the standard deviation is large. The number of respondents on each question varies so that one cannot be sure whether the same person answered all the questions, or only some of them. If those who answered this question had answered all items, the significance would have been greater. Bearing this in mind, these data will be used in the thesis as the base for calculating the multiply effects, since no other data are available.

Table 6.9. Please estimate truthfully how much was spent proportionally at the final destination.

<table>
<thead>
<tr>
<th>Item</th>
<th>Mean</th>
<th>Proportion spent locally</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food, beverages, catering</td>
<td>15,443</td>
<td>35.3%</td>
<td>5,451</td>
</tr>
<tr>
<td>Accommodation</td>
<td>8,908</td>
<td>85.9%</td>
<td>7,651</td>
</tr>
<tr>
<td>Fuel / gasoline</td>
<td>23,229</td>
<td>25.1%</td>
<td>5,826</td>
</tr>
<tr>
<td>Transport by air / bus</td>
<td>5,336</td>
<td>17.6%</td>
<td>938</td>
</tr>
<tr>
<td>Rented equipment (Car, All-Terrain Vehicles)</td>
<td>8,564</td>
<td>79.2%</td>
<td>6,783</td>
</tr>
<tr>
<td>Hunting licence</td>
<td>67,444</td>
<td>32.3%</td>
<td>21,778</td>
</tr>
<tr>
<td>Hunting equipment</td>
<td>34,906</td>
<td>2.2%</td>
<td>768</td>
</tr>
<tr>
<td>Clothing</td>
<td>17,101</td>
<td>1.2%</td>
<td>200</td>
</tr>
<tr>
<td>Guidance</td>
<td>23,772</td>
<td>86.6%</td>
<td>20,587</td>
</tr>
<tr>
<td>Souvenirs</td>
<td>1,752</td>
<td>75.5%</td>
<td>1,322</td>
</tr>
<tr>
<td>First aid kit</td>
<td>907</td>
<td>27.9%</td>
<td>253</td>
</tr>
<tr>
<td>Recreation (hot pot, swimming, nature watching)</td>
<td>2,247</td>
<td>70.6%</td>
<td>1,586</td>
</tr>
<tr>
<td>Other</td>
<td>7,887</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>217,497</td>
<td><strong>73,143</strong></td>
<td></td>
</tr>
</tbody>
</table>

Table 6.9 presents a comparison of amounts spent on each item, and, on the other hand, the proportion of money spent in the hunting area. A large proportion spent locally and
a simultaneously large amount in terms of money is important for the economy of the area. When studying the table, bearing this in mind, the most important items are hunting licences, guidance, and accommodation, rented equipment, fuel and food, beverages and catering. This table is important and data from it will be used when estimating the economic impact on the hunting area later in the thesis. The number of hunters who answered each item differs. Bearing that in mind, the total amount of the mean, 217,469 ISK, is a rough estimate, as well as the total amount spent in the hunting area, 73,143 ISK. Therefore it can be estimated that the total expenditure on hunting reindeer in 2009 was about 290 mISK when the figures are multiplied by the numbers of hunters that year. In the table, the rate on hunting licences spent locally is 32.2% which is not in accordance with information from the DNR. The subdivision of the licence fee is as follows: Landowners 85%, Náttúrustofa Austurlands (NA) (East Iceland Natural History Institute) 4%, (located in the hunting area) and the DNR 11% (located outside the hunting area) (Gunnarsson verbal source, November 22, 2011). But landowners are not all located in EI; for example the state owns some of the land but it was a difficult task to identify the number of landowners living outside the area. Therefore the author of this thesis estimated that 72% of the fees for hunting licences remain in the hunting area and this rate is used in calculations in Chapter 7. The fees for hunting licences which end up in the hunting area come to about 65 mISK.

\[2\] This is a conservative estimate by the author of this thesis, and is explained above.
Figure 6.2. Total expenditure and classification of hunting trips according to number of days.

Figure 6.2. reveals the total expenditure of hunting trips according to number of days. Some expenditures are fixed, independent of the number of days spent hunting; for example, hunting licence, travel cost, and hunting equipment. The cost of those hunters staying one day or less is lowest, then the cost increases for those staying two or three days, and the cost for those staying four days or more decreases.

Figure 6.3. How long did you stay with the guide? n = 178

Figure 6.3 shows that the most common length of stay with the guide was one day or less or 62% and then two days 29%; one hunter stayed more than one week with the guide. The length of stay is an important topic since the hunters pay a considerable amount for guidance and 87% of it is spent locally as can be seen in Table 6.9. If the
stay with the guide could be made longer the economic impact on the hunting area would increase.

Table 6.10 shows a comparison between those living in the capital city area of Reykjavík (100-299), the Akureyri area (600 and 603) and others.

**Table 6.10. Length of stay with the guide and residence.**

<table>
<thead>
<tr>
<th>Postcode</th>
<th>≤ 1 day</th>
<th>≥ 2 days</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>100-299</td>
<td>67</td>
<td>49</td>
<td>116</td>
</tr>
<tr>
<td>600, 603</td>
<td>9</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>Others</td>
<td>34</td>
<td>15</td>
<td>49</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>110</strong></td>
<td><strong>68</strong></td>
<td><strong>178</strong></td>
</tr>
</tbody>
</table>

As can be seen in Table 6.10, 110 hunters spent 1 day with a guide or about 62%, and hunters from area 100 – 299 are 62% of those. Hunters from the Akureyri area (600 and 603) are about 8%, hunters from other areas are about 30%. Hunters spending 2 days or more are 38%. Most hunters who stayed 2 days or more were from the Reykjavík area, 49 out of 68, or 72%. Considering that the greatest number of hunters come from that area, this is an important factor from an economic point of view. Only 4 hunters, or 6%, are from the Akureyri area. The remaining 22% are hunters from other areas.

**Figure 6.4. Was your guide resident in the hunting area?**

As can be seen in Figure 6.4, 87% of the guides were resident in the hunting area. This is an important issue as the local guides will probably spend a much larger share of their income in the hunting area (locally) than guides from other areas.
Figure 6.5, a price interval was set up as in all monetary questions. Some guides offer more services than guidance alone, such as accommodation and catering and a facility to skin the quarry, cool it and process it. The average amount paid was 39,710 ISK, with std. dev. 31,456 ISK. Here, the standard deviation is large. The number of respondents here was 181 which is a higher number than those who went hunting in 2009 (which was 163).

Then the respondents were asked to itemize what they paid the guides for, if possible. The results are shown in Table 6.11.

Table 6.11. If possible, can you itemize what you paid the guide for?

<table>
<thead>
<tr>
<th>Description</th>
<th>Mean</th>
<th>St. Dev.</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guidance</td>
<td>23,511</td>
<td>13,394</td>
<td>136</td>
</tr>
<tr>
<td>Driving to and from hunting area*</td>
<td>8,109</td>
<td>14,134</td>
<td>76</td>
</tr>
<tr>
<td>Usage of all terrain vehicle</td>
<td>7,303</td>
<td>13,128</td>
<td>76</td>
</tr>
<tr>
<td>Usage of trailer*</td>
<td>2,950</td>
<td>10,090</td>
<td>60</td>
</tr>
<tr>
<td>Usage of facilities while slaughtering reindeer*</td>
<td>6,187</td>
<td>13,035</td>
<td>79</td>
</tr>
<tr>
<td>Aid of professional butcher*</td>
<td>5,430</td>
<td>12,829</td>
<td>64</td>
</tr>
<tr>
<td>Facilities for hunting equipment*</td>
<td>1,386</td>
<td>7,648</td>
<td>55</td>
</tr>
<tr>
<td>Accommodation</td>
<td>5,904</td>
<td>11,453</td>
<td>65</td>
</tr>
<tr>
<td>Catering</td>
<td>2,818</td>
<td>9,001</td>
<td>59</td>
</tr>
<tr>
<td>Hot pot</td>
<td>2,778</td>
<td>17,221</td>
<td>54</td>
</tr>
<tr>
<td>Other</td>
<td>2,778</td>
<td>17,221</td>
<td>28</td>
</tr>
</tbody>
</table>

Table 6.11 shows that the highest amount was paid for guidance, or 23,511 ISK. For transport to and from the hunting area the cost was 8,109 ISK. For usage of all terrain
vehicle 7,303 ISK. For aid of a professional butcher 5,430 ISK and for the use of facilities while slaughtering reindeer 6,187 ISK. Cost of accommodation was 5,904 ISK. The total amount paid for these items is about 69,000 ISK. But this amount is considerably higher than the amount paid according to the question: *How much did you pay the guide in total?* - which was 39,710 ISK. Here the number of respondents varies from one question to another. As can be seen in Table 6.11, the number of respondents ranges between 136 for guidance down to 28 for “other”. Because of this uneven number of respondents, the table should be interpreted with caution. The number of respondents that answered the question: *How much did you pay the guide in total?* was 181. Only items in Table 6.11 marked with * will be used with all the items in Table 6.9 when the total cost of the hunting trip, spent in the hunting area, is estimated. When the questionnaire was compiled, the questions marked * were not asked in Table 6.9.

Next, the proportion of hunters that did not pay for service offered by the guides will be studied.

*Table 6.12. Rate of hunters that did not pay for the services listed below*

<table>
<thead>
<tr>
<th>Service offered by guide</th>
<th>% spent 0 ISK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guidance</td>
<td>6.6%</td>
</tr>
<tr>
<td>Driving to and from hunting area</td>
<td>48.7%</td>
</tr>
<tr>
<td>Usage of facilities while slaughtering reindeer</td>
<td>50.6%</td>
</tr>
<tr>
<td>Usage of all terrain vehicle</td>
<td>51.3%</td>
</tr>
<tr>
<td>Accommodation</td>
<td>66.2%</td>
</tr>
<tr>
<td>Aid of professional butcher</td>
<td>78.1%</td>
</tr>
<tr>
<td>Usage of trailer</td>
<td>80.0%</td>
</tr>
<tr>
<td>Catering</td>
<td>81.4%</td>
</tr>
<tr>
<td>Other</td>
<td>92.6%</td>
</tr>
<tr>
<td>Facilities for hunting equipment</td>
<td>94.5%</td>
</tr>
<tr>
<td>Hot tub</td>
<td>96.2%</td>
</tr>
</tbody>
</table>

Table 6.12 reveals that when the hunters were asked to itemize what they paid the guide for, 6.6% of the hunters did not pay for guidance. 48.7% did not pay for driving, 50.6% did not pay for use of facilities while slaughtering reindeer, 51.3% did not pay for usage of all terrain vehicle, 66.2% did not pay for accommodation, 78.1% did not pay for the aid of a professional butcher and about 80% did not pay for the use of a trailer or catering. For the last three items almost nobody paid for facilities, neither hunting equipment nor hot tub.
6.2.1 Inferences about two means

This section comprises a comparison of expenditure between hunters living in the hunting area (locals) and hunters living outside the hunting area (non-locals) on the hunt. This is focused on because the non-locals bring new money into the area which would have been spent elsewhere if they had not gone reindeer hunting. When comparing the difference between two means, a t-test is used. Such a test is used when the population standard deviations are unknown; the two samples are normally distributed and independent: Samples are defined as independent samples when they are not related (Bluman, 2009). Table 6.13 presents a comparison between those hunters living in the hunting area (locals) and others (non-locals) when asked how much they paid the guide in total.

Table 6.13. Comparison between locals and non–locals.

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean ISK</th>
<th>df</th>
<th>t value</th>
<th>p - value</th>
</tr>
</thead>
<tbody>
<tr>
<td>700-799</td>
<td>25</td>
<td>24,000</td>
<td>179</td>
<td>-1.939</td>
<td>0.054</td>
</tr>
<tr>
<td>Others</td>
<td>156</td>
<td>37,901</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Here, the null hypothesis is that there is no difference in spending between these two groups (two-tailed hypothesis). As can be seen in Table 6.13 the mean amount for the hunters in areas 700-799 is 24,000 ISK and for others the amount is 37,901 ISK. The critical value of a t-table with df = 179 and $\alpha = 0.05$ is ± 1.984. According to the t-test, if the calculated number is larger than the positive number or smaller than the negative number there is no significant difference between the means. Also, if the p-value is > than $\alpha$, no significant difference is registered. The calculated value is -1.939 which is < than the critical value and the p-value is 0.054 which is > than 0.05. The result is, therefore, that no significant difference exists between the amount paid by locals and non-locals. If, however, the number of locals had been higher, probably the outcome would have shown a significant difference in the spending of these two groups. The calculated p-value of 0.054 is not very far from the critical value of 0.05, and the critical value of the t-test ± 1.984 is very close to the calculated value of -1.939. In that case, the value of non-locals would have been greater than the value of locals. In this case, however, there is the possibility that a Type 1 and Type 2 error may occur. A Type 1 error occurs if the null hypothesis is rejected when it is true and a Type 2 error occurs if the null hypothesis is not rejected when it is false (Bluman, 2009). If it is presupposed that there is a significant difference between these two groups, the non-locals are more
valuable to the communities in the hunting area as indicated by the findings in article “Regional Economic Impact Assessments of Recreational Fisheries: An Application of the IMPLAN Modelling System to Marine Party and Charter boat fishing in Maine” in Chapter 4, Literature review.

6.2.2 Residence of the hunters

Figure 6.6 shows the residence distribution of reindeer hunters in 2009 and the proportion of residents \( \geq 20 \) years. The columns reveal the numbers of hunters from each area and the red strokes show the proportion of residents in each area.

\[ \text{Figure 6.6. Residence of hunters. } N = 163 \]

The highest proportion amongst residents is in hunting area (700-799) or 0.26\%. The second highest rate is amongst residents in area 600-699, 0.1\%. The lowest rate is amongst residents in areas 400-499 and 800-900 or 0.02\%. From this figure it is hard to draw the conclusion that the distance from the hunting area has any impact on whether hunters go reindeer hunting or not because the number of respondents is too low.

Table 6.14 shows a comparison between local hunters and non-locals. This question was included to see if there is a statistically significant difference between locals and non-locals. Here, a t-test is used as before in this section. Non-locals bring with them new money into the economy of the hunting area, as mentioned before.
Table 6.14. How much paid to the guide, comparison between locals and non-locals.

<table>
<thead>
<tr>
<th>Item</th>
<th>Residence</th>
<th>N</th>
<th>Mean ISK</th>
<th>Std. Dev. ISK</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guidance</td>
<td>Locals</td>
<td>20</td>
<td>18,688</td>
<td>12,718</td>
<td>0.669</td>
</tr>
<tr>
<td></td>
<td>Non-locals</td>
<td>116</td>
<td>24,343</td>
<td>13,384</td>
<td></td>
</tr>
<tr>
<td>Driving to and from hunting area</td>
<td>Locals</td>
<td>14</td>
<td>2,768</td>
<td>6,108</td>
<td>0.031*</td>
</tr>
<tr>
<td></td>
<td>Non-locals</td>
<td>62</td>
<td>9,315</td>
<td>15,154</td>
<td></td>
</tr>
<tr>
<td>Usage of all terrain vehicle</td>
<td>Locals</td>
<td>14</td>
<td>357</td>
<td>1,032</td>
<td>0.009*</td>
</tr>
<tr>
<td></td>
<td>Non-locals</td>
<td>62</td>
<td>8,690</td>
<td>14,099</td>
<td></td>
</tr>
<tr>
<td>Usage of trailer</td>
<td>Locals</td>
<td>13</td>
<td>385</td>
<td>1,069</td>
<td>0.053</td>
</tr>
<tr>
<td></td>
<td>Non-locals</td>
<td>47</td>
<td>3,617</td>
<td>11,233</td>
<td></td>
</tr>
<tr>
<td>Usage of facilities while slaughtering reindeer</td>
<td>Locals</td>
<td>18</td>
<td>1,667</td>
<td>2,536</td>
<td>0.014*</td>
</tr>
<tr>
<td></td>
<td>Non-locals</td>
<td>61</td>
<td>7,520</td>
<td>14,530</td>
<td></td>
</tr>
<tr>
<td>Aid of a professional butcher</td>
<td>Locals</td>
<td>14</td>
<td>982</td>
<td>3,332</td>
<td>0.005*</td>
</tr>
<tr>
<td></td>
<td>Non-locals</td>
<td>50</td>
<td>6,400</td>
<td>14,162</td>
<td></td>
</tr>
<tr>
<td>Facilities for hunting equipment</td>
<td>Locals</td>
<td>13</td>
<td>96</td>
<td>347</td>
<td>0.156</td>
</tr>
<tr>
<td></td>
<td>Non-locals</td>
<td>42</td>
<td>1,786</td>
<td>8,735</td>
<td></td>
</tr>
<tr>
<td>Accommodation</td>
<td>Locals</td>
<td>13</td>
<td>96</td>
<td>347</td>
<td>0.001*</td>
</tr>
<tr>
<td></td>
<td>Non-locals</td>
<td>52</td>
<td>6,274</td>
<td>12,398</td>
<td></td>
</tr>
<tr>
<td>Catering</td>
<td>Locals</td>
<td>13</td>
<td>96</td>
<td>347</td>
<td>0.020*</td>
</tr>
<tr>
<td></td>
<td>Non-locals</td>
<td>46</td>
<td>3,587</td>
<td>10,082</td>
<td></td>
</tr>
<tr>
<td>Hot pot</td>
<td>Locals</td>
<td>13</td>
<td>96</td>
<td>347</td>
<td>0.277</td>
</tr>
<tr>
<td></td>
<td>Non-locals</td>
<td>40</td>
<td>1,688</td>
<td>10,673</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>Locals</td>
<td>13</td>
<td>0</td>
<td>0</td>
<td>0.191</td>
</tr>
<tr>
<td></td>
<td>Non-locals</td>
<td>41</td>
<td>3,659</td>
<td>19,739</td>
<td></td>
</tr>
</tbody>
</table>

* Significant difference

In Table 6.134 the p-value is shown. There is a significant difference in expenditure between these two groups, locals and non-locals in items marked *, groups where the p-value is < 0.05. Non-local hunters, in all cases, paid more than local hunters. These items are: driving to and from the hunting area, the difference is 337%; usage of all terrain vehicles, the difference is 2.434%; usage of facilities while slaughtering the reindeer, the difference is 450%; aid of a professional butcher, the difference is 652%; Accommodation, the difference is 6.535%; finally, catering, the difference is 3.736%. The main reason for this difference is probably that the non-local hunters exploit more than local hunters, that many guides own specially equipped 4-wheel-drive jeeps and also trailers for which they charge the hunters. Those hunters also use local accommodation and catering, because they have to stay longer in the hunting area than local hunters, who can return home immediately after the hunt. There are also some
butchers in the area that offer hunters their service in processing the meat of the hunt. The number of respondents on each question varies, from 13 up to 20 for locals and from 40 up to 116 for non-locals as shown in the table. It is obvious that non-local hunters are more valuable for the hunting area than local hunters, because they spend more money in the area.

Information regarding this monetary expenditure will be used to calculate the multiplier effects in the hunting area.

6.2.3 Income of the hunters

In this section, the income of the hunters before taxes will be looked at in general. In addition, income distribution by residence will be examined, since this was one of the background questions respondents were asked.

![Graph showing mean and standard deviation of hunters' income before taxes.](image)

**Figure 6.7. Hunters' income before taxes.**  \(N = 348\)

Here the respondents had to punch in the amount. Figure 6.7 reveals that the mean income before taxes is 505,330 ISK with a standard deviation of 237,091 ISK. According to Statistics Iceland, the average income for the year 2009 was 423,000 ISK. Thus, hunters had higher than average income (Statistics Iceland).
Next, the income distribution based on residence will be examined. Figure 6.8 reveals that hunters’ income is highest in area 600 and 603. This does not conform to Statistics Iceland which reveals that income in area 100-299 is 12% higher than in other regions in Iceland in the years 2005-2008 (Statistics Iceland). This rate is not likely they have decreased since then. The reason for this difference could be, among other things, that fewer respondents in area 100-299 answered this question than those from other areas.

6.2.4 Hunters’ accommodation

Figure 6.9 shows the type of accommodation used when reindeer hunting. The most common pattern is accommodation with the guide, secondly with friends and/or
relatives, thirdly, but similar to staying with friends or relatives, is staying in farmhouse accommodation and the usage of a vacation house/flat. Other options are fewer. As a relatively large number of hunters go hunting late in the season, which ended 15th September, hunters’ use of accommodation is a profitable addition to the tourism business in the area in question, because the traditional tourism season is waning at this point of time, as shown in Figure Figure 6.10 (Statistics Iceland).

![Figure 6.10 Total number of bed nights in 2010 in East Iceland by periods.](image)

Figure 6.10 reveals total numbers of bed nights in 2011 in East Iceland by periods.

![Figure 6.11. Length of stay in East Iceland in connection with the reindeer hunt.](image)

Figure 6.11 reveals that the most common length of stay is 3 days, then 2 days and in third place is 4 days. 15 hunters stayed one week or more. The length of stay increases
the income from the hunters in the hunting area and therefore is it important to consider whether their stay can be extended.

Figure 6.12 shows the number of hunters that carried out other types of hunting alongside the reindeer hunt. In fact, 65 hunters used the hunting trip to hunt other animals.

![Bar Chart](chart.png)

**Figure 6.12. Other hunting alongside the reindeer hunt. N = 178**

When answering what prey was hunted, it turned out that hunting of pink footed geese was most common, secondly graylag and in third place was the hunting of ducks. On 20th August the goose hunting season started and hunting of ducks began 1st September.

In the next chapter the economic impact in the hunting area will be estimated.
7 Economic impacts

In this part, the data obtained in the survey will be used to calculate the multiply effects of the reindeer hunt on the hunting area. This chapter will use the Equations (5.1) – (5.9) presented in the chapter: Multiply Related researches: What does a University add to its local economy? The flow of money into East Iceland because of reindeer hunting will be used to estimate the creation of jobs and the efficiency of reindeer hunting will be discussed.

7.1 The multiply effects on the hunting area

The expenditure base $E$, is defined as $E = L + G$ as in Equation (5.1), the first-round additional gross output $Y_1 = L + A + hG$, Equation (5.2), and the first-round impact on the disposable income $D = (1-t)(Y_1-M-hiG)$, Equation (5.3). Table 7.1 shows the calculation of the average direct tax rates. Part of direct tax includes the repayment of students’ loans. But no information is available as to whether – or how many of – the guides are repaying such loans, so this aspect will not be taken into consideration with regard to direct tax rates.

Table 7.1. Average direct tax rates.

<table>
<thead>
<tr>
<th>Deduction</th>
<th>% of salary/wages</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Locals t</td>
</tr>
<tr>
<td>Employers’ pension contribution</td>
<td>8</td>
</tr>
<tr>
<td>Employers’ pension extra contribution</td>
<td>4</td>
</tr>
<tr>
<td>Employees’ pension contribution</td>
<td>4</td>
</tr>
<tr>
<td>Employees’ pension extra contribution</td>
<td>2</td>
</tr>
<tr>
<td>Social security charge</td>
<td>7</td>
</tr>
<tr>
<td>Trade Union, employers’ contribution</td>
<td>1.25</td>
</tr>
<tr>
<td>Trade Union, employers’ contribution</td>
<td>1</td>
</tr>
<tr>
<td>Income tax</td>
<td>27</td>
</tr>
<tr>
<td>Local tax</td>
<td></td>
</tr>
<tr>
<td><strong>Total sum</strong></td>
<td><strong>54.25</strong></td>
</tr>
</tbody>
</table>

The table is similar to Table 2 in the article by Bleaney et al, (page 209). The non-locals pay the local tax where their legal domicile is.

The salaries of guides, locals and non-locals and total expenses were calculated with 95% confidence level. Table 7.2 reveals the average amounts of these items. Indirect tax rate $i$ is the VAT (value-added tax) and other indirect taxes. Other indirect taxes are, for
example, tariffs and excise duties (Guðmundsson verbal source, May 10, 2011). Other indirect taxes are estimated, by the author, to be 2% of the total indirect tax in the premise. The calculations of direct tax rates, $t$ and $t^*$ for locals and non-locals are shown in Table 7.1. Table 7.2 reveals other parameters used in calculating the multiply effects: The proportion of goods/services bought locally by guides, $h$, is an estimate by the author; $v$, the proportion of goods/services spent locally by hunters, is obtained through the survey; $c$, marginal propensity to consume, is obtained from report “Tekjumargfaldarinn” (Knútsdóttir, 2004, p. 30); $w$, the proportion of income of guides spent locally, is obtained from the report “Samfélagsáhrif álvers- og virkjanaframkvæmda á Austurlandi” (Heiðarsson, 2005, p. 14). The parameters in the model, $L$, salaries of guides and $Z$, total expenses of the hunters spent locally, are obtained through the survey. $G$, goods and services bought non-locally by guides, constitutes 20% of $L$, and the figure is an estimate by the author. $M$, salaries of guides (non-locally), is also acquired through the survey, and is 12% of $L$. As can be seen in Figure 6.4, 12% of the guides were non-locals.

Table 7.2. Parameters and model, considering average salaries and total expenses.

<table>
<thead>
<tr>
<th>Premises</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$i$</td>
<td>0.1978</td>
</tr>
<tr>
<td>$t$</td>
<td>0.5425</td>
</tr>
<tr>
<td>$t^*$</td>
<td>0.6725</td>
</tr>
<tr>
<td>$h$</td>
<td>0.8000</td>
</tr>
<tr>
<td>$v$</td>
<td>0.4832</td>
</tr>
<tr>
<td>$c$</td>
<td>0.7300</td>
</tr>
<tr>
<td>$w$</td>
<td>0.6600</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Model</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>$L$</td>
<td>49,155</td>
</tr>
<tr>
<td>$W$</td>
<td></td>
</tr>
<tr>
<td>$G$</td>
<td>9,831</td>
</tr>
<tr>
<td>$A$</td>
<td>0</td>
</tr>
<tr>
<td>$M$</td>
<td>5,899</td>
</tr>
<tr>
<td>$Z$</td>
<td>85,865</td>
</tr>
<tr>
<td>$E$</td>
<td>58,986</td>
</tr>
</tbody>
</table>

It is also assumed that the guides do not buy any additional labour; thus $A$, additional labour bought by guides, is equal to zero. The author does not make any distinction between $L$ and $W$, wages of guides, and therefore $W$ is set equal to zero.
Table 7.3 reveals the calculations of Gross output $Y$, Disposable income $D$, and the multipliers. The amounts are in ISK.

**Table 7.3. Calculations of $Y$ and $D$ and Base multiplier.**

<table>
<thead>
<tr>
<th></th>
<th>$Y$</th>
<th>$D$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>57,020 kr.</td>
<td>22,676 kr.</td>
</tr>
<tr>
<td>2</td>
<td>53,349 kr.</td>
<td>19,579 kr.</td>
</tr>
<tr>
<td>3</td>
<td>9,433 kr.</td>
<td>3,462 kr.</td>
</tr>
<tr>
<td>4</td>
<td>1,668 kr.</td>
<td>612 kr.</td>
</tr>
<tr>
<td>5</td>
<td>295 kr.</td>
<td>108 kr.</td>
</tr>
<tr>
<td>6</td>
<td>52 kr.</td>
<td>19 kr.</td>
</tr>
<tr>
<td>7</td>
<td>0 kr.</td>
<td>0 kr.</td>
</tr>
<tr>
<td>f</td>
<td>121,818 kr.</td>
<td>46,457 kr.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>$Y_f/E$</th>
<th>$D_f/E$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multipliers</td>
<td>2.136</td>
<td>2.049</td>
</tr>
<tr>
<td>Base multiplier</td>
<td>2.0652</td>
<td>0.788</td>
</tr>
</tbody>
</table>

Thus Equation (5.2) can be written as

$$Y_1 = 49,155 + 0 + 0.8\times 9,831 = 57,020 \text{ ISK.} \quad \text{(8.1)}$$

This represents the first-round impact on the gross output of the local economy at market prices.

In order to estimate the first-round impact on disposable income of the hunting area residents, excluding migrants (non-local guides) who would not otherwise have been in the hunting area $D_1$, the migrants’ incomes $M$ have to be subtracted and rates of direct and indirect taxes applied.

Thus Equation (5.3) can be written as

$$D_1 = (1 - 0.5425)\times (57,020 - 5,899 - 0.8\times 0.1978\times 9,831) = 22,676 \text{ ISK} \quad \text{(8.2)}$$

Neither Equation (8.1) nor (8.2) gives the multiplicand for calculating the multiplier effects. For this the hunters’ expenditures, $Z$, must be taken into account as well. Also the proportion $v$, and $w$. It is assumed that a proportion $c$ of disposable income is consumed. Then the second-round increase in local gross output, according to Equation (5.4), would be (at market prices)

$$Y_2 = 53,349 \text{ ISK.}$$

Next, the impact on local residents’ disposable income, given by Equation (5.5), is

$$D_2 = 19,579 \text{ ISK.}$$
The third round expenditure is given by Equations (5.6) and (5.7)

\[ Y_3 = 9,433 \, \text{ISK and } D_3 = 3,462 \, \text{ISK.} \]

The process is assumed to converge to final increments to gross output and disposable income of \( Y_f = 121,818 \) ISK and \( D_f = 46,457 \) ISK respectively.

Keynesian multiplier for gross output = \( Y_f / Y_1 = 121,818 / 57,020 \)

\[ Y_f = 2.136 \]

Keynesian multiplier for disposable income = \( D_f / D_1 = 46,457 / 22,676 \)

\[ D_f = 2.049 \]

What might be termed “base expenditure” multipliers for the hunting area, are also calculated, being the ratios \( Y_f / E = 2.0652 \) and \( D_f / E = 0.788. \)

These multipliers are high compared to the multipliers in Section 5.1.2, and it is obvious that the reindeer hunt is of a great importance to the hunting area.

If the amount 121,818 ISK (gross output) is multiplied by the number of issued hunting licences (1,333) this gives about 162 mISK. If the amount 46,457 (disposable income) is multiplied by 1,333 it gives about 62 mISK. This excludes the income from hunting licences. In 2009 the gross area product (GAP) for East Iceland was 40,258 mISK (Árnason verbal source, January 27, 2012), see Appendix IV, therefore, the impacts of the hunt on GAP are 0.4% and 0.2% respectively.
Table 7.4. Lower confidence level.

<table>
<thead>
<tr>
<th>Model</th>
<th>L 42,618</th>
<th>W 5,114</th>
<th>G 8,524</th>
<th>A 0</th>
<th>M 5,114</th>
<th>Z 70,242</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Salaries, guides</td>
<td>Wages, guides</td>
<td>Goods and services bought by guides</td>
<td>Additional labour force bought by the guides</td>
<td>Salaries, guides (non-local)</td>
<td>Total expenses of the hunters spent locally</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Y</th>
<th>2.086</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yf/E</td>
<td>2.086</td>
<td>Df/E</td>
</tr>
<tr>
<td>Base multiplier</td>
<td>1.468</td>
<td>0.607</td>
</tr>
</tbody>
</table>

Table 7.4 reveals the multipliers; the parameters $L$ and $M$, are the lower 95% confidence level. The multipliers $Y_f/Y_I = 2.086$ and $D_f/D_I = 2.168$. The base multipliers are 1.468 and 0.607. The gross output multiplier $Y_f$ is lower and the disposable income multiplier $D_f$ is higher and the base multipliers are lower than when the average parameters of $L$ and $M$ are used.

Table 7.5. Upper confidence level.

<table>
<thead>
<tr>
<th>Model</th>
<th>L 55,692</th>
<th>W 5,114</th>
<th>G 11,138</th>
<th>A 0</th>
<th>M 6,683</th>
<th>Z 101,488</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Salaries, guides</td>
<td>Wages, guides</td>
<td>Goods and services bought locally by guides</td>
<td>Additional labour force bought by the guides</td>
<td>Salaries, guides (non-local)</td>
<td>Total expenses of the hunters spent locally</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Y</th>
<th>2.175</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yf/E</td>
<td>2.084</td>
<td>Df/E</td>
</tr>
<tr>
<td>Base multiplier</td>
<td>1.384</td>
<td>0.528</td>
</tr>
</tbody>
</table>

The multipliers, and the parameters $L$ and $M$, are the upper 95% confidence level (Table 7.5). The multipliers $Y_f/Y_I = 2.175$ and $D_f/D_I = 2.084$. The base multipliers are 1.384 and 0.528. This results in higher multipliers of $Y_f$ and $D_f$ but lower base multipliers.

Estimates of the proportion of consumption which goes on local value-added clearly have a significant impact on the value of the multiplier. Some simple experiments show how sensitive the multipliers are to changes in $v$ (proportion of goods/services spent locally by hunters) and $w$ (proportion of guides’ income spent locally).

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If, instead of using the parameters \( v = 0.48 \) and \( w = 0.66 \) each of these is increased by 10 percentage points, to 0.58 and 0.76 respectively, the multiplier for gross output goes up from 2.136 to 2.397, and that for disposable income increases from 2.049 to 2.289. If, on the other hand, \( v \) and \( w \), are reduced by 10 percentage points, to 0.38 and 0.56 respectively, the multiplier for gross output falls to 1.881 and that for disposable income falls to 1.813. It is obvious that estimates of local economy multipliers are sensitive to variations in these parameters. These calculations are based on Table 7.2.

These findings (the multipliers) should be interpreted with caution. As mentioned earlier in this report, the response rate was about 12% and more participation would have been preferable. A survey among those who served the hunters, such as guides, would have increased the validity. Nevertheless, these findings imply that the hunts are economically important for this area.

### 7.2 The flow of money and creation of jobs

This chapter is based on work by Sigurðsson (the author of this thesis) and Heiðarsson and relates to the findings in the survey on which this thesis is based (Sigurðsson & Heiðarsson, 2010).

Money can be brought into a community by two means. On the one hand, simply by delivering the money to persons in that community in exchange for work or purely as a grant of some kind. On the other hand, money can be brought into a community by purchasing local goods and services. These two ways have slightly different effects in the community when the money changes hands and moves further in the economy. But in both cases jobs are created.

In this chapter, the number of direct jobs and indirect jobs due to the buying of goods and services by hunters in the hunting area will be calculated.

The information is in ISK and thus it has to be converted into man-years. That is done by the following methods:

\[
D_j = D_w / \alpha
\]  

Where \( D_j \) represents the number of direct jobs, \( D_w \) represents total direct wages and \( \alpha \) represents average wages in the service sector in East Iceland.

The number of indirect jobs will be calculated by the following method:
\[ I_j = D_m / \alpha \]  
(7.4)

Where \( I_j \) represents the number of indirect jobs because of delivered money, \( D_m \) represents total delivered money and, as before, \( \alpha \) represents average wages in the service sector in East Iceland.

\[ I_{jgs} = D_{gs} / \alpha \]  
(7.5)

Where \( I_{jgs} \) represents the number of indirect jobs because of buying goods and service, \( D_{gs} \) represents total direct wages following the buying of goods and services, and \( \alpha \) represents average wages in the service sector in East Iceland.

Forward linkage effects, \( F_{le} \), are not specially calculated, but an estimate. It appears that forward linkage effects arising from reindeer hunting are rather limited in East Iceland. In 2009 one entrepreneur in East Iceland offered a taxidermy service for the production of trophies. It is assumed that only one person in the region is gainfully employed from the processing of raw materials from reindeer. (see chapter 7.2.11).

The total impact in terms of jobs, \( T_j \), will be found in the sum of direct, indirect jobs and forward linkage effects.

\[ T_j = D_j + I_j + I_{jgs} + F_{le} \]  
(7.6)

The calculation of total impact (Equation 7.6) is the objective of this chapter. The following sub-chapters provide information and calculations of the parameters in the equations above.

The consumer and producer surplus will be discussed as well.

**7.2.1 Purchasing goods and services**

When money is used to buy goods and services, part of the amount goes to the persons or institutions selling those goods or services. That is, in all cases, part of the income of companies selling goods and services goes as wages to their workers. The ratio of labour cost to income \( L_{cr} \) is about 20% in the service sector. It is possible to calculate a more accurate ratio if it is known what kind of goods and services are bought. This ratio (labour cost/total turnover) can be calculated from the annual accounts of Icelandic companies published by Statistics Iceland. The last year for which this data are available is 2007 but probably the ratio has not changed significantly since then (Statistics Iceland). If one million ISK is spent on goods and services \( G \) it is assumed that about
200 thousand ISK $G^*L_{cr}$: $1,000,000 \times 0.2 = 200,000$ ISK is spent on labour cost $L$ in the companies where the commodities are bought. About 90% of labour costs (direct payment ratio $D_{pr}$) represent direct payments $D_p$ to the work force. About 10% are estimated wage-related expenses (contributions to pension funds and trade unions). In this context, it is therefore assumed, if not explicitly calculated, that $D_p \times D_{pr}$: $200,000 \times 0.9 = 180,000$ ISK of each million ISK spent on goods and services ends as direct payments to the workers delivering those same goods and services.

### 7.2.2 Delivered money

If money is delivered directly to a person, for example in exchange for work, this amount is divided into two portions; taxes and disposable income. In Iceland, taxes are of two kinds, taxes to the state (income tax) and taxes to the municipality (local tax). These taxes are used, for example, to finance schools, health care services, and police. A large proportion of the money taken from individuals in the form of taxes is used to fund state or municipal services. The proportion of money classed as individual net income $I$ is $I = (1-t) \times X$ (wages) is largely used by individuals to buy goods and services, and approximately 20%, $D_{wr}$ (direct wage rate) of this money ends up as direct wages $D_w$: $D_{wr} \times I$ to other workers in the service sector, as already explained. There is, however, no guarantee that a person’s purchase of goods and services will take place in the community where the individual lives. It is most likely, for example, that part of the expenditure of individuals living in East Iceland will take place outside East Iceland both in other parts of Iceland, as well as in other countries. Here it is assumed that two thirds of East Icelanders’ expenditure will take place in East Iceland. This is a given assumption or subjective estimate because it would require thorough and time-consuming research to determine the exact proportion. Furthermore, it is assumed that a quarter of the money delivered to an individual living in East Iceland ends up as wages to other people in East Iceland (Heiðarsson, 2005, p. 14).

### 7.2.3 Buying of goods and services by hunters, guide excluded

This chapter reveals the estimated spending of reindeer hunters in East Iceland (EI). Here, equations used to calculate direct payments, $D_p$, direct wages, $D_w$ and delivered money $D_m$ will also be introduced.
Table 7.6. Estimated spending of reindeer hunters in East Iceland 2009

<table>
<thead>
<tr>
<th>Amounts in IS K</th>
<th>a percentage of hunters who pay for this factor</th>
<th>b average spending in E I of those who pay</th>
<th>c estimated labour cost ratio</th>
<th>L = a<em>b</em>c labour cost (ISK)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food, beverages, catering</td>
<td>93.10%</td>
<td>8,286</td>
<td>0.22</td>
<td>1,697</td>
</tr>
<tr>
<td>Accommodation</td>
<td>55.70%</td>
<td>13,075</td>
<td>0.28</td>
<td>2,039</td>
</tr>
<tr>
<td>Fuel/gasoline</td>
<td>97.00%</td>
<td>9,274</td>
<td>0.04</td>
<td>360</td>
</tr>
<tr>
<td>Transport by air / bus</td>
<td>18.50%</td>
<td>263</td>
<td>0.27</td>
<td>131</td>
</tr>
<tr>
<td>R ented equipment (car, ATV)</td>
<td>38.30%</td>
<td>14,321</td>
<td>0.25</td>
<td>1,371</td>
</tr>
<tr>
<td>Hunting equipment</td>
<td>77.50%</td>
<td>3,685</td>
<td>0.16</td>
<td>457</td>
</tr>
<tr>
<td>Clothing</td>
<td>49.30%</td>
<td>1,349</td>
<td>0.19</td>
<td>126</td>
</tr>
<tr>
<td>Guide and handling of meat</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Souvenirs</td>
<td>16.80%</td>
<td>4,949</td>
<td>0.17</td>
<td>141</td>
</tr>
<tr>
<td>First aid kit</td>
<td>16.30%</td>
<td>1</td>
<td>0.16</td>
<td>37</td>
</tr>
<tr>
<td>Recreation (hot pot, swimming, nature watching)</td>
<td>38.50%</td>
<td>3,652</td>
<td>0.3</td>
<td>422</td>
</tr>
<tr>
<td>Other</td>
<td>48.60%</td>
<td>8</td>
<td>0.19</td>
<td>739</td>
</tr>
<tr>
<td>Total spent in East Iceland</td>
<td></td>
<td>39,847</td>
<td>0.189</td>
<td>7,520</td>
</tr>
</tbody>
</table>

Those buying a licence for hunting reindeer in EI will also buy services and goods in the region. According to the survey, see Table 7.6, reindeer hunters’ spending in East Iceland, excluding the cost of a hunting guide, was on average 39,847 ISK. The estimated average ratio of total spending going into labour costs is 18.9%, $c$, see bottom line in Table 7.6. The calculations in the table are as follows:

\[ L_i = a_i b_i c_i \]

where the labour expenses, $L_i$, for each factor $i$ is the product of the share of hunters paying for the relevant factor, $a_i$, average spending in East Iceland, $b_i$, estimated labour spending, $c_i$. The total spending is a composite of several purchases and if accommodation and fuel/gasoline are taken as examples:

\[ L_{	ext{accommodation}} = 0.557 \times 13,075 \times 0.28 = 2,039 \text{ ISK}. \]

\[ L_{	ext{fuel/gasoline}} = 0.97 \times 9,274 \times 0.04 = 360 \text{ ISK}. \]

This comparison reveals that the economic effects of each factor offered are of varying importance for the area. Estimated labour cost ratio $E_{lcr}$ is calculated from annual accounts of businesses providing a range of different services and products (Icelandic version of ILO’s ISCO) published by Statistics Iceland.
In 2009 1,333 reindeer were hunted in East Iceland. If every hunter spent on average 39,847 ISK in East Iceland during the hunting trip (cost of hiring a guide excluded) then the total spending by reindeer hunters in EI, $T$, is an estimated 53 mISK (39,847*1,333).

Direct payments $D_p$ represent payments to the work force in companies that deliver goods and services. $T$ represents total spending by reindeer hunters in East Iceland, as mention earlier; $c$ represents the estimated average labour cost ratio (see bottom line in Table 7.6). Direct wages $D_w$ represents wages to the work force in companies selling goods and services. $C$ represents cost in form of goods and services. $D_{pr}$ represents direct payment ratio and $D_m$ represents delivered money. Following Equations are used for calculations:

$$D_p = T \times c \quad (7.7)$$
$$D_w = C \times c \quad (7.8)$$

Type I employment multiplier: Type equation here.$D_m = T \times D_{pr} \quad (7.9)$

By using Equation (7.7), direct payments to the service sector in EI amount to: $D_p = 53$ mISK $\times 0.189 = 10$ mISK. By using premises in chapter 7.3.1, (90% of labour cost represent direct payments to work force), the direct wages are $= 10 \times 0.9 = 9$ mISK. Total direct wages and total delivered money will be used to estimate the number of jobs in EI, as explained in beginning of chapter 7.2.

Summary: Direct wages $D_w$ following the buying of goods and services are 9.0 mISK, delivered money $D_m = 0$ ISK.

7.2.4 Payments for guidance, slaughtering facilities and butcher

According to the survey, (see Table 6.12), 93.4%, of the hunters paid for a guide and on average paid 23,772 ISK, (see Table 6.8). The survey suggests that 13% of the guides were living outside East Iceland (see Figure 6.4); so on average local guides were receiving 19,317 ISK. per hunter (23,772*0.934*0.87). When this is multiplied by the 1,333 reindeer hunted, it can be estimated that reindeer hunters spent 25.75 mISK , $T$, on local guides. It is likely that this represents net income for the guides. Some cost to the guide is inevitable, however. It is assumed, therefore, that 23.17 mISK (90%*25.75mISK), Equation (7.9), of this sum was classed as delivered money and 2.57 mISK (10%*25.75mISK) as cost in the form of goods and services $C$. By using
Equation (7.8) \( D_w = C \times c \), direct wages \( D_w \) in the service sector are: \( 2.57 \text{ mISK} \times 0.189 = 0.49 \text{ mISK} \).

About half of the hunters or 49.4% (Table 6.12) paid for carcass handling and processing facilities at an average cost of 12,532 ISK. Given that most guides offer this facility and that specialist facilities for processing reindeer meat are found only in East Iceland, it is a given premise that 67% of butchering was carried out locally as the survey did not address this. The total spending in East Iceland \( C \) is then estimated to be 5.5 mISK \( (12,532 \times 0.494 \times 1,333 \times 0.67) \) and this amount is treated as representing the buying of goods and services, Equation (7.8) \( D_w = C \times c \), gives: \( 5.5 \times 0.189 = 1.04 \text{ mISK} \) as direct wages to workers.

Just over a fifth, or 21.9% (see Table 6.12), of the hunters paid for the services of a professional butcher at an average cost of 24,821 ISK. It was a given premise that 67% of butchering was carried out locally as the survey did not address this. The total spending in East Iceland is then estimated at 4.85 mISK \( (24,821 \times 0.219 \times 0.67 \times 1,333) \). Most of this is assumed to represent net income for the butchers, but some cost is assumed to be incurred by the butcher and, as in the case of guides, that delivered money (Equation 7.9) is \( D_m = T \times Dpr = 4.85 \times 0.9 = 4.37 \text{ mISK} \) and 10% of the amount \( (4.37 \times 0.1 = 0.44 \text{ mISK}) \) goes to purchasing goods and services. Equation (7.8) \( D_w = C \times c \), gives: \( 0.44 \times 0.189 = 0.08 \) which goes as \( D_w \) to other service providers.

Summary: Total \( D_w \) following the buying of goods and services: \( 0.49 + 1.04 + 0.08 = 1.61 \text{ mISK} \). Total \( D_m \) are: \( 23.17 + 4.37 = 27.54 \text{ mISK} \).

7.2.5 Hunting licence

In 2009 the total raised from the sale of reindeer hunting licences was 96.85 mISK (Beck verbal source, November 11, 2011), see Appendix V. This amount was divided into three portions. The next three sub-chapters reveal this subdivision.

7.2.5.1 The share of the Department of Natural Resources (DNR)

The DNR received 10.3 mISK to cover the costs of controlling and monitoring the reindeer hunt. At least 8 mISK of this amount was spent in East Iceland and it is assumed that 7 mISK went on the labour cost of 1.5 UST staff and the rest; 1 mISK was spent on goods and services. Out of the 7 mISK, 6.3 \( (7 \times 90\%) \) mISK constituted direct wages and 18.9% of the 1 mISK ended up as direct wages in the service sector.
Summary: $D_n$ following the buying of goods and services 0.19 mISK, $D_m$ 6.3 mISK.

7.2.5.2 The share of East-Iceland Institute of Natural History (NA)

The NA received 3.957 mISK for research on reindeer which forms the basis for the control and regulation of the hunt quota. This research comprises the evaluation and monitoring of the reindeer population, its habitat and vegetation use. The labour cost ratio in this institute is 68% so labour cost represents an estimated 2.69 mISK (3.957*0.68). Equation (8.8) 2.69*0.9 = 2.42 mISK is classed as delivered money. The remaining 32% was most likely spent on goods and services, amounting to 1.267 mISK and thereof 18.9% in direct wages to other service sector workers. Equation (7.4) gives: 1.267*0.189 = 0.24

Summary: $D_n$ following the buying of goods and services 0.24 mISK, $D_m$ 2.42 mISK.

7.2.5.3 The share of landowners

The remainder is divided among the landowners. In 2009 this amounted to an estimated 82.6 mISK. These are the landowners who own the land where the reindeer are hunted and killed. Some of these landowners do not live in East Iceland, so payments to them have no economic meaning for East Iceland. The state also owns some of the land. It is not known how much of the payments goes to this group, but according to an expert at the Agricultural Association in East Iceland it is believed that 10-20% of the farms are owned by people living outside East Iceland. The majority, here assumed to be 85%, are landowners living in East Iceland and their apportionment was estimated to be 70.2 mISK (86.2 mISK*85%). It seems likely these payments are classified in the same way as other farm income and subject to taxation similarly to other income. This 70.2 mISK is therefore classified as delivered money.

Summary: $D_n$ following the buying of goods and services is 0 ISK, $D_m$ 70.2 mISK.

7.2.6 Government funding

The funding received by the East-Iceland Institute of Natural History from their apportionment of hunting licences (3.957 mISK) was insufficient to cover the cost of reindeer research. The shortfall of 6.7 mISK in 2009 was met by the Icelandic government, that is, 68% in labour cost and 32% in goods and services.

Summary: Direct wages following the buying of goods and services $6.7*0.32*0.189 = 0.41$ mISK, delivered money $6.7*0.68*0.9 = 4.1$ mISK.
7.2.7 Jobs in East Iceland as a result of reindeer hunting

All the above mentioned effects of economic linkages sustained by reindeer hunting are summarised in Table 7.7. The amounts are shown in the summaries in each sub-chapter above.

Table 7.7. Flow of money into East Iceland following reindeer hunting.

<table>
<thead>
<tr>
<th>The year 2009</th>
<th>Delivered money</th>
<th>Direct wages following buying of goods and services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amounts in millions ISK</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buying of goods and services by reindeer hunters, guide excluded</td>
<td>0</td>
<td>9.00</td>
</tr>
<tr>
<td>Payments to guide, butcher and slaughtering facilities</td>
<td>27.54</td>
<td>1.61</td>
</tr>
<tr>
<td>Hunting licences, the share of DNR</td>
<td>6.30</td>
<td>0.19</td>
</tr>
<tr>
<td>Hunting licences, the share of NA</td>
<td>2.42</td>
<td>0.24</td>
</tr>
<tr>
<td>Hunting licences, the share of landowners</td>
<td>70.2</td>
<td>0.00</td>
</tr>
<tr>
<td>Government funding</td>
<td>4.10</td>
<td>0.41</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>110.56</strong></td>
<td><strong>11.45</strong></td>
</tr>
</tbody>
</table>

The next chapter presents calculations on how many jobs reindeer hunting was created in East Iceland 2009. The estimate is based on Table 7.7 and other available statistical information from the year 2009. But first the average wages, $\bar{a}$, of the service sector in East Iceland will be examined.

The mean total wages for full-time employees before taxes and wage-related expenses by occupational groups in Iceland are published by the Icelandic Statistics. This amount was 334,000 ISK per month in the service sector (service workers and shop and market sales workers (Statistics Iceland). If compared to the average income by regions it seems that the wages are 8% lower in East Iceland in the service sector than in Iceland as a whole, but that comparison is only available till 2005. In this study it is assumed that this difference remained 8% in 2009 and the outcome is 307,000 ISK per month, yielding annual wages of 3.7 mISK in EI.
7.2.8 Direct jobs

This chapter reveals the total number of estimated direct jobs.

According to UST and NA, 3.3 jobs in these institutes directly relate to the reindeer (Beck verbal source, April 2, 2011). Thus, there is no need to estimate the number of jobs in this case, the delivered money of 12.82 mISK seems to stand behind 3.3 direct jobs. In Table 7.7 the numbers 6.3, 2.42 and 4.1 add up to 12.82 mISK.

Direct wages delivered to guides and butchers are considered to be 27.54 mISK. A mean yearly salary of 3.7 mISK (see above) for employees is assumed in the service sector in East Iceland in 2009. Therefore, the estimated annual regional income to guides and butchers of 27.54 mISK equates, according to Equation (7.3) \( D_j = D_w / \alpha = 27.54 / 3.7 = 7.4 \) jobs.

In total it is estimated that delivered money creates 3.3 + 7.4 = 10.7 direct jobs in research, management, guiding services and the processing of meat.

In the case of landowners it is more complicated to assess the impact of the estimated 70.2 mISK classified as delivered money, \( D_m \), to this group. Payments to landowners for reindeer hunting most probably do not create jobs directly in East Iceland, therefore \( D_w = 0 \). This type of remuneration may, however, cross-subsidise other farm activities and represent a significant source of income, helping sustain farms and associated jobs in the region.

7.2.9 Indirect jobs, \( I_j \), because of delivered money

There are also indirect effects of the delivered money. It is assumed that 25% of delivered money goes as direct wages to others in East Iceland (Heiðarsson, 2005, p. 15). Twenty-five percent of 110.56 mISK (see Table 7.7) is 27.64 mISK. According to Equation (7.3) this amount equates to about 7.5 jobs (27.64/3.7). This is not all, however, because the chain goes on, creating more indirect effects. When 27.64 mISK are delivered as wages in East Iceland 25%, 6.9 mISK, of that amount ends up as another person’s wages and then again and again. This is part of the multiplier effect. The total amount which in this way is channelled into direct wages is about 37 mISK (27.6*0.25=6.91, 6.91*0.25=1.73, 1.73*0.25=0.43, 0.43*0.25=0.1 and so on or 27.6 +
6.91 + 1.73 + 0.43 + 0.1 + \ldots)^3. The delivered money, estimated at 110.56 mISK should therefore, according to Equation (7.4), equate to 10.0 indirect jobs (37/3.7).

### 7.2.10 Indirect jobs, $I_{gs}$, because of buying goods and services

An estimated 11.45 mISK which flowed into direct wages following the buying of goods and services in East Iceland is due to reindeer hunting, see Table 7.7. As before, this is not the whole effect; 25% of that amount is likely to end up as direct wages paid to other employees, and so on. The total amount which is paid in this way as direct wages is an estimated 15.0 mISK (same premise as in chapter 7.2.9) and according to Equation (7.5) this corresponds to an estimate of 4.0 jobs (15.0/3.7).

### 7.2.11 Forward linkage effects

It appears that forward linkage effects arising from reindeer hunting are rather limited in East Iceland. The main product which comes out of hunting is meat, although skin, horn and heads for trophies are also produced. However, there appears to be very limited activity of this kind to be found. The carcass and meat are usually retained by the hunter who may pay for butchering services, although this is often part of a service package offered by the guide. Horns and skin are used in producing handicrafts in East Iceland and to some extent in other regions, but the turnover is very limited. It is also possible that the craftsmen will simply use other raw materials, if those from reindeer are unavailable. In 2009 one entrepreneur in East Iceland offered a taxidermy service for the production of trophies. In light of this, it is assumed that only one person in the region is gainfully employed from the processing of raw materials from reindeer.

### 7.2.12 Crowding out effects

A ‘crowding out’ effect may be observed when a new economic activity pushes other activities aside. The established occupation is then not competitive, so the introduction of the new activity leads to job losses in the older one. However, there appears to be no crowding out effect in this system and it is assumed to be zero in this study. This is probably due to that the hunting is seasonal and those who are working in connection to the hunt may use their spare time doing that.

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3 This is geometric progression. Geometric progressions are endless but still have limit.
7.2.13 Summation

Here the effects are lumped together. By using Equation (7.6): $T_j = 10.7 + 10 + 4 + 1 = 25.7$ jobs, it is estimated that reindeer hunting was the basis for about 26 jobs in East Iceland in 2009. When comparing these 26 jobs to full-time employed persons in East Iceland in 2009 they add up to about 0.4% of full-time employed persons (Friðriksson verbal source, February 10, 2012), see Appendix VI.

Table 7.8 Estimated number of jobs in East Iceland because of reindeer hunting

<table>
<thead>
<tr>
<th>Estimated number of jobs in East Iceland because of reindeer hunting</th>
<th>Number of jobs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct jobs because of research, management and guidance</td>
<td>10.7</td>
</tr>
<tr>
<td>Indirect jobs because of delivered money</td>
<td>10.0</td>
</tr>
<tr>
<td>Indirect jobs because of buying of goods and services</td>
<td>4.0</td>
</tr>
<tr>
<td>Forward linkage effects</td>
<td>1.0</td>
</tr>
<tr>
<td>Total</td>
<td>25.7</td>
</tr>
</tbody>
</table>

Table 7.8 reveals estimated number of jobs in East Iceland because of reindeer hunting.

7.3 The efficiency of reindeer hunting

The sale of reindeer hunting licences in Iceland is not efficiently organised according to natural resource economics. The efficient use of a resource implies that its use maximizes the present value of the net benefit (Tietenberg & Lewis, 2009).

The source, in this case, is wild reindeer in East Iceland. Over hunting is not considered a problem as is sometimes the case with wild animals, as the hunt is regulated by the Department of Natural Resources. The inefficiency occurs in the sale of each unit of the resource, that is, the sale of each hunting licence. In 2009, as mentioned earlier in this report, on average 2.4 applications were submitted per each hunting licence. This implies that the hunting licences are sold at lower prices than might be plausible. No attempt is made to sell the licences at the highest possible price. Consequently, the income from the resource is lower and the economic impact on East Iceland is less than would be the case if the sale of each unit from the source was more efficiently organised. Selling the licences at higher prices would undoubtedly create more indirect
jobs compared to the present system. The results would be higher payments to landowners and probably even more research and monitoring. From the economic point of view, it would be preferable to sell the hunting licences at the highest possible price i.e. selling to those who are willing to pay the highest amount. This would at least ensure efficient pricing.

### 7.3.1 Consumer surplus

Each buyer is eager to buy a commodity at a price less than his willingness to pay, and would refuse to buy at a price exceeding his willingness to pay. The buyer, however, would still remain prepared to buy the commodity at a price exactly equal to his willingness to pay. Each buyer’s maximum measures how highly that particular buyer values a specific good. “Consumer surplus is the highest price a buyer is willing to pay minus the amount the buyer actually pays for it” (Mankiw & Taylor, 2006, p. 132). Consumer surplus measures the benefit to buyers of participating in the market. It is closely related to the demand curve for the product because the demand curve represents an indication of the willingness of consumers to pay. In short, the demand curve is a graph of the relationship between the price of a good and the quantity demanded. Because the demand curve reflects the willingness to pay, which can be thought of as the utility from consuming the good, it can be used to measure the consumer surplus.

### 7.3.2 Producer surplus

Now the other side of the market is focused upon and the sellers’ benefits from participating in a market are considered. This will reveal that the analysis of sellers’ surplus is similar to that of buyers’ surplus.

A producer is willing to sell his product if the selling price exceeds his marginal cost of production. The term cost is interpreted as the producer’s opportunity cost: explicit and implicit cost. Because a producer’s cost is the lowest price he would accept for his good, cost is a measure of his willingness to sell his good. “Producer surplus is the amount a seller is paid minus the cost of production” (Mankiw & Taylor, 2006, p. 137). It measures the benefit to sellers of participating in a market. Producer surplus is intimately related to the supply curve, just as consumer surplus is closely connected to the demand curve. Because the supply curve reflects producers’ willingness to sell, it can be used to measure producer surplus.
Figure 7.1. Consumer and producer surplus at equilibrium price $P$ and quantity $Q$.

Figure 7.1 shows the surplus of consumers and producers at the equilibrium price $P$ and quantity $Q$ on a market. The area below the demand curve and above the price measures the consumer surplus in a market or the area of the triangle ABD. The reason is that the height of the demand curve measures the value buyers place on the good, as well as measuring the willingness to pay for it. The difference between this willingness to pay and the market price is each buyer’s consumer surplus. Producer surplus is the area below the price and above the supply curve, or arc, of the triangle BCD, which is the surplus for the hunting area in East Iceland. Part of the consumer surplus goes to hunters living in the hunting area who went reindeer hunting that year. In the short run, the producer surplus is total revenues minus variable cost, because fixed cost is something the producers cannot change. Social surplus is the total of both consumer surplus and producer surplus (Karlsson, 2007b). The reason is that the height of the supply curve measures the value producers place on the good, as well as measuring the willingness to sell it. Figure 7.2 applies to a free market with many producers (Mankiw & Taylor, 2006).
Figure 7.2. Different demand curves.

In 2009 the quota was 1,333 animals, whereas applications totalled 3,266 or about 2.4 applications per hunting licence as may be seen in Table 2.3. The average price per licence in 2009 was about 70,000 ISK. The surplus of the DNR (producer) that year is the rectangle ABCD and was about 93 M ISK minus the cost which is calculated. The supply curve is vertical because of a fixed supply of licences (1,333).

It is obvious that that all the licences could have been sold at higher price. But at what price will the numbers of applications equal the supply of hunting licences? In the survey, the respondents were not asked to name the maximum price they were willing to pay for a hunting licence. Thus it is not possible to calculate the surplus of a higher fee for the licences. Three demand curves are drawn in Figure 7.2; D₁ at price P₁, D₂ at price P₂ and D₃ at price P₃. The surplus of the DNR would be highest at demand curve D₁ and lowest at demand curve D₃. And correspondingly, the hunters’ surplus will decline. But no calculations will be done because no indications are available as to the appropriate price.

So what form of allocation should be used to maximize the profit of the reindeer hunt? If the licences were to be auctioned off, each hunter would be willing to pay his maximum price for the licence, or at least much closer to the maximum price. This way, in 2009, the 1,333 hunters offering the
highest prices (number of licences that year) would obtain the licences. Given that
hunters would pay its maximum price, no consumer surplus would exist, only producer
surplus, because the hunters offer the maximum price they are willing to pay. The
surplus is the area ACDB as may be gathered from Figure 7.3. This should result in a
significantly higher income for the hunting area. Furthermore, this should encourage
foreign hunters since their possibilities of obtaining hunting licences are considerably
improved. From an economic point of view, hunters from abroad should be more
valuable for tourism as a whole, as they will avail themselves of the service of Icelandic
international airlines and use accommodation in Reykjavik, the capital area. And they
must travel to East Iceland, either by plane or car. They might also take the opportunity
to try out other kinds of leisure activities in Iceland. Thus, these hunters are without
doubt more valuable from an economic point of view than domestic hunters. Besides, an
auction should provide an indication as to the prices at which hunting licences could be
sold and thus increase the efficiency of the reindeer as a natural resource.

Furthermore, the current system of allocation of hunting licences is probably not
attractive to foreign hunters who may be willing to pay larger sums money than
Icelandic hunters and thus represent a potentially lucrative market. The current licence
allocation is, as mentioned earlier in the report, determined by a lottery where all
applicants have an equal chance of being drawn, regardless of willingness to pay above
the current market value. The ‘lottery’ system of allocating licences may discourage

Figure 7.3. The auction way.
foreign hunters from considering reindeer hunting in Iceland as a possible hunting activity. If hunting licences were to be sold to those willing to pay the highest price this might well encourage foreign hunters to bid, rather than taking their business elsewhere. According to the manager of a tourist company, and a reindeer guide, with a special emphasis on hunting tourism, a foreign hunter is up to ten times more valuable for his business than a domestic hunter (Guðjónsson verbal source, May 5, 2010). Therefore, it is very likely that the Icelandic economy is being deprived of valuable revenue because of the inefficient pricing of this resource. The potential of selling licences to foreign hunters at higher prices has not been investigated. There is, however, a need for such an investigation to be conducted.

7.3.3 Recommendations for increasing income from licences

The quota is decided for each year according to recommendations from Náttúrustofa Austurlands (NA). The strategy for pricing hunting licences is as follows: The Reindeer Council (i. Hreindýraráð) and parties in the Department of Natural Resources make a proposal for the prices of hunting licences to the Ministry for the Environment where the final prices are decided. The policy has been, as the reindeers are looked upon as a common natural resource of the Icelandic people, to ensure that most hunters should be able to afford to go reindeer hunting independent of their finances (Pálsson verbal source, May 22, 2011).

What can be done to increase the efficiency of this natural resource? The entire quota or at least a certain proportion of it could be in the form of an auction. Then those hunters who can afford higher prices and also parties involved in hunting tourism could make a bid and those active in hunting tourism could resell the licences e.g. to foreign hunters. The proportion that is not sold in a form of an auction could be disposed of in the same way as has been done in the past. This could raise the income from hunting tourism in hunting areas and strengthen this profession, as a large number of hunters go after the reindeer when the traditional tourism season is decreasing. What could happen to the number of applications if the prices for hunting were to be increased? Probably the number of A type hunters would decrease, but the B type would not, and still all licences would be sold. The only restrictive factor in increasing the efficiency of this natural resource is the quota.
8 Discussion

This chapter comprises a discussion as to if and how those who serve reindeer hunters, can exploit information from this survey to increase their income as well as considerations regarding the possibility of transferring reindeer to new locations in Iceland to strengthen the economy of new areas and meet the increasing demand for hunting licences.

8.1.1 The residence of hunters and their hunting cost

Figure 8.1 shows distance from hunting area and the average cost paid by hunters living in each area. Figure 2.1 reveals the location of postcodes.

![Figure 8.1. Residence and average cost of hunters.](image)

Figure 8.1 reveals that hunters living in areas 100-299, number of respondents 104, and in areas 300-399, number of respondents 4, are those living farthest from the hunting area and the average cost is also highest among them, or about 222,000 ISK. Area 400-499 is also very remote, but only one hunter participated in the survey; his cost was about 102,000 ISK. Hunters living in area 600-699, number of respondents 21, paid on average about 207,000 ISK. This area is closest to the main hunting area. Hunters living in areas 500-599, number of respondents 4, and 800-900, number of respondents 3, paid on average about 150,000 ISK. The hunters living in area 700-799, number of respondents 24, paid about 110,000 ISK. It is to be expected that they should pay less than hunters living in other areas (area 400-499 excluded) because probably most of
them do not pay for services such as accommodation and catering. The hunters living furthest from the hunting area are the most valuable for those parties selling hunting-related services and goods. Therefore, an effort should be made to persuade them to stay longer in the area by offering services and goods they value, such as other kinds of hunting. Figure 6.12 shows that about 37% of hunters practised other hunting alongside the reindeer hunt. This presents an opportunity to increase the number of hunters who stay longer in the area and carry out other hunting as well.

A total of 486 hunters, hunted reindeer in September 2009, or about 36% of issued hunting licences (Gunnarsson verbal source, September 2, 2011). In September, since the traditional tourist season has already started to fade away, at least as far as Icelanders are concerned, probably a fair choice of accommodation is available. Therefore, those hunters represent a valuable supplement for those parties in the area that sell hunting-related services and goods.

### 8.1.2 Undeveloped potential

Table 8.1 shows the percentage of hunters that paid nothing for services offered by guides. Here is, from the author’s point of view, an opportunity to increase income

<table>
<thead>
<tr>
<th>% spent 0 ISK</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Driving to and from hunting areas</td>
<td>48.7%</td>
</tr>
<tr>
<td>Accommodation</td>
<td>66.2%</td>
</tr>
<tr>
<td>Usage of facilities while slaughtering reindeer</td>
<td>50.6%</td>
</tr>
<tr>
<td>Usage of all terrain vehicle</td>
<td>51.3%</td>
</tr>
<tr>
<td>Aid of a professional butcher</td>
<td>78.1%</td>
</tr>
<tr>
<td>Guidance</td>
<td>6.6%</td>
</tr>
<tr>
<td>Usage of trailer</td>
<td>80.0%</td>
</tr>
<tr>
<td>Catering</td>
<td>81.4%</td>
</tr>
<tr>
<td>Facilities for hunting equipment</td>
<td>94.5%</td>
</tr>
<tr>
<td>Hot pot</td>
<td>96.2%</td>
</tr>
</tbody>
</table>

There is a case for persuading those hunters to exploit more services offered by local people, thus supporting the local economy. But not all guides offer all the services mentioned above.

The current system of allocating licences is not efficient according to natural resource economics which emphasizes maximizing the present value of the net benefit. The
allocation is in the form of a lottery that may deter foreign hunters from considering reindeer hunting in Iceland as a possible option, as mentioned earlier in this thesis.

As mentioned before, the number of applications per hunting licence averaged 2.4. This implies that the licences are under-priced. The DNR should be able to substantially increase the price for hunting licences but nevertheless be able to sell them all, see Table 2.3. The average price in 2009 was about 70,000 ISK. For example if the average price in 2009 had been raised by 30%, to 91,000 ISK, the added income would have amounted to about 28M ISK. The DNR’s management cost probably would not have increased and the rise in income from licences probably would have resulted in the creation of more indirect jobs compared to the present system, higher payments to landowners, and increased local consumption. Besides, more money could have been spent on research and monitoring.

8.1.3 Attitudes of locals in East Iceland

The author of this thesis expects that many hunters and parties in the hunting area are averse to the idea of migrating reindeer to new regions. There is a long tradition of reindeer hunting in East Iceland and many people in the area earn part of their income from providing services for hunters. Those people may see the transfer of reindeer to new areas as a threat to their income. Such worries, however, are unnecessary as can be seen from the number of applications for hunting licences. A new hunting area will probably increase the number of hunters who can go after reindeer and therefore the current hunting area should not lose any income as a result of this development.

8.1.4 Number of applications

Does the number of applications in 2009 (2.4 per licence) reveal the actual number of hunters who actually plan to go hunting reindeer? The author of this thesis, his son and son-in-law have all applied for hunting licences for the same hunting season. This was done to increase the odds of obtaining one licence, since one licence for the whole group was the objective. Probably some other hunters do the same. Therefore it is not unrealistic to argue that the numbers of “actual” applications are in fact fewer than the number of applications each year.

8.1.5 Extending hunting areas and creating new ones

It should be possible to extend hunting area number 1 to the north. There is new information to the effect that reindeer have moved to this area and also that animals
from this herd have been killed by poachers. If this particular area was preserved for some time, the animals should be able to prosper in the area and multiply, and as a result the quota could be increased. As mentioned in chapter 1.1.5, there are undoubtedly locations in the rural areas of Iceland beside East Iceland where reindeer can prosper. When the author was finishing this thesis, news came regarding the establishment of an association of interested parties for the purpose of transferring reindeer to the West Fjord area. In order to qualify as members, people must have legal residence in the area and be the owners of real estate or a farm. The objective is to take into consideration the pros and cons of moving reindeer into the region (Tálknaðjordur.is, 2011). Those against this suggestion say that the reindeer could carry diseases which may constitute a threat to the local sheep stock. This, however, should be investigated by the proper authorities, as well as whether the local vegetation is suitable for reindeer. If it is found that the reindeer do not pose a threat to the sheep stock and the vegetation is suitable transferring reindeer into the area should strengthen local tourism and the local economy as a whole. It is obvious from this example that there is interest in transferring reindeer into new areas in Iceland.
9 Conclusions

The research question set forth in this thesis was: *What is the economic impact of reindeer hunting on the hunting area?*

The thesis has by degrees provided guidance as to which methods could be used in this process and the survey itself provided the information needed to answer the questions. Before the answers are dealt with, however, it seems appropriate to sum up some points regarding the importance of tourism for Iceland.

Iceland differs in various ways from many other the Western countries. It appears, for example, to depend to a greater extent upon natural resources than most of them. Iceland possesses rich fishing grounds which constitute one of the cornerstones of the economy. Besides, Iceland controls many renewable natural resources, such as streams and rivers and geothermal areas which are used to produce electricity both for industry and for domestic households. Fisheries are central to the economy, and the power industry which is based on domestic producers is larger here than in many other countries. The same applies to the tourism, which is based upon the local natural environment. Direct consumption of the natural resources is an important factor. Consumers, both domestic and foreign, enjoy more contact with unspoiled nature than is common in other Western countries. Probably these boons of nature are of great importance to the inhabitants. The value of this direct consumption, and therefore the natural environment it is based on, does not feature in the National Accounts, but could indeed come to a very high amount.

Tourism has become an increasingly important industry in rural areas in Iceland and farmers involved in tourism are, to a growing extent, providing access to their land for hunting and charging the hunters accordingly. Tourism has had a considerable economic impact in Iceland over the past decades and has been the main growth industry in rural areas: Hunting tourism is thought to provide considerable seasonal income to rural economies. There is little information, however, on the actual economic impact of hunting tourism in Iceland, and decisions in the hunting tourism sector seem to be largely based on educated guesses. The data on hunting statistics are fragmented and, in many cases, outdated.
In 2008 the share of tourism in gross domestic product (GDP) was 4.6%. Total internal tourism consumption in 2008 was 171 billion ISK or 11.5% of GDP. That year more than 9,200 people were employed in tourism which is about 5.1% of all people employed. In the past few years, the tourism sector has increased more rapidly than the economy as a whole.

In 2011 it is anticipated tourist numbers will increase by 75,000-100,000 compared to 2010. The increase in foreign currency is expected to be about 30 billion ISK this being the highest growth in this sector since its quantification commenced.

Hunting is one of the oldest ways of using natural resources and as such falls under the category of consumptive wildlife tourism, a small specialised sector of tourism which panders to a well-defined market segment. Iceland has only a short history of hunting tourism, which nevertheless is considered to have great potential in this country. Hunting activities mainly take place in the shoulder and off season to regular tourism and, could, therefore, help to expand the tourist season in Iceland. In this research, the economic value of reindeer hunting was estimated by working out the multiply effects on the reindeer hunting area in East Iceland and how many jobs, direct and indirect, were created.

8.2 The answers

The research question was:

*What is the economic impact of reindeer hunting on the hunting area?*

To answer the research question, multiply effects were calculated, using Keynesian multipliers, and the continuous economic effects on the hunting area were calculated.

The findings were, using gross output, on the one hand and disposable income on the other, that 162 mISK and 62 mISK respectively constitutes the economic impact in the hunting area. In 2009 the gross area product (GAP) in East Iceland was 40,258 mISK; therefore the impacts of the hunt on GAP are 0.4% and 0.2% respectively.

According to the survey, hunters spent on average about 217,000 ISK. in total on the hunt. The total number of hunters was 1,333 and this yields about 290 mISK. Out of that amount about 93 mISK (70,000*1,333) was for hunting licences. It was estimated that 72% of the amount was paid to landowners resident in the hunting area, or about 67 mISK. Spending on other items relating to the hunt was therefore about 197 mISK.
A total of 26 direct and indirect jobs were created in the area by the reindeer hunting, as indicated by the flow of money. When these 26 jobs are compared to full-time employed persons in East Iceland in 2009 they add up to about 0.4% of full-time employed persons. This does not mean that those who undertake the task of serving the hunters have no other occupation. This simply serves as an addition to their current occupation. Probably some of the guides are also farmers and guiding and assisting hunters is a part-time activity which helps them to survive in the current situation.

The former sub-question was:

What is the proportion of the hunting licence in the total cost of a hunting trip?

In chapter 7 hunters were asked to estimate how much they spent in relation to the hunting trip in 2009. The answer revealed that the hunting licence constitutes only about 1/3 of the total cost of the hunting trip.

This proportion and the number of applications per licence (2.4) in 2009 imply, from the authors’ point of view, that the price of the licence could be raised and still licences could be sold.

The latter sub-question was:

Is the transportation of reindeer into new areas likely to reinforce tourism and also increase land use in those areas?

To transfer a herd into a new area and build it up will take some time. But the findings of this thesis reveal that in the long run such an initiative would strengthen tourism in the relevant area. The thesis could help those parties who are interested in transferring reindeer into new areas and official institutions concerned with decision making.

8.3 Implications for the tourist industry

The findings in chapters 8.3.16-8.3.18 reveal that the hunting licences could undoubtedly be sold at higher prices, thus increasing the economic impact of this natural resource, which reindeer undoubtedly are. As has been revealed in this thesis, the number of applications per hunting licence was 2.4 in 2009 and in 2011 the figure was about 4 applications per licence. If an auction had been used in 2009, the 1,333 hunters bidding the highest prices (the quota that year) would have obtained the licences, and thus the efficiency of this natural resource would have been significantly enhanced. This
proposal is obviously a radical change from the current arrangement of distributing the licences. The author recommends that, for example, 20% of the quota could be sold at an auction and hunters who can afford higher prices and also parties involved in hunting tourism could make a bid and the latter could resell the licences e.g. to foreign hunters. The selling of the remaining 80% could be conducted in the traditional manner. This could raise the income of hunting tourism in East Iceland and strengthen the economy in the area as a large number of hunters go hunting at the shoulder of the traditional tourism season. The transfer of reindeer into new hunting areas, for example the West Fjords should be looked at with an open mind and its pros and cons estimated since this type of hunting is of significant economic importance as has been revealed in this thesis.

8.4 Further research

Some questions raised in the thesis pertain to foreign hunters. How much do they spend on a hunting trip? It would be interesting to compile a questionnaire to find that out and also to discover whether they use the trip to carry out other activities in Iceland simultaneously. To gain access to those hunters would need the cooperation of the guides who serve them.

It would also be interesting to participate in the work that has to be done before a decision is made as to whether or not, and why or why not, to transfer reindeer into the West Fjords of Iceland.

It would also be interesting to look at other types of hunting, such as the hunting of geese, ducks and ptarmigan to evaluate their economic impact.
9 References


Benediktsson, K., Júlíusdóttir, M., Karlsdóttir, A. (2008). *Litróf landbúnaðarsamfélagsins.* Retrieved April 22, 2011, from http://www.landbunadur.is/landbunadur/wgsamvef.nsf/6d3d18e301de1f5e0025768c00561c33/01d18d2690583fc200257486003eca32/$FILE/Litr%C3%B3f%20landb%C3%BA%20arsamf%C3%A9lagsins.pdf


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Lög um vernd, friðun og veiðar á villtum fuglum og villtum spendýrum nr. 64/1994


Reglugerð um veiðikort og hæfnispróf veiðimanna nr. 291/1995

Reglugerð um stjórn hreindýraveiða nr. 486/2003


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## 10 Appendixes

**Table 10.1 Abbreviation and interpretation**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Interpretation</th>
</tr>
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<tbody>
<tr>
<td>Lcr</td>
<td>Labour cost ratio</td>
</tr>
<tr>
<td>GS</td>
<td>Goods and service</td>
</tr>
<tr>
<td>Lc</td>
<td>Labour cost</td>
</tr>
<tr>
<td>Elcr</td>
<td>Estimated labour cost ratio</td>
</tr>
<tr>
<td>Dp</td>
<td>Direct payment</td>
</tr>
<tr>
<td>Dpr</td>
<td>Direct payment ratio</td>
</tr>
<tr>
<td>T</td>
<td>Total spending by reindeer hunters</td>
</tr>
<tr>
<td>C</td>
<td>Cost in form of goods and services</td>
</tr>
<tr>
<td>Dm</td>
<td>Delivered money</td>
</tr>
<tr>
<td>t</td>
<td>Tax</td>
</tr>
<tr>
<td>X</td>
<td>Salary total</td>
</tr>
<tr>
<td>Y</td>
<td>Net income</td>
</tr>
<tr>
<td>Dw</td>
<td>Direct wages</td>
</tr>
<tr>
<td>Dwr</td>
<td>Direct wage ratio</td>
</tr>
<tr>
<td>Dew</td>
<td>Direct employees’ wages</td>
</tr>
<tr>
<td>A</td>
<td>Labour</td>
</tr>
<tr>
<td>a</td>
<td>Proportion of hunters paying for each factor</td>
</tr>
<tr>
<td>b</td>
<td>Average spending</td>
</tr>
<tr>
<td>c</td>
<td>Estimated labour cost</td>
</tr>
<tr>
<td>My</td>
<td>Man – year</td>
</tr>
<tr>
<td>Dj</td>
<td>Derivative jobs</td>
</tr>
<tr>
<td>Ble</td>
<td>Backward linkage effects</td>
</tr>
<tr>
<td>Coe</td>
<td>Crowding out effects</td>
</tr>
<tr>
<td>Tme</td>
<td>Total multiplier effects</td>
</tr>
</tbody>
</table>
### Appendix I

**Tafla 10.24**  Fjöldi kindakjötsframleiðenda almanaksárið 2010 eftir landshlutum, skipið eftir aldri framleiðenda

*Mutton, number of producers 2010 by regions and age of producer*

<table>
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<tr>
<th>Aldur framleiðenda</th>
<th>&lt;17</th>
<th>17-25</th>
<th>26-35</th>
<th>36-45</th>
<th>46-55</th>
<th>56-65</th>
<th>66-69</th>
<th>&gt;69</th>
<th>Félagsbú</th>
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<td>3</td>
<td>1</td>
<td>3</td>
<td>12</td>
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<td>13</td>
<td>3</td>
<td>7</td>
<td>17</td>
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<tr>
<td>Höfuðb.sv. og</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>8</td>
<td>11</td>
<td>6</td>
<td>8</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Vesturland</td>
<td>3</td>
<td>3</td>
<td>21</td>
<td>54</td>
<td>87</td>
<td>82</td>
<td>16</td>
<td>49</td>
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<td>8</td>
<td>28</td>
<td>48</td>
<td>35</td>
<td>12</td>
<td>34</td>
<td>7</td>
</tr>
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<td>Norðurland vestra</td>
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<td>20</td>
<td>44</td>
<td>100</td>
<td>106</td>
<td>106</td>
<td>30</td>
<td>77</td>
<td>30</td>
</tr>
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<td>2</td>
<td>3</td>
<td>23</td>
<td>58</td>
<td>111</td>
<td>71</td>
<td>21</td>
<td>49</td>
<td>57</td>
</tr>
<tr>
<td>Austurland</td>
<td>-</td>
<td>2</td>
<td>7</td>
<td>39</td>
<td>86</td>
<td>75</td>
<td>22</td>
<td>42</td>
<td>27</td>
</tr>
<tr>
<td>Suðurland</td>
<td>16</td>
<td>14</td>
<td>34</td>
<td>69</td>
<td>125</td>
<td>109</td>
<td>40</td>
<td>87</td>
<td>53</td>
</tr>
</tbody>
</table>

| 10.1.1.1.2 Samtal    | 71  | 45    | 140   | 368   | 587   | 497   | 152   | 351 | 241    | 2.452 |
| Skipting eftir aldri % | 2,9 | 1,8   | 5,7   | 15,0  | 23,9  | 20,3  | 6,2   | 14,3| 9,8    | 100,0 |

Heimild: Ændasamtök Íslands.
Appendix II

<table>
<thead>
<tr>
<th>Hunting area</th>
<th>Quota 2009</th>
<th>Number of applications</th>
<th>Pricelist 2009</th>
<th>Total</th>
</tr>
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<tr>
<td></td>
<td>Cows</td>
<td>Bulls</td>
<td>Cows</td>
<td>Bulls</td>
</tr>
<tr>
<td>1 and 2</td>
<td>547</td>
<td>(11)</td>
<td>200</td>
<td>(66)</td>
</tr>
<tr>
<td>3</td>
<td>40</td>
<td>20</td>
<td>115</td>
<td>77</td>
</tr>
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<td>37</td>
<td>44</td>
</tr>
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<td>83</td>
<td>40</td>
<td>240</td>
<td>160</td>
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<td>6</td>
<td>10</td>
<td>25</td>
<td>43</td>
<td>106</td>
</tr>
<tr>
<td>7</td>
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<td>9</td>
<td>27</td>
<td>15</td>
<td>65</td>
<td>36</td>
</tr>
<tr>
<td>Total:</td>
<td>925</td>
<td>408</td>
<td>1885</td>
<td>1375</td>
</tr>
<tr>
<td>Total:</td>
<td>1,333</td>
<td>3,260</td>
<td>2.4</td>
<td>Average price</td>
</tr>
</tbody>
</table>

Ref. UST

Appendix III

Reindeer quota vs. applications

Ref. UST
Appendix IV

Sæll Stefán

Hér er taflan sem liggur á bak við hlutfallstöllumar fyrir Austurland. Tölurnar eru í milljónum kr.

<table>
<thead>
<tr>
<th>Year</th>
<th>Töllur (milljón)</th>
<th>% Change</th>
</tr>
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<tbody>
<tr>
<td>2003</td>
<td>26.446</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>27.108 3%</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>35.720 32%</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>42.819 20%</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>48.111 12%</td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>45.612 -5%</td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>40.258 -12%</td>
<td></td>
</tr>
</tbody>
</table>

Med kveðju

Sigurður Árnason

Byggðastofnun - þróunarvíð
Ártorgi 1, 550 Sauðárkrókur

Sími: 455 5400

Netfang: sigurdur@byggdastofnun.is
## Appendix V

### Heildartekjur vegna hreindýraveiða 2009

<table>
<thead>
<tr>
<th></th>
<th>2009</th>
</tr>
</thead>
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<tr>
<td>S tofnmat</td>
<td>6400</td>
</tr>
<tr>
<td>Hreindýr Reindeer</td>
<td>1565</td>
</tr>
<tr>
<td>Tarfar</td>
<td>402</td>
</tr>
<tr>
<td>Kýr</td>
<td>917</td>
</tr>
<tr>
<td>S amtals fullorðin</td>
<td>1319</td>
</tr>
<tr>
<td>Kálfar</td>
<td>230</td>
</tr>
<tr>
<td>Alls</td>
<td>1549</td>
</tr>
<tr>
<td>Kvöti</td>
<td>1333</td>
</tr>
<tr>
<td>Ums óknir</td>
<td>3265</td>
</tr>
</tbody>
</table>

### Arður

- Fullorðin: 71,920,500
- Kálfar: 4,140,000
- Felligjöld: 6,595,000

### S amtals

- Fullorðin: 82,655,500

### Umhverfis tofnun

- US T-Kálfar: 460,000
- US T-Fullorðin: 9,892,500

### S amtals

- Fullorðin: 10,352,500

### Náttúrus tofa Austurlands

- 3,957,000

### S amtals tekjur

- 96,965,000
Appendix VI

Sæll Stefán.

Árið 2009 var áætlaður fjöldi á vinnumarkaði á Austurlandi sem hér segir:

Atvinnuþátttaka = 80,4%
Áætlaður fjöldi á vinnumarkaði = 7.080 (Starfandi og atvinnulausir)
M.v. 250 að meðaltali atvinnulausa eru því starfandi alls:
7.080 (Fj.íbúa 16-69 ára m.t.t. 80,4% meðal atv.þáttt.árið 2009) - 250 (atvinnulausir)= 6.830 Starfandi á Austurlandi (áætlaður fjöldi) árið 2009

Kv.

Frank Friðrik Friðriksson
Hagfræðingur,
Vinnumálastofnun
Kringlan 1,
150 Reykjavík,
Iceland
515-4800
frank.fridriksson@vmst.is
www.vinnumalastofnun.is
Appendix VII

Þú er að svara skrefi númer 1 af 5.

Athugið: Ævins er hægt að svara þessari könnun eintu sinni.

Ábyrgðarmálur þessarar könnunar er hjordis@unak.is
Grunnupplýsingar
1. Hveri er þá karl eða kona?

Karl ☐
Kona ☐

2. Hvaða ár er þá fædd(ur)

1919 ☑

3. Hver er hjúskaparstada þin?

Einshlýp(ur) | fráskilin(n) | ekkja/ekkill ☐
Í samboð | gift(ur) ☐

3b. Hver mjög börn húsa á heimiliðu sem eru á þinn framfæri
Hér er átt við eigin börn, stjónbörn og fossurbörn

Blöndið börn ☑

4. Hvert er þöfnúmerið þá þér?

101 ☑
Þú er að svara skrefi númer 2 af 5.

Aðhugið: Adeins er hægt að svara þessari könnun einu sinni

Ábyrgðarmálar þessarar könnunar er hjordis@unak.is
Upplysingar um hreindýraveiðimálaverðina
5. Fóru þu a hreindýraveiðimálaverðinum árið 2009?
Eftir svarinu er nei þú mátt þú fari a mánu síðu (spurning 22).
Já ☐
Nei ☐

5b. Hvad befur þú farði oft?

6. A þekksta veiðisvæði þu hreindýraveiðiðið 2009?

7. Hreindýraveiðiðið var fyrir
tarf ☐
kú ☐

7b. Var kötlur fellur?

Já ☐
Nei ☐
<table>
<thead>
<tr>
<th></th>
<th>kr. 1-500</th>
<th>kr. 5.001-10.000</th>
<th>kr. 15.001</th>
<th>kr. 20.001</th>
<th>kr. 30.001</th>
<th>kr. 40.001</th>
<th>kr. 50.001</th>
<th>kr. 75.001</th>
<th>Meint en kr. 100.000</th>
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</thead>
<tbody>
<tr>
<td><strong>Matur, drykkir, veitingar</strong></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td><strong>Flugfari/trutufar</strong></td>
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<td><strong>Leigið teks (t.d. bil, serðjólf, veitigrætur...)</strong></td>
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<td><strong>Veidiðleyfi</strong></td>
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<td><strong>Sjúkraostaða</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>s.s. plattur, umbúðir...</td>
<td></td>
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<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td><strong>Athreying (s.s hefur pottur, sand, fuglasköðun, natturusköðun</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

8. Viðsveigast ásveiði eftir bestu getu hversu miklun fjármaður fór eyðdir í tengslum við breiðtryvareisfjöðina
9. Vinsamlegastu ávitaðu eftir bestu getu hafað kostnaðir í heimaði, á ferðinni eða á áfangastað.

<table>
<thead>
<tr>
<th>% í heimaði</th>
<th>% á ferðinni</th>
<th>% á áfangastað</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Matur, drykkir, veitingar
Gístikostnaður
Flugfær/rúturfær
Bensín/diesel
Leigð tæk (s.s. bill, veidígræjar...
Veidíleyfi
Veidíbúnaður
Fatnaður
Gjafavara, minjagyverir
Sjúkrakostnaður, sjúkrægögn (s.s plástur, umbúðir)
Aflþreying (s.s. heitur pottur, sund, fuglaskoðu, náttúraskoðun...

10. Hvarra gistimáta nýttir þú þér í hreiðýravingsferðinni?

<table>
<thead>
<tr>
<th>Engan</th>
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<tbody>
<tr>
<td>Bændagistingu</td>
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<tr>
<td>Veidíhús</td>
</tr>
<tr>
<td>Orlofskóli</td>
</tr>
<tr>
<td>Orlofskúlaður</td>
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<tr>
<td>Gístiheimilí</td>
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<tr>
<td>Hótel</td>
</tr>
<tr>
<td>Gistingu í heimaði</td>
</tr>
<tr>
<td>Gistingu hja leiðsögumanna</td>
</tr>
<tr>
<td>Aðra gistimöguleika, hvaða?</td>
</tr>
</tbody>
</table>

145
11. Hvad dvaldir þú lengi á Austurlandi í lengdum við hreindaþyvæðiðferðina?

Einn dag eða minna 
Tvo dagar
Þrjá dagar
Fjóra dagar
Fimm dagar
Sex dagar
Einn vika
lengur en eina viku

12. Hvad varstu lengi með leiðsögu manninum?

Einn dag eða minna
Tvo dagar
Þrjá dagar
Fjóra dagar
Fimm dagar
Sex dagar
Einn vika
lengur en eina viku

13. Hversu margir voru með í för aðrir en þú og leiðsögunadurinn í hreindaþyvæðiðferðinni?

Einn
Tveir
Þrir
Fjórir eða fleiri
15. Hvað kostast hetádarppakkum sem þú geymdir leidþögumanninum?

kr. 25.000 eða minna ɣ
kr. 25.001-50.000 ɣ
kr. 50.001-75.000 ɣ
kr. 75.001-100.000 ɣ
kr. 100.001-125.000 ɣ
kr. 125.001-150.000 ɣ
kr. 150.001 eða meira ɣ

Ég greiddi leidþögumanninum ekki neitt ɣ

16. Ef möguleiki er getur þú sundraðað þá þætti sem þú geymdir leidþögumanningum fyrrin?

Vinsamlegast tilgreinandi upphæð í krönum í hvortu lío fyrrir sig sem við á

<table>
<thead>
<tr>
<th>Leidþög</th>
<th>Kr. 2.50</th>
<th>Kr. 5.001</th>
<th>Kr. 10.00</th>
<th>Kr. 15.00</th>
<th>Kr. 30.00</th>
<th>Kr. 45.00</th>
<th>Kr. 60.00</th>
<th>Kr. 75.00</th>
<th>Kr. 100.00</th>
<th>Meira en 100.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kr. 1-2.5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Kr. 2.5-5</td>
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<td>0</td>
<td>0</td>
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<tr>
<td>Kr. 5-10</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Kr. 10-15</td>
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<td>0</td>
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<td>0</td>
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<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Kr. 15-30</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Kr. 30-45</td>
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<td>0</td>
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<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Kr. 45-60</td>
<td>0</td>
<td>0</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Kr. 60-75</td>
<td>0</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Kr. 75-100</td>
<td>0</td>
<td>0</td>
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<td>0</td>
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<tr>
<td>Kr. 100+</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Leidþög

Akstur til og frá veiðisvæði

Aftot af fjór/sedhjóli

Aftot af kermu

Aftot af aðgerðanaðstöðu/slátur húst

Aðgengi að kjöfnaðarmanninni

Aðstoðu undir veiðisvæði

Gistingu

Veitingar
17. Hversu ánægð(ur) eða óánægð(ur) varst þú með þá hjónustu sem leiðsögunðurinn havið upp á?

Mjög ánægð(ur) ○
Frekar ánægð(ur) ○
Hvorki ánægð(ur) ně óánægð(ur) ○
Frekar óánægð(ur) ○
Mjög óánægð(ur) ○

18. Hversu ánægð(ur) eða óánægð(ur) varst þú með frammistöðu / leiðsogumanusinu?

Mjög ánægð(ur) ○
Frekar ánægð(ur) ○
Hvorki ánægð(ur) ně óánægð(ur) ○
Frekar óánægð(ur) ○
Mjög óánægð(ur) ○

19. Er leiðsögumaðurinn þinn bísettur á Austurlandi?

Já ○
Nei ○
Veit ekki ○

20. Fórst þú í aðra veiðið samhliða hvændyraveiðiðróðinni?

Já ○
Nei  
20k. Hvad vetdir þú?

Endur  
Grænges  
Heidiargæs  
Mink  
Rjapu  
Skarf  
Svartfugl  
Varg  
Anmað, hvað?  

21. Erit þú sát(st) við nýverandi fyrirkomulag varðandi úthlutan á hreindýraveiðið leyfin?

Já  
Nei / hvers vegna  
Afann

Þú er àð svara skrefi númer 3 af 5.

Afann
prufa 09

Athugðið: Aðeins er hægt àð svara þessari könnun einu sinni

Ábyrgðarmáður þessarar könnunar er hjordis@unak.is

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Já ☑
Nei ᐥ

23. Hvornar var þin síðasta veiðif erð?
Sláðu inn mánuð og ár:

24. Hvort forstu síðast á skorveðinar innanlands?

Svæði 1 - VE ☑
Svæði 2 - VF ☑
Svæði 3 - NV ☑
Svæði 4 - NE ☑
Svæði 5 - AU ☑
Svæði 6 - SU ☑

25. Á hvaða veiðisvæði er algengast að þú veiðir hérlandis?

Algengasta veiðisvæði: 

Næst algengasta veiðisvæði: 

Bráðja algengasta veiðisvæði: 

26. Hvokta tegund er algengast að þú veiðir? Vinsamlegast fergangsnavíð efir tegundum
26b. Hvað annað eftir þú vantar vón að veiða?

27. Vinsamlegast áætlaðu eftir þessu getu hversu miklýri þú eyðir að meðalslí i eftirfarandi þatti á hverju þeiklarveitumabili (þreindyndaveitufjördum er ekki talin með hér inni)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5</td>
<td>5.00</td>
<td>0</td>
<td>10.00</td>
<td>-</td>
<td>15.001</td>
<td>15.000</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>15.000</td>
<td>20.000</td>
<td>30.000</td>
<td>40.000</td>
</tr>
<tr>
<td>50.001</td>
<td>50.000</td>
<td>75.001</td>
<td>100.001</td>
<td>100.000</td>
<td>150.000</td>
<td>0</td>
</tr>
</tbody>
</table>

Meint en kr.

<table>
<thead>
<tr>
<th>kr.</th>
<th>kr.</th>
<th>kr.</th>
<th>kr.</th>
<th>kr.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Matur, drykkir, veitingur

Gistikostnæður

Flugfær/rútufær

Bensín/dísel

Leigdó tekki (s.s. bili, veitígrætur.)

Leigu á landi til gæsaveiða

Veïðleyfi

Leiðsögn

Veïðbúnað
<table>
<thead>
<tr>
<th>Fatnað</th>
<th>% á heimaslíðum</th>
<th>% á ferðinni</th>
<th>% á ãfangastað</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gjafavóru, minjargripi, tengdum veiðiferðum</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sjúkranstað, sjúkröggn (s.s. plástr, umbúðir.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Afþreyingu (s.s. heitan pott, sund, fuglaskoðun, nattúraskoðun.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leiga á landi til þúpnaveiða</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

28. Viðsamegast sundurhliðaðu eftir bestu getu hlutfall kostnaðar sem verður til í heimabýggð, a ferðinni eða á ãfangastað.

<table>
<thead>
<tr>
<th>% á heimaslíðum</th>
<th>% á ferðinni</th>
<th>% á ãfangastað</th>
</tr>
</thead>
<tbody>
<tr>
<td>Matur, drykkur, veiðingar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gistikostnaður</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flugfar/riðufar</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bensín/disel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leigða tæki (s.s. bil, veiðigræfur...)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leiga á túsni</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Veidileyfi</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leiðsöggn</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Veidibúnað</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gjafavara, minjargripir frá svæðinu</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sjúknkostnaður, sjúkröggn (s.s. plástr, umbúðir.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Afþreyingu (s.s. heitur pottur, sund, fuglaskoðun, sofín...)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
29. Hverjar af efírtókum fjólskyldum ældimmum snanda skotveðar auk þín? Vinsamlegast merkið við alla sen við á
Maki □
Somur □
Dúttir □
Fúðir □
Moðir □
Enginn □
30. Með hverjum ferð þú helst til skotveða? Vinsamlegast veljið þrjá algengastu ferðafélagið

Algengast

Næst algengast

Þríðja algengast

31. Hver er algengasta lengd veiðiferðar? Vinsamlegast forgangsráðið

Algengast

Næst algengast

Þríðja algengast

32. Ef þú lengsar um skotveðarferðar þína, hversu oft nýttir þú þær efþarfarið þessi?

Veitir á aðrir efnir
Leyfi til að veitir á heimilandi
Leigu á landi til gæsaverða
Ný frúa
Leifsöyn
Gistingu
Veitingar
Bát
Aðstöðu fyrir veiðibúnað
Heita potta

Allt af Mjó og oft Stundum Spaldan Aldrei
Fuglaskoðun

Nattúraskoðun

Leiga á landi til rjúpnaveiða
32b. Aðrir þaðir en takdir eru upp hér að ofan.
Hvadá aðrir þaðir?


<table>
<thead>
<tr>
<th>Algengast</th>
<th>Bændagisfling</th>
<th>Bændagisfling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Næst algengast</td>
<td>Bændagisfling</td>
<td>Bændagisfling</td>
</tr>
<tr>
<td>Þriðja algengast</td>
<td>Bændagisfling</td>
<td>Bændagisfling</td>
</tr>
</tbody>
</table>

33b. Ég nota annan gístimoguleika en talid er upp hér fyrrir framan
Hvóða gístimoguleika?

34. Notfærir þá þér að skreppa í skotveiði þegar þá átt leið um landið að veiditumabli i óðrun algengs?

<table>
<thead>
<tr>
<th>Allt af</th>
<th>Mjög oft</th>
<th>Oft</th>
<th>Stundum</th>
<th>Sjaldan/aldrei</th>
</tr>
</thead>
</table>
25. Hefur þá farði á skorveðar erlendis?
   Íf þú hefur ekki farði á skorveðar erlendis getur þú skipti næstu spurningum og farði í næsta hlutf.

   Já ☐
   Nei ☐

35b. Til hvada landa hefur þá farði á skorveðar

35c. Hvort fórst síðast?

35d. Hvenær fórstu síðast?
   Vinsamlegast tilgreindu mánuð og är

35e. Hvað veiddir þú?

35f. Hversu lón vor veidífröð?
   Vinsamlegast tilæknu dagafjölda dvalar

35g. Var leðrógsmadur med í frø?

   Já ☐
Nei

35h. Hvað greiddir þu mikla fyrir veitíforðina í heild sinni? (f. m. n. flug, gesting, veitíforð, leiðsögur, ...)

Vinsamlegast sláðu inn upphæð í íslenskum krónum

Þú er t að svara skrefi númer 4 af 5.

Senda númer
praða 09

North Hunt

Athugðið: Adeins er hægt að svara þessari könnun einu sinni

Ábyrgskarmaður þessarar könnunar er hjordis@unak.is

Almennar upplýsingar
36. Í hvaða átvinnumgrein starfar þú?

37. Hver er menntun þín?

Grundskóla- eða gagnfræðapröf
Pröf í íþingrein
Studentspröf
Háskólapróf

38. Hverjar eru heildarvegur þinam og fjölskyldumnar fyrir skatta?
(teljö bara upp kaunatækjur, lfyrir, námskán og atvinnuveysætun en ekki barnabætur od hrar felagslegar bætur)

Heildartækjur minar fyrir skatta eru á mánuði kr.:  

Heildartækjur fjórskylendum fyrir skatta eru á mánuði kr.:  


Jönsa svört.