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The economic impact of hunting reindeer in East Iceland

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The purpose of the research

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 (Karl Benediktsson, Magnfríður Júlíusdóttir, & Anna 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 Data on hunting statistics are fragmented and, in many cases, outdated (Sigríður Jóhannesdóttir, Eiríkur Blöndal, & Árni Snæbjörnsson, 2006).

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.

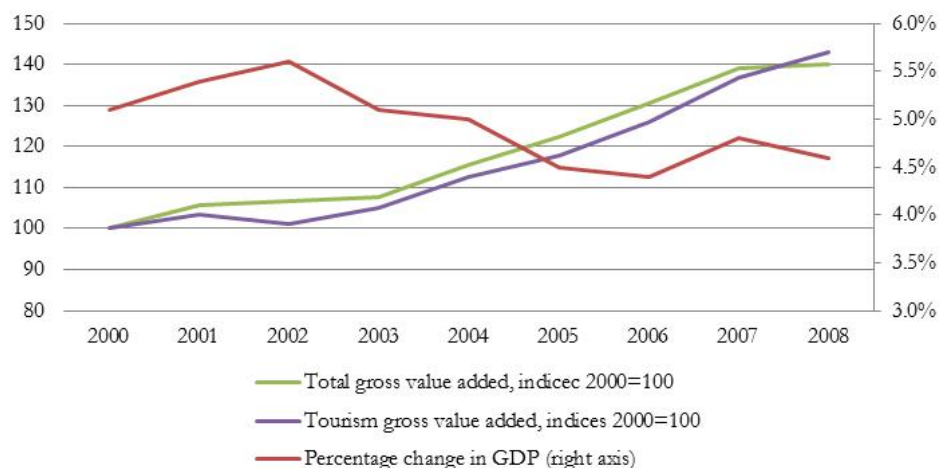


Figure 1. Value added and Tourism industry's share in GDP. Ref. Statistics Iceland

During the period 2000-2008 the share of tourism in GDP was 4.3% to 5.7% as may be gathered from Figure 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).

The purpose of this paper 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.

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 Department of Natural Resources (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. 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.

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).

The questionnaire

The analysis this research is based on 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 paper. 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 method

The question, the author was faced with was: Which method should be used to evaluate the generated data? The author read several articles, both domestic and foreign. The literature reviewed that different methods were used to analyse the data received in each one of them. Table 1 reveals the main findings.

Table 1. The main findings.

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

According to Karlsson (Vífill Karlsson, 2007) and Knútsdóttir (Sigríður Theodóra Knútsdóttir, 2004), the Keynesian multipliers are useful to estimate the multiplier effects in rural Iceland. According to Sinclair and Sutcliffe (Sinclair & Sutcliffe, 1982), Bleaney et al. (Bleaney, Binks, Greenaway, Reed, & Whynes, 1992) the Keynesian multipliers are useful to estimate the multiplier effects and the expenditure of tourists, evaluation of income/expenditure flows and income multiplier. According to McNicoll (McNicoll, 1981), Armstrong and Taylor (Armstrong & Taylor, 1993) and Heiðarsson (Jón Þorvaldur Heiðarsson, 2005), 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.

What does a University add to its local economy?

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).

In a paper named: What does a University add to its local economy, by Bleaney et al. 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.

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.

Their findings yielded 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 = $[1 - w_c(1 - t)(1 - i) - 1] = 1.059$.¹

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 et al., 1992).

¹ See appendix 1 for abbreviation and interpretation.

Results of the survey

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

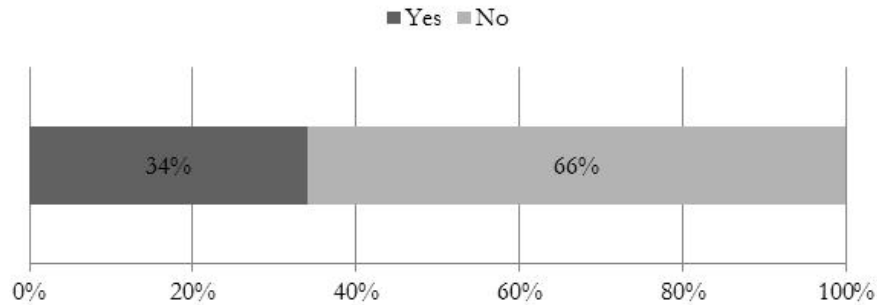


Figure 2. Did you go hunting for reindeer in 2009?

Figure 2 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. The hunters were asked to estimate how much they spent on the hunting trip in total.

Table 2. Please estimate truthfully how much you spent in relation for your hunting expedition

	Mean	St. Dev.	N
Food, beverages, catering	15443	15282	175
Accommodation	8908	12006	158
Fuel / gasoline	23229	17790	168
Transport by air / bus	5336	15524	119
Rented equipment (Car, All-Terrain Vehides)	8564	17056	141
Hunting licence	67444	32006	177
Hunting equipment	34906	47925	160
Clothing	17101	28350	144
Guidance	23772	16559	169
Souvenirs	1752	8086	137
First aid kit	907	3168	135
Recreation(hot pot, swimming, nature watching)	2247	5049	148
Other	7887	11670	142
Total	217,497		

Table 2 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. Table 2 shows that 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 3. Please estimate truthfully how much was spent proportionally at the final destination

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

Table 3 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 (EI) 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%² of the fees for hunting licences remain in the hunting area and this rate is used in the calculations. 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.

Premises

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. Table 4 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 4. Average direct tax rates

Calculation of average direct tax rates		
Deduction	% of salary/wages	
	Locals t	Non locals t*
Employers' pension contribution	8	8
Employers' pension extra contribution	4	4
Employees' pension contribution	4	4
Employees' pension extra contribution	2	2
Assurance fee	7	7
Trade Union, employers' contribution	1.25	1.25
Trade Union, employees' contribution	1	1
Income tax	27	27
Local tax		13
Total sum	54.25	67.25

Table 4 is similar to Table 2 in the article by Bleaney et al, (p. 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 4 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 4. Table 5 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” (Sigríður Theodóra Knútsdóttir, 2004, p. 30); w , the proportion of income of guides spent locally, is obtained from the report “Samfélagsáhrif álvers- og virkjanaframkvæmda á Austurlandi” (Jón Þorvaldur 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 . According to the survey 12% of the guides were non-locals.

Table 5. Parameters and model considering average salaries and total expenses

Premises		
i	0.1978	Indirect taxes
t	0.5425	Taxes
t*	0.6725	Taxes, immigrants
h	0.8000	Proportion of goods/service bought locally by guides
v	0.4832	Proportion of goods/service spent locally by hunters
c	0.7300	Marginal propensity to consume
w	0.6600	Proportion of income of guides spent locally
Model		
L	49,155	Salaries, guides
W		Wages, guides
G	9,831	Goods and service bought non-locally by guides
A	0	Additional labour force bought by the guides
M	5,899	Salaries, guides (non - local)
Z	85,865	Total expenses of the hunters spent locally
E	58,986	L + G

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.

Calculations of the multipliers

The calculations in this chapter are based on same method as Bleaney at al use in the article *What does a University add to its local economy*.

Table 6 shows the equations used in the calculations, the abbreviations and interpretations can be seen in Appendix 1.

Table 6. Equations used in the calculations

Formulas	Equations
$Y1=L+A+hG$	1
$D1=(1-t)(Y1-M-hiG)$	2
$Y2=vZ+wD1+w(1-t^*)M$	3
$D2=(1-t)(1-i)Y2$	4
$Y3=w(1-t)(1-i)Y2$	5
$D3=w(1-t)(1-i)D2$	6
$Y4=w(1-t)(1-i)Y3$	7
$D4=w(1-t)(1-i)D3$	8
$Y5=w(1-t)(1-i)Y4$	9
$D5=w(1-t)(1-i)D4$	10
$Y6=w(1-t)(1-i)Y5$	11
$D6=w(1-t)(1-i)D5$	12

Table 7 reveals the calculations of Gross output Y, Disposable income D, and the multipliers. The amounts are in ISK.

Table 7. Calculations of Y, D and Base multiplier

	<i>Y</i>	<i>D</i>
1	57.020 kr.	22.676 kr.
2	53.349 kr.	19.579 kr.
3	9.433 kr.	3.462 kr.
4	1.668 kr.	612 kr.
5	295 kr.	108 kr.
6	52 kr.	19 kr.
7	0 kr.	0 kr.
f	121.818 kr.	46.457 kr.
Multipliers	2,136	2,049
	<i>Yf/E</i>	<i>Df/E</i>
Base multiplier	2,0652	0,788

$$Y1 = 49,155 + 0 + 0.8*9,831 = 57,020 \text{ ISK.} \quad (1)$$

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 D1, the migrants' incomes M have to be subtracted and rates of direct and indirect taxes applied.

$$D1 = (1 - 0.5425)*(57,020 - 5,899 - 0.8*0.1978*9,831) = 22,676 \text{ ISK} \quad (2)$$

Neither Equation (1) nor (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 (3), would be (at market prices)

$$Y2 = 53,349 \text{ ISK.}$$

Next, the impact on local residents' disposable income, given by Equation (4), is

$$D2 = 19,579 \text{ ISK.}$$

The third round expenditure is given by Equations (5) and (6)

$$Y3 = 9,433 \text{ ISK and } D3 = 3,462 \text{ ISK.}$$

The process is assumed to converge to final increments to gross output and disposable income of $Yf = 121,818 \text{ ISK}$ and $Df = 46,457 \text{ ISK}$ respectively.

$$\text{Keynesian multiplier for gross output} = Yf / Y1 = 121,818 / 57,020$$

$$Yf = 2.136$$

$$\text{Keynesian multiplier for disposable income} = Df / D1 = 46,457 / 22,676$$

$$Df = 2.049$$

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 Sinclair and Sutcliffe found in their article Keynesian income multipliers with first and second round effects: An application to tourist expenditure (Sinclair & Sutcliffe, 1982) and it indicates 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), therefore, the impacts of the hunt on GAP are 0.4% and 0.2% respectively.

The lower confidence level

Table 8. Lower confidence level

Model		
L	42.618	Salaries, guides
W		Wages, guides
G	8.524	Goods and service bought by guides
A	0	Additional labour force bought by the guides
M	5.114	Salaries, guides (non - local)
Z	70.242	Total expenses of the hunters spent locally
	<i>Y</i>	<i>D</i>
Multipliers	2,086	2,168
	Y_f/E	D_f/E
Base multiplier	1,468	0,607

Table 8 reveals the multipliers; the parameters L and M, are the lower 95% confidence level. The multipliers $Y_f / Y_1 = 2.086$ and $D_f / D_1 = 2.168$. 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.

The upper confidence level

Table 9. Upper confidence level

Model		
L	55.692	Salaries, guides
W		Wages, guides
G	11.138	Goods and service bought locally by guides
A	0	Additional labour force bought by the guides
M	6.683	Salaries, guides (non - local)
Z	101.488	Total expenses of the hunters spent locally
	<i>Y</i>	<i>D</i>
Multipliers	2,175	2,084
	Y_f/E	D_f/E
Base multiplier	1,384	0,528

The multipliers, and the parameters L and M, are the upper 95% confidence level (Table 9). The multipliers $Y_f / Y_1 = 2.175$ and $D_f / D_1 = 2.084$. 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).

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 fyrstu töflunni

Conclusion

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 ($70,000 \times 1,333$) 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.

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 the hunting area.

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 calculations of the numbers of direct and indirect jobs are not shown in this paper.

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Appendix

Abbreviation	Interpretation
Lcr	Labour cost ratio
GS	Goods and service
Lc	Labour cost
Elcr	Estimated labour cost ratio
Dp	Direct payment
Dpr	Direct payment ratio
T	Total spending by reindeer hunters
C	Cost in form of goods and services
D _m	Delivered money
t	Tax
X	Salary total
Y	Net income
A	Labour
a	Proportion of hunters paying for each factor
b	Average spending
c	Estimated labour cost