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Hedmark and Dalarna Cross Border Region

The Cross Border Region;
Definitions and Economic and Innovation Profile

Katrine Gløtvold-Solbu & Morten Ørbeck

Notat

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Referat: The paper addresses the cross border region between Hedmark County, Norway, and Dalarna County, Sweden. Economic specialization is discussed. An overview of important socio-economic trends and challenges, major threats and opportunities for economic developments are given. Key innovation indicators are presented and innovation actors described. Finally numbers for cross-border interaction, viz. migration, commuting, traffic, trade and second homes, are presented.

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PREFACE

The border region between the counties of Hedmark, Norway and Dalarna, Sweden is one of several border regions in an OECD project on cross-border regional innovation policy. This project prepares, by 21st December, a background description and discussion, including:

- Part 1. Definition of the cross-border region, its economic and innovation profile
- Part 2. Current strategies and policies for innovation
- Part 3. Cases of cross-border innovation initiatives and policies

Project Manager Kjell Vaagen has asked the Eastern Norway Researh Institute (ENRI) to assist in preparing Part 1, especially on issues relating to border region Socioeconomic Profile (ch. 1.3) and Innovation Profile (ch. 1.4).

This contribution is reported in this working paper and in a spreadsheet file where data are presented. While the paper refers solely to county level data, the attached data file add local level numbers where this has been provided.

It should be noted that the work of this paper were mainly conducted in November and December 2012 and hence are based on the then available statistics.

Lillehammer/Hamar, 20. December 2012

Svein Erik Hagen
head of research

Morten Ørbeck
project leader

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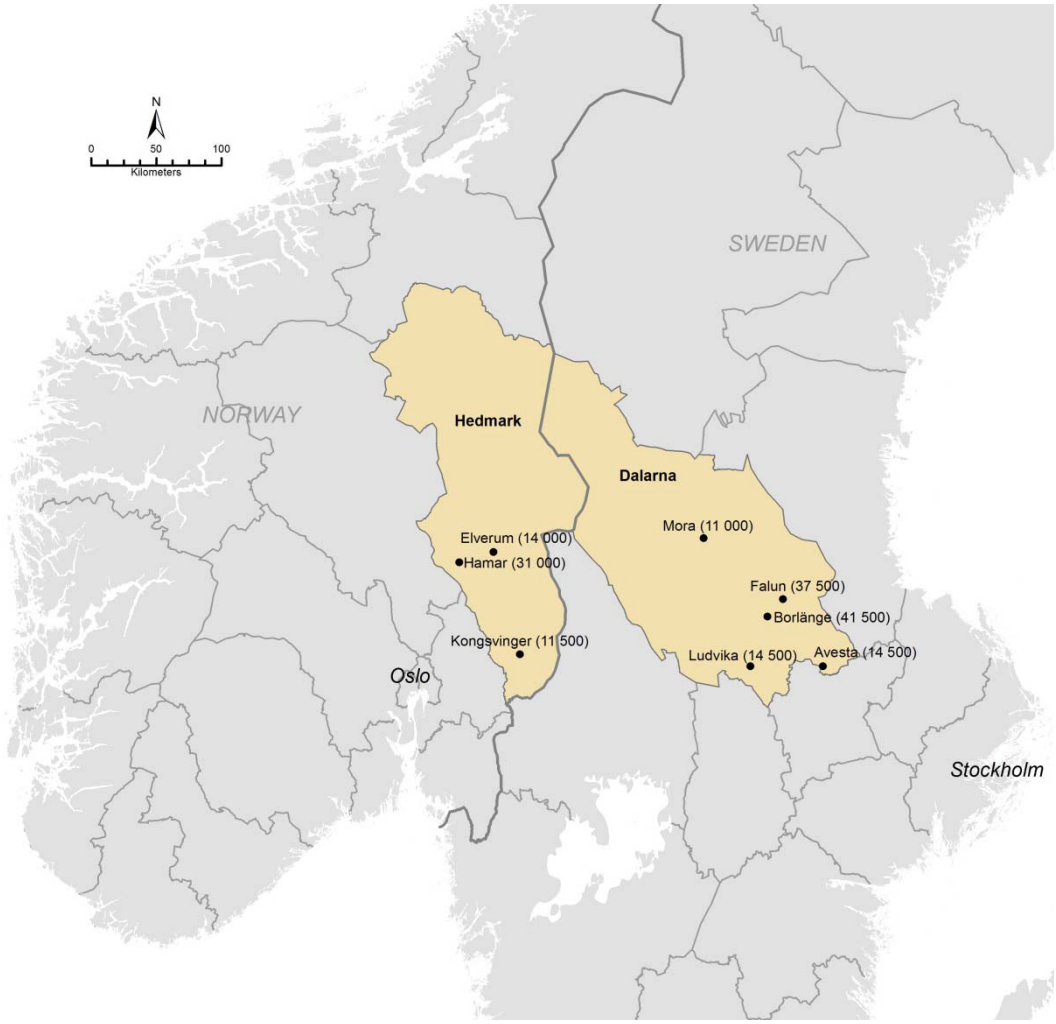
1 SOCIO-ECONOMIC PROFILE

The chapter present key economic indicators for the area. Economic specialization is discussed. An overview of important socio-economic trends and challenges is presented, and major threats and opportunities for economic development in the cross-border area Hedmark and Dalarna.

Figure 1: Map of Hedmark and Dalarna with the largest cities[1]



[1] The numbers of resistents are given for det utrban settlements (and not the municipalities)

1.1 Key economic indicators

The following present key economic indicators for the area:

- Surface,
- Population and population growth,
- Immigration and out migration flows,
- GDP and GDP growth,
- Participation rate and unemployment rates,
- Qualification of population (primary, secondary and tertiary educational attainment)

For relevant variables (population, GDP, etc.) time series of approximately 15 years upstream are available.

1.1.1 Surface

Table 1: Area in sq kilometres

	Land area	Lakes and streams	Total area
Norway	365 246	19 940	385 186
Hedmark	26 084	1 314	27 398
Sweden	410 335	39 960	450 295
Dalarna	28 190	2 208	30 398

Hedmark County covers a total of 27.398 square kilometres, of which 26.084 are land. Of the nineteen counties in Norway, Hedmark is the third largest (after Finnmark and Nordland) and accounts for more than 7 per cent of Norway's land area. The municipality of Rendalen is the largest in the county, with its 3.061 square kilometres. Dalarna County covers a total area of 30.398 square kilometres, of which 28.190 are land. Of Sweden's twenty-one counties Dalarna is the fourth largest (after Jämtland, Västerbotten and Norrbotten) and accounts for nearly 7 per cent of Sweden's land area. The municipality of Älvdalen is, with its 6.917 square kilometers, the largest in the county.

1.1.2 Population and migration

Hedmark county has a population of 192.791 (1. January 2012). Of the 19 counties in Norway, Hedmark is number 11 by population and accounts for nearly 4 per cent of Norway's population. The largest municipality in Hedmark by population is Ringsaker with 33.191.

Dalarna county has a population of 276.565 (1. January 2012). Of the 21 counties in Sweden, Dalarna is number 9 by population and accounts for nearly 3 per cent of Sweden's population. The largest municipality in Dalarna by population is Falun with 56.124.

Over the last fifteen years the population in Hedmark increased nearly 4 per cent and the population in Dalarna was reduced 4 per cent. In both counties the natural population increase was negative. Unlike Dalarna however Hedmark had a significant net migration, particularly since 2007 and mainly due to labour immigration.

Table 2: Population, natural increase and net migration

Population 1 January	Norway	Hedmark	Sweden	Dalarna
1997	4 392 714	186 003	8 844 499	288 171
1998	4 417 599	186 118	8 847 625	285 232
1999	4 445 329	186 321	8 854 322	282 898
2000	4 478 497	187 103	8 861 426	280 575
2001	4 503 436	187 999	8 882 792	278 259
2002	4 524 066	187 965	8 909 128	277 010
2003	4 552 252	188 281	8 940 788	276 636
2004	4 577 457	188 326	8 975 670	276 520
2005	4 606 363	188 376	9 011 392	276 042
2006	4 640 219	188 511	9 047 752	275 755
2007	4 681 134	188 692	9 113 257	275 711
2008	4 737 171	189 289	9 182 927	275 618
2009	4 799 252	190 071	9 256 347	275 867
2010	4 858 199	190 709	9 340 682	276 454
2011	4 920 305	191 622	9 415 570	277 047
2012	4 985 870	192 791	9 482 855	276 565
Population increase	593 156	6 788	638 356	-11 606
Population increase	13,5 %	3,6 %	7,2 %	-4,0 %
Natural popu.increase	5,4 %	-3,1 %	1,4 %	-3,8 %
Net migration	8,1 %	6,8 %	5,8 %	-0,2 %

1.1.3 GDP and GDP growth

The gross product for Hedmark in 2009 was 49 billion NOK. This accounted for nearly 3 per cent of the Gross domestic product for mainland Norway (excl. petroleum activities and ocean transport) in basic values. There has been a 90 per cent increase since 1997.

Dalarna's gross product in 2009 was 80 billion SEK and accounted for 2,6 per cent of the Gross domestic product for Sweden. There has been a 42 per cent increase since 1997.

Table 3: Gross domestic product 1997-2009

	Norway	Hedmark	Sweden	Dalarna
1997	796 778	25 500	1 932 988	56 205
1998	867 279	27 534	2 025 024	56 944
1999	912 167	28 333	2 138 421	58 873
2000	976 516	30 907	2 265 447	62 919
2001	1 044 997	33 838	2 348 419	64 773
2002	1 081 588	34 753	2 443 630	66 824
2003	1 132 339	37 831	2 544 867	70 718
2004	1 202 999	39 962	2 660 957	74 490
2005	1 285 910	41 394	2 769 375	78 120
2006	1 395 969	42 501	2 944 480	82 358
2007	1 516 175	44 040	3 126 018	86 716
2008	1 669 207	48 150	3 204 320	87 296
2009	1 685 321	48 654	3 105 790	79 642
Increase	888 543	23 154	1 172 802	23 437
Increase	111,5 %	90,8 %	60,7 %	41,7 %

1.1.4 Participation rate

The following description and the data is obtained from Gløtvold-Solbu & Ørbeck (2012).

The EU2020 target is 75 % of the working population aged 20-64 to be employed. According to Eurostat, the situation in 2010 was 68.6 % in the EU27, 78.7 % in Sweden and 79.6 % in Norway.

Short Description: The employment rate is calculated by dividing the number of persons aged 20 to 64 in employment by the total population of the same age group. The indicator is based on the EU Labour Force Survey. The survey covers the entire population living in private households and excludes those in collective households such as boarding houses, halls of residence and hospitals. Employed population consists of those persons who during the reference week did any work for pay or profit for at least one hour, or were not working but had jobs from which they were temporarily absent.

The definition of the participation rate in SSBs Labour force surveys and SCBs Labour force surveys is almost the same at the definition of employment in EU2020. This is a wider definition of employment than in the register based statistics, which means that the employment rate Eurostat operates with will be higher than that the statistics published on a county or municipal level. We have used the register based statistics to get employment rate by the appropriate age division and county level.

The employment rate in both Hedmark and Dalarna has already meet EUs targets for 2020 of an employment rate of at least 75%.

The employment rate of Dalarna is to some extent affected by the fact that the commuters from Dalarna to Norway are not taken into account in the national employment rate

statistics. The cross border commuters are counted in the population statistics as citizens in the age group 20-64 years, but not in the Swedish register based labour market statistics. Knowing that in 2009 1.339 inhabitants from Dalarna commuted to Norway, of which 1.280 were 20-64 years of age, indicate that the employment rate in Dalarna is supposed to be 0,8 per cent higher than in the table, i.e. 78,0 per cent. Also on a national level in Sweden, the employment rate would be 0,8 per cent higher than in the table below, i.e. 76.9, when we take into account the total of 28.141 commuters from Sweden to Norway, of which 26.605 at the age 20-64, and also the 20.189 commuters to Denmark, of which 19.767 at the age 20-64.

Table 4: Employment rate in Norway and Sweden, 2010

	Employed residents (20-64)	Population (20-64 years)	Employment rate
Hedmark	84 083	110 420	76,1%
Norway	2 298 142	2 932 729	78,4%
Dalarna	120 018	155 498	77,2%
Sweden	4 172 565	5 494 760	75,9%

Source: SSB and SCB. Edited by ENRI

This statistics are available on a municipal level on both sides of the border, except on a municipal level on the Norwegian side of the border were age group is 20-66 instead of 20-64 years. At the time beeing we only use statistics on a county level.

1.1.5 Unemployment rates

The unemployment is higher in Sweden than in Norway, on average 5 per cent. The unemployment rate in Sweden and also in Dalarna County has over all been falling in period of 15 years from 1997 to present day. The unemployment rate in Dalarna is higher than in Sweden, but the rates evolve in the same manner. The unemployment rate in Norway and Hedmark is almost identical. The trend in the unemployment is slightly declining in the period 2005-2011.

Table 5: Unemployment rate in Norway 2005-2011 and Sweden 1997-2011

	Norway	Hedmark	Sweden	Dalarna
1997			11,2 %	12,2 %
1998			9,8 %	10,9 %
1999			9,9 %	11,2 %
2000			7,9 %	9,4 %
2001			8,0 %	9,3 %
2002			8,0 %	9,2 %
2003			9,0 %	10,1 %
2004			8,8 %	9,9 %
2005	3,5 %	3,2 %	8,8 %	9,6 %
2006	2,6 %	2,7 %	7,9 %	8,7 %
2007	1,9 %	2,0 %	6,5 %	7,4 %
2008	1,7 %	1,8 %	5,9 %	6,5 %
2009	2,7 %	2,8 %	7,3 %	7,3 %
2010	2,9 %	2,8 %	7,7 %	7,9 %
2011	2,7 %	2,7 %	7,3 %	7,5 %

Source: SSB and SCB. Edited by ENRI

1.1.6 Qualification of population

The qualification of the population (age 16-66 years old) is divided into three levels of education. Primary and lower secondary educations means you have completed ISCED level 2, upper secondary education means you have completed ISCED level 3 and tertiary level education means you have completed ISCED level 5 or higher. Please note that the division between primary and secondary education is somewhat different in the two countries' statistics

Table 6: Education level 2011

	Primary and lower secondary education	Upper secondary education	Tertiary-level education
Hedmark	32 %	44 %	24 %
Norway	27 %	42 %	32 %
Dalarna	46 %	27 %	28 %
Sweden	39 %	25 %	36 %

Source: SSB and SCB. Edited by ENRI

1.2 Economic specialization

1.2.1 Employment by industry

Primary industries (agriculture and forestry) account for 6 per cent of the jobs in Hedmark compared to 3 per cent in Dalarna. Primary industries are more important for employment in both Hedmark and Dalarna than on a national level, respectively Norway and Sweden (LQ> 1). Manufacturing including mining, etc. accounts for 18 per cent of jobs in Dalarna,

and are overrepresented compared to Sweden as a whole. In Hedmark, the manufacturing industry represents a more modest share of the employment, 9 per cent, and is also underrepresented compare to Norway as a whole (LQ <1). More than half of manufacturing jobs in Hedmark are within the food, lumber and wood industries.

Service industries including building and construction account for 84 per cent of jobs in Hedmark compared to 78 per cent in Dalarna. The majority of the services sector is person-oriented and local market-based, closely linked to population and therefore relatively scattered throughout the two countries, same as the population. These kinds of jobs are increasing and will provide businesses in Hedmark and Dalarna with new opportunities, if they succeed in increasing the population.

Table 7: Employment by industry, 2011 Q4

	Dalarna			Hedmark		
	Numbers	Share	LQ[2]	Numbers	Share	LQ
01-03 Agriculture, forestry, hunting and fishing	4 288	3 %	1,5	5 041	6 %	2,2
05-33 Manufacturing, mining and extr. of oil and gas	22 849	18 %	1,3	8 015	9 %	0,8
35-39 Electricity and water supply	1 351	1 %	1,0	967	1 %	1,0
41-43 Construction	10 369	8 %	1,2	7 125	8 %	1,1
45-47 Wholesale and retail	14 006	11 %	0,9	11 934	14 %	1,0
49-53 Transportation and communication	5 256	4 %	0,8	3 424	4 %	0,7
55-56 Restaurants and hotels	4 053	3 %	1,0	1 996	2 %	0,7
58-63 Information and communication	1 881	1 %	0,4	1 264	1 %	0,4
64-68 Finance and insurance	1 055	1 %	0,4	1 381	2 %	0,8
68-75 Real estate and technical activities	1 865	1 %	0,9	3 296	4 %	0,6
77-82 Business services	9 878	8 %	0,7	3 529	4 %	0,8
84 Public administration and defence,	7 284	6 %	1,0	6 719	8 %	1,3
85 Education	12 187	10 %	0,9	6 828	8 %	1,0
86-88 Health and social services	24 156	19 %	1,2	20 360	24 %	1,2
90-99 Personal services	5 776	5 %	1,0	3 236	4 %	1,0
00 Not specified	1 736	1 %	1,2	429	1 %	1,0
Total	127 990	100 %	1,0	85 544	100 %	1,0

1.2.2 Clusters

In Hedmark there have been several attempts to develop cooperation between companies, researchers and the public sector (triple helix) to develop more dynamic regional clusters. An important contribution in this respect has been participating in cluster development projects within programs like Arena and NCE driven by Innovation Norway in cooperation with the Research Council and the SIVA. It has been developed business networks and it has been applied for or implemented Arena project in industries as wood and wood products, biotechnology and bioenergy.

[2] Location quotient: $LQ = \frac{e_i/e}{E_i/E}$ Where: e_i =Local employment in industry i. e =Total local employment. E_i =National employment in industry i. E = Total national employment. It is assumed that the base year is identical in all of the above variables

Production of wood and wood products

"Trepiloten" was an Arena project dealing with the wood and wood products industry in the Glåmdal region (southern Hedmark) in the period 2003-2005 with "Tretorget" in a leading role. Also the producers of wooden prefabricated buildings, mainly in the Hamar region, made a network and applied the Arena program in 2008 and almost got it. The producers of wood and wood products in Hedmark employ more than 2.000 people, of which 800 in the Glåmdal region and 900 in the Hamar region.

The food industry

"Innlandsmat" is the network of the major food producers around the lake of Mjøsa. The network has been in operation for several years, and applied in 2008 for grants in the Arena project. The application was not awarded grants. The food industry in Hedmark employs more than 2.100 people, of which 1.200 are located in the Hamar region.

Biotechnology

"BioInn" is a network and now a foundation that organized collaboration in applied biotechnology (especially breeding) in Hamar. "BioInn" was an Arena Project supported project in 2003-6, and applied for NCE status in 2006 and 2007. They did not succeed. Arena Heidner is however a new Arena project which was approved in 2012: Arena Heidner has a vision to be the leading specialist in blue-green biotechnology in the region. The industrial cluster has a geographic centre in the Hamar region and consists of 22 companies and research institutions like Hedmark University Colleges, Bioforsk and CIGene. In addition, there are close relations with different universities in Norway. Heidner is a research intensive industrial cluster where both companies and research institutions run a number of research projects with regional, national and international funding.

Bioenergy

Arena Bioenergy Inland was a project that ran from 2008-2011 with a focus on developing the bioenergy field in the region. After the termination of the Arena Bioenergy Inland (ABI) R&D actors like Hedmark university collage and Eastern Research Institute of Norway have taken an active role in cluster development efforts. Rough estimates indicate that the region produce and consume at least 1.6 TWh bioenergy every year, which represents nearly 1.000 jobs and 1 billion NOK in value. In addition there are major net exports of timber and fuel out of the region

1.2.3 Large companies

Foreign ownership is much more common in Dalarna than in Hedmark, when we compare at the largest companies in the two counties.

Tabell 8: 15 larges companies in Hedmark 2012 by annual turnover in 2011

Rating 2012	Company	Annual turnover (1000 NOK)	Industry	Number of employees	Owner-ship
1	Helse Sør-Øst RHF	59 346 330	Health and social services	1 100	Nor
2	Norsk Tipping AS	16 265 500	Personal services	371	Nor
3	Sykehuset Innlandet HF	7 402 616	Health and social services	8 429	Nor
4	Asko Hedmark AS	3 875 264	Wholesale and retail	227	Nor
5	Plantasjen Norge AS	2 214 890	Wholesale and retail	727	GB
6	Nordek AS	1 808 208	Wholesale and retail	19	Nor
7	K A Rasmussen AS	1 660 565	Manufacturing	64	Nor
8	Farveringen AS	1 582 528	Wholesale and retail	108	Nor
9	Terra Forsikring AS	1 472 718	Finance and insurance	125	Nor
10	Eidsiva Marked AS	1 248 217	Electricity and water supply	63	Nor
11	Sparebanken Hedmark	1 247 000	Finance and insurance	518	Nor
12	Strand Unikorn AS	1 227 124	Manufacturing	85	Nor
13	Eidsiva Nett AS	1 133 805	Electricity and water supply	82	Nor
14	Moelven Virke AS	1 002 716	Manufacturing	0	Nor
15	Eidsiva Anlegg AS	763 321	Construction	408	Nor

Source: www.ravninfo.no. Edited by ENRI

Tabell 9: 15 larges companies in Dalarna 2012 by annual turnover in 2011

Rating 2012	Company	Annual turnover (1000 SEK)	Industry	Number of employees	Owner-ship
1	Outokumpu Stainless AB	14 856 000	Manufacturing	2270	Fin
2	Stora Enso Skog AB	8 417 600	Agriculture, forestry, hunting and fishing	543	Foreign
3	Clas Ohlson AB	6 260 000	Wholesale and retail	1305	Swe
4	Stora Enso Kvarnsveden AB	4 957 700	Manufacturing/Electricity and water supply	824	Foreign
5	Stora Enso Fors AB	3 461 300	Manufacturing	686	Foreign
6	Ovako Bar AB	2 662 148	Manufacturing	638	Foreign
7	Bergvik Skog AB	2 568 000	Agriculture, forestry, hunting and fishing	22	Swe
8	Stora Enso Timber AB	2 220 625	Manufacturing	428	Foreign
9	Dala Kraft AB	1 875 195	Electricity and water suppply	44	Swe
10	Maserfrakt AB	1 754 351	Transportation and communication/ Real estate and technical activities	18	Swe
11	Arctic Paper Grycksbo AB	1 736 727	Manufacturing	445	Foreign
12	Ski Star AB	1 574 177	Restaurants and hotels/ Business services/ Education/Personal services	821	Swe
13	Ejendals AB 1)	1 464 877	Wholesale and retail	120	Swe
14	Bergkvist-Insjön AB	1 281 583	Agriculture, forestry, hunting and fishing/ Manufacturing/ Wholesale and retail	150	Swe
15	Falu Stadshus AB	951 489	Real estate and technical activities	0	Swe

Source. http://www.121.nu/ and http://www.largestcompanies.se/. Edited by ENRI

The manufacturing industry is very important the county of Dalarna. And the company Stora Enso and its subsidiary companies is by far the most important company in the county.

Many of the largest companies in Hedmark are in the wholesale and retail industries, two large hospital corporations are located in the region, and the public owned energy company Eidsiva and its subsidiary companies is also an important industry participant.

Moelven Industrier ASA is Scandinavia's foremost supplier of products and services for the building industry, has 3.500 employees and 8,0 billion NOK operating revenue in 2011 and has its headquarters at Moelv in Hedmark. The group consists however of a number of

independent companies which report separately where they are located. Meanwhile some large food manufacturers in Hedmark are included in companies with headquarters outside the region, mostly in Oslo.

1.3 Overview of important socio-economic trends and challenges

We will here give an overview of some important socio-economic trends and challenges, major threats and opportunities for economic development in Hedmark County

1.3.1 Hedmark - characteristics, challenges and opportunities

Hedmark businesses are diversified with respect to industries and characterized by many small and medium-sized enterprises:

- Lack of strong clusters and locomotive companies in business development
- But also few one-industry towns and vulnerable communities

Hedmark is the most important county in Norway with respect to agriculture and forestry with a well-developed agricultural and forestry based processing industry.

- Not industries with the highest value and highest rates of growth so far
- But the decrease of real prices of food and fibre has turned worldwide
- And there are exciting growth opportunities in Biotechnology and Bioenergy

Hedmark has the oldest population:

- Contributes to birth deficits and low population growth
- Contributes to low employment rate of total population, low education level and low GDP per capita
- But local buying power and production of services are ensured by the central government as long as people live here (Norway is a unitary state with strong government finances and comprehensive retirement savings abroad)
- And population growth is ensured through the positive net migration

Hedmark is an attractive place to live:

- Large parts of the county have net inflow
- There has been commuting based migration from the Oslo region
- Especially since the end of the 1990s, and caused by relocation of the main airport in 1998, road and rail development north of Oslo and more flexible and commuting friendly work methods (internet, home offices, etc.).

People's climate is important for business development:

- More and more jobs in services will have to follow people
- With future labour shortages also other businesses increasingly will need to locate near to where people want to live
- Hamar and Elverum as an example has created more jobs compared to national level, after the migration accelerated in the late 1990s.

Hedmark three major advantage in the future:

- A region in one of the world's richest and best country to live in
- A region in the neighbourhood of Norway's most important growth areas in and around Oslo
- Natural resources an important basis for attractiveness, recreation, tourism and agriculture and forest-based industries

1.3.2 Trends that gives Hedmark new opportunities and challenges

There are four major trends that Norwegian regions will be facing the years to come

- Norway is in the middle of a period with strong population growth. According to Statistics Norway's population projections, based on the intermediate assumptions of future changes in fertility, mortality, immigration and domestic mobility, Hedmark will get 36.000 new residents within year 2040. For comparison, its population remained almost unchanged from 1980 to 2007. The strong population growth in Norway over the past 5 years, and growth projections, are based largely on immigration, primarily European immigration from countries such as Poland, Lithuania, Sweden and Latvia.
- Despite the expected population growth the ratio between pensioners and employed will change. E.g. the ratio between population aged 20-66 years and 67 years or more will be reduced from 4,0 per cent to 2,5 per cent in Hedmark in 2040. In several municipalities, this ratio will become less than 2,0 per cent.
- Many municipalities and communities in Hedmark and Oppland must therefore plan for greater population growth, and everyone should plan for a growing proportion of immigrants in the population and new groups of immigrants, both with respect to integration, house-constructing and school-planning. At the same time the growing share of elderly people represent multiple challenges.
- The Oslo region is expected to grow very fast in the years to come and experts expect housing shortage in the central Oslo region. At the same time there are major on-going and planned investments in road and rail systems that will expand the functional living and working region around Oslo. This will enable new commuting based immigration (people who move out of the Oslo but keep their job there) and population growth in parts of Hedmark, especially in the Hamar, Elverum and Kongsvinger area. This population growth will provide a basis for

new jobs within the service sector, and eventually be able to attract another type of business that seeks recruitment opportunities. But the opportunities will come in all directions around Oslo. The challenge is thus to create an attractiveness that is competitive.

- Norway has a kind of dual economy that represents a challenge for Hedmark. Norwegian coastal areas are undergoing strong growth in association with oil and gas related activities and in marine and maritime sector. This growth, along with oil revenue funded growth in public welfare services, lead to stronger wage and cost inflation and a stronger currency that affects the non-oil related but export oriented businesses in Hedmark.

2 INNOVATION PROFILE

2.1 Key innovation indicators

The background description include key innovation indicators for the area: R&D investments (private, public) as volume and as a per cent of GDP, R&D personnel, patents, other innovation indicators, employment in high and medium high-technology manufacturing and/or knowledge intensive services, etc.

2.1.1 R&D investments

The following description and the data is obtained from Gløtvold-Solbu & Ørbeck (2012), but are updated.

The EU has a target which says that 3 % of GDP should be invested in research and development (R&D). According to Eurostat, the situation is 2,0 % in the EU27, 3,42% in Sweden and 1,71% in Norway. The indicator provided in Eurostat is GERD (Gross domestic expenditure on R&D) as a percentage of GDP. "Research and experimental development (R&D) comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society and the use of this stock of knowledge to devise new applications" (Frascati Manual, 2002 edition, § 63). R&D is an activity where there are significant transfers of resources between units, organisations and sectors and it is important to trace the flow of R&D funds.

The Norwegian R&D statistics on a county level are published by NIFU and Statistics Norway publishes the Regional GDPs.

R&D statistics for the counties in Sweden is divided into R&D for each sector and summarized by us. This may cause double counting because some of the country's own R&D can be registered as the university and college sector R&D expenditure (due to the agreement on Medical Education and Research). But if the error occurs it is only modest because county council and municipalities R&D expenditures in Dalarna is just 14 million, so it's a relatively small percentage compared to the county divided GDP (respectively 0.02%). Expenditure on R & D in the sector of non-governmental organizations are not divided on the different county, but on a national level the expenditures only make up to 84 million SEK.

Table 10: Share of GDP invested in Research and development 2009

	Research and development expenses (mill. kr)	GDP county divided (mill. kr)	R&D as a share of GDP
Hedmark	179	48 654	0,4 %
Norway	41 885	1 687 236	2,5 %
Dalarna	719	86 716	0,8 %
Sweden	111 720	3 105 790	3,6 %

Source: SSB and SCB. Edited by ENRI

The expenses on R&D in Hedmark is only 0,4 % as a share of the county's GDP. In Dalarna's case the R&D activity is about 0,8 % as a share of the county's GDP. The shares spent on R&D are much smaller in Norway than in Sweden.

2.1.2 Research and Innovation activities in the business sector

Table 11: R&A and innovation activities in the business sector in 2010. Regions in Hedmark

	R&D 1000 NOK per employee	Percentage of employees in innovative enterprises
Norway	28,4	32
Hedmark	7,2	25
Kongsvinger region	14,3	26
Hamar region	6,6	23
Elverum region	1,7	24
Tynset region	2,4	34

Similar data is not available in Sweden

2.1.3 Employment in high-technology manufacturing etc.

A more thorough review of the employment in high-technology manufacturing and knowledge intensive services can be found in the ØF-working paper "Indre Skandinavia i et Florida-perspektiv" (2012), where the following are obtained from.

Technology is about the structure of industry in the region and that it has an element of knowledge intensity. To measure the prevalence of knowledge-intensive industries one can use a technopol index. This is according to the OECD standard those who work in industries that are defined as "high" and "high-medium" tech. This applies to both the production of goods and services. By this we do not mean that only these industries depend on knowledge and expertise. In today's economy, on the contrary, this is very important for most industries and businesses. This indicator indicates the formal qualifications in these industries, which is often highlighted as important for the majority of the economy.

Table 12: Industries included in the technopol index

Standard Industrial Classification (SIC2007)	Description
21.1 and 21.2	Manufacture of basic pharmaceutical products and preparations
26	Manufacture of computer, electronic and optical products
30.3	Manufacture of air and spacecraft and related machinery
32.5	Manufacture of medical and dental instruments and supplies
58.2	Software publishing
59	Motion picture, video and television programme production, sound recording and music publishing activities
61	Telecommunications
62	Computer programming; consultancy and related activities
63.1	Data processing, hosting and related activities; web portals
72	Scientific research and development
71	Architectural and engineering activities; technical testing and analysis
95.1	Repair of computers and communication equipment

The per centage of jobs in technology professions in Hedmark is 2,4 % and in Dalarna 2,8 %. In Norway as a whole the percentage is 5,6% and in Sweden 7,3 %.

Table 13: The top 5 municipalities in Dalarna, Sweden

Municipality	Percentage of jobs in the municipality in technology professions	National ranking
2081 Borlänge	4,4 %	64
2080 Falun	4,2 %	71
2026 Gagnef	3,2 %	101
2083 Hedemora	3,0 %	118
2031 Rättvik	2,2 %	150

Table 14: The top 5 municipalities in Hedmark, Norway

Municipality	Percentage of jobs in the municipality in technology professions	National ranking
0427 Elverum	4,1 %	48
0403 Hamar	3,9 %	52
0402 Kongsvinger	3,8 %	54
0441 Os	2,7 %	78
0439 Folldal	2,3 %	104

2.2 Main R&D and innovation actors in Hedmark

In the county of Hedmark it was conducted research for about 207 million NOK in 2010. Research for about 85 million was done by local businesses, 80 million NOK in university

colleges and 42 million at research institutes, including 24 million NOK in health sector (Sykehuset Innlandet). A more thorough review of the different actors will follow.

2.2.1 Hedmark University College

Hedmark University College has about 5.000 students and 500 employees at the four different departments in Hamar, Elverum, Rena og Evenstad. According to R&D statistics 71 R&D man years were conducted at the Hedmark University College

Table 15: Students, employees and scientific publications, University college of Hedmark

	Students		Employees		Publications	
	2008S	2012S	2008	2011	2008	2011
Hedmark University college	**3 892**	**4 881**	**490**	**459**	**91**	**90**
Faculty of Public Health (Elverum)	1 148	1 720	114	106	9	19
Faculty of Education and Natural Sciences (Hamar)	1 551	1 722	186	163	66	43
Faculty of Applied Ecology and Agricultural Sciences Evenstad+Blæstad)	130	265	36	52	7	11
Faculty of Business Administration (Rena)	1 064	1 162	74	57	4	17
Central Administration (Elverum) + Not specified		12	80	81	5	

[1]Number of students in full-time equivalents.

At the Hedmark University College it was a declining number of students from 2003 up until 2009, but since then the number has been increasing. When it comes to R&D activities the development over time shows that:

- Hedmark University College has increased the number of research positions from 23 in 2001 to 71 man years in 2010, ie more than three times double.
- Measured as R&D expenditure, the expenditures at Hedmark University College has increased from 31 million NOK in 2001 to 80 million NOK in 2010.
- Production of publishing points has from 2004 to 2011 increased from 28 to 90 at Hedmark University College.

This increased focus on research at the Hedmark University College must be seen in the context of the Project "Innlandsuniversitetet" (PIU) where the Hedmark University College has worked together with the university colleges in Lillehammer and Gjøvik to establish doctoral programs in the region and thereby qualify for a university status. Although it has not yet been possible to merge the three colleges and thereby seek university status, one has managed to get approved five PhD studies, including two at Hedmark University College. The college has the following master's and PhD's programs and associated research expertise on a professor and associate-level and doctoral candidate's level:

- PhD in applied ecology
    - Master in applied ecology
- PhD in teacher education profession
    - Master SEN

    - Master in culture and language subjects didactics
    - Master in Digital Communication and Culture
- Master in Mental Health
- Master of Public Health
- Master in Public Management and governance
- Master in Applied and commercial biotechnology

The college's research activities are organized into six strategic research areas:

- Applied Ecology (Evenstad)
- Value creation in business and management (Rena)
- Public Health (Elverum)
- Education and Diversity (Hamar)
- An arena for culture and languages (Hamar)
- Biotechnology (Hamar).

The college has also a centre for practice-based educational research (Hamar) which has extensive cooperation with different municipalities and counties in the region.

2.2.2 Eastern Norway Research Institute

Norway has, in an international context, a large institute sector. In 2010 the sector could be accounted for 24 per cent of all R&D done in Norway. After the closure/relocation of Bioforsk's departments in Ringsaker and Tynset, Eastern Norway Research Institute is the only institute left in the institute sector in Hedmark.

Eastern Norway Research Institute AS (ENRI) is owned by Hedmark and Oppland County, Sparebanken Hedmark, the University College of Lillehammer and the Foundation Eastern Norway Research Institute. It shall as a regional research institute, maintain two roles: ENRI shall be a actor in the national and international research system, and need to develop high expertise in selected areas to compete here. In addition ENRI shall be an important and active part in the regional innovation system and provide the region with relevant and useful knowledge and expertise in a wide range of areas and topics. The institute is organized into two research groups respectively Welfare, organization and municipal (VOK) and the Business and Regional Development (RN). ENRI had at the beginning of 2012 a total of 31 employees (23 man-labour years) at the headquarters in Lillehammer and Hamar, including 6 professors, another 8 people that has a PhD and 2 under doctoral education. The activities are interdisciplinary with emphasis on social sciences, ranging from long-term research to research-based advising.

2.2.3 The Inland Hospital (Sykehuset Innlandet)

The Inland Hospital is a health corporation consisting of 10 divisions, including several hospitals that are spread out in the counties of Hedmark and Oppland. In addition, several

spesialized divisions serve the rest of the corporation with its services. In addition to the eight hospitals, there are decentralized services in both psychiatry and general medicine. The administration is in Brumunddal. The Inland Hospital has a dedicated research department organized under Health staff department. The department will stimulate clinical research in Inland Hospital, in cooperation with management in each division. In addition, there are six research advisors in the various divisions and four research supervisors connected to various doctoral fellows.

2.2.4 R&D in business and public sector

Intramural R&D in the business sector in Hedmark in 2010 accounted for 126 million NOK. Most of this is connected to the actors in the biotechnology cluster in the Hamar Region as Graminor AS, Geninova AS, The Innovation Centre of Hedmark AS (Hedmark Kunnskapspark), LabNett AS, BioBank AS, Norsvin, BioKapital, Spermvital AS, Forest Seed (Skogfrøverket) and Geno. And in addition to R&D institutions the Innovation Centre of Hedmark (Hedmark kunnskapspark) has an important role as facilitator of business clusters and in building R&D environment networks

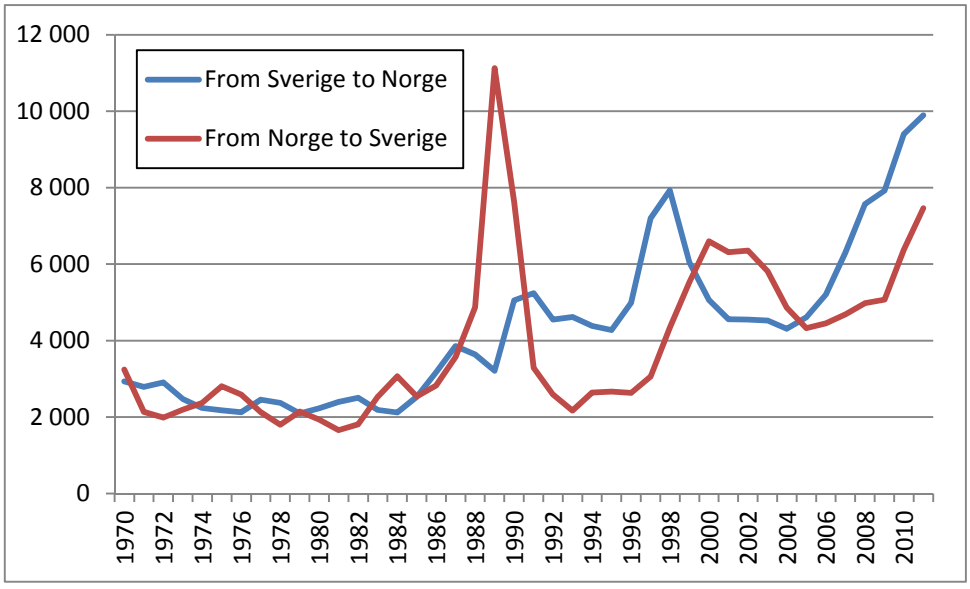
3 CROSS BORDER INTERACTION

We will in this section present some numbers for cross-border interaction, such as migration, commuting, traffic, trade and second homes:

3.1 Migration

In 2011 there were 9.894 (9.397 in 2010) immigrants from Sweden to Norway and 7.457 (6.373 in 2010) from Norway to Sweden. In 2010 there were 240 immigrants from Sweden to Hedmark and 158 from Norway to Dalarna.

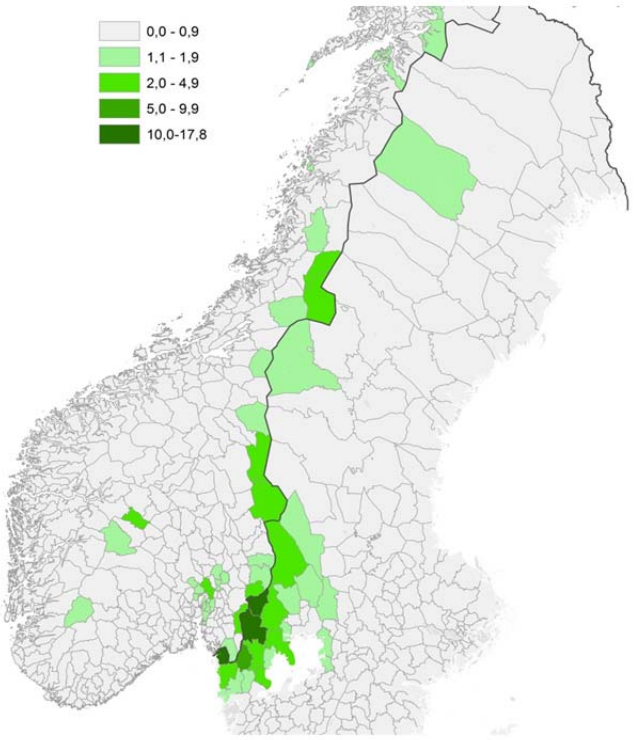
Figure 2: Migration between Norway and Sweden, 1970-2011



The map shows the ratio of Norwegian nationals living in Sweden and Swedish nationals living in Norway. There are now municipalities in Dalarna among the 15 Swedish municipalities with highest rate of Norwegian nationals in their population. But there are three municipalities in Hedmark among the 7 Norwegian municipalities with highest rate of Swedish nationals. Among these Engerdal and Trysil are neighbours to Dalarna.

Figure 3: Per centage of swedes and norwegians i the population 1.1.2011

Se-1730 Eda	1520	17,8 %
Se-1486 Strömstad	1297	11,0 %
Se-1765 Årjäng	1080	11,0 %
Se-1438 Dals-Ed	259	5,5 %
Se-1460 Bengtsfors	389	4,0 %
Se-1435 Tanum	383	3,1 %
Se-1737 Torsby	336	2,7 %
Se-1784 Arvika	616	2,4 %
Se-1785 Säffle	344	2,2 %
Se-1461 Mellerud	203	2,2 %
Se-1430 Munkedal	195	1,9 %
Se-1447 Gullspång	96	1,8 %
Se-2506 Arjeplog	50	1,6 %
Se-1764 Grums	139	1,5 %
Se-1492 Åmål	177	1,4 %
No-0618 Hemsedal	104	4,9 %
No-1738 Lierne	46	3,3 %
No-0121 Rømskog	19	2,8 %
No-1739 Røyrvik	13	2,6 %
No-0434 Engerdal	35	2,5 %
No-0428 Trysil	160	2,4 %
No-0301 Oslo	14193	2,4 %
No-0420 Eidskog	144	2,3 %
No-0119 Marker	71	2,0 %
No-1711 Meråker	45	1,8 %



3.2 Commuting

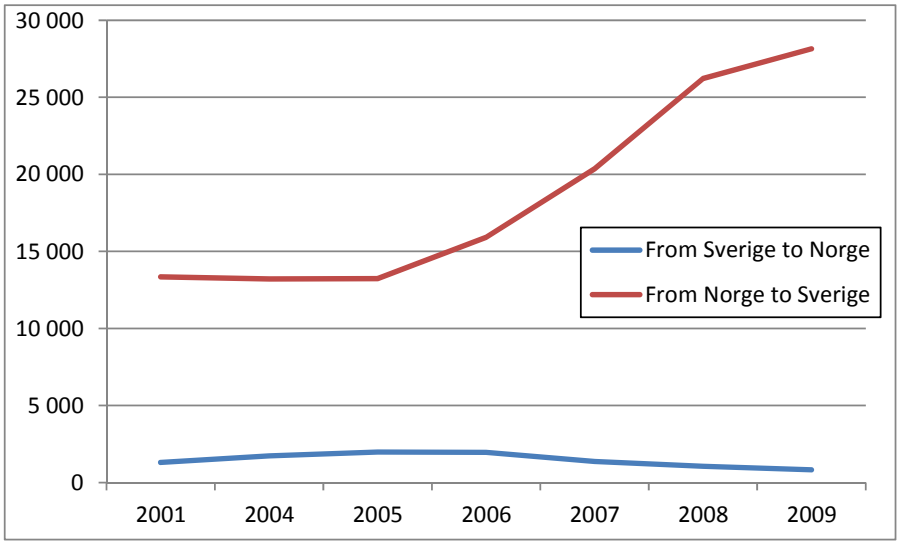
In 2009 there were a total of 28.141 commuters from Sweden to Norway, but only 833 the opposite direction. There were 7 commuters from Hedmark to Dalarna and 162 from Dalarna to Hedmark.

Table 16: Cross border commuting in the Nordic countries in 2009.

Fra/Til	Norway	Sweden	Denmark
Norway	2 493 087	833	Data missing
Sweden	28 141	4 291 088	20 189
Denmark	Data missing	1 129	2 684 946

Source: StatNord

Figure 4: Cross border commuting between Norway and Sweden 2001- 2009.

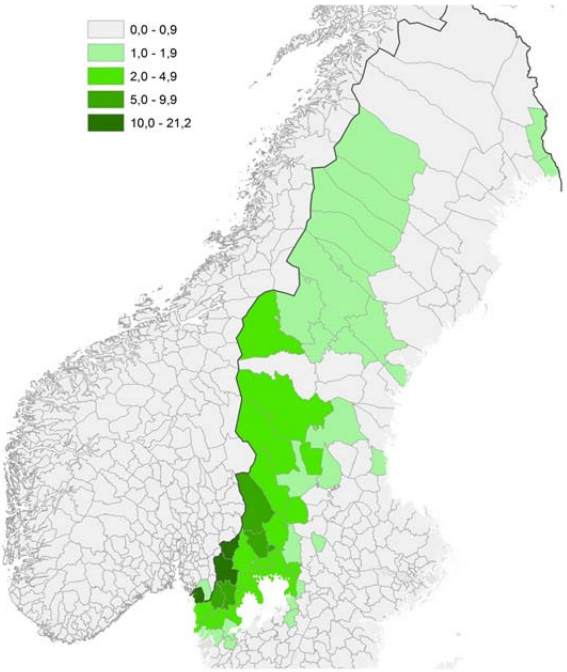


Source: StatNord

The map shows the ratio of commuting to respectively Norway and Sweden as a percentage of the employed population. We can find three municipalities in Dalarna among the 15 Swedish municipalities with highest rate of commuters to Norway; Malung, Älvdalen and Vansbro. There are also three municipalities from Hedmark among the 7 Norwegian municipalities with highest rate of commuters to Sweden, but the numbers are small.

Figure 5: Cross border commuting per cent of employed population by residence 2009

Se-1730 Eda	677	21,2 %
Se-1765 Årjäng	832	21,1 %
Se-1486 Strömstad	790	14,9 %
Se-1737 Torsby	478	9,3 %
Se-1438 Dals-Ed	184	9,0 %
Se-1766 Sunne	312	5,3 %
Se-1460 Bengtsfors	212	5,3 %
Se-1762 Munkfors	74	5,1 %
Se-1784 Arvika	529	4,8 %
Se-1435 Tanum	265	4,7 %
Se-1785 Säffle	287	4,4 %
Se-2023 Malung	203	4,3 %
Se-2039 Älvdalen	136	4,2 %
Se-1430 Munkedal	174	3,9 %
Se-2021 Vansbro	110	3,7 %
No-0101 Halden	206	1,5 %
No-0420 Eidskog	24	0,9 %
No-1711 Meråker	7	0,6 %
No-0119 Marker	10	0,6 %
No-0434 Engerdal	3	0,4 %
No-1738 Lierne	3	0,4 %
No-0428 Trysil	7	0,2 %



3.3 Traffic and trade

There is a major cross border traffic and trade between Norway and Sweden, but none of the most important border crossings are between Hedmark and Dalarna.

Figure 6: Cross border traffic between Norway and Sweden. Average annual daily traffic.

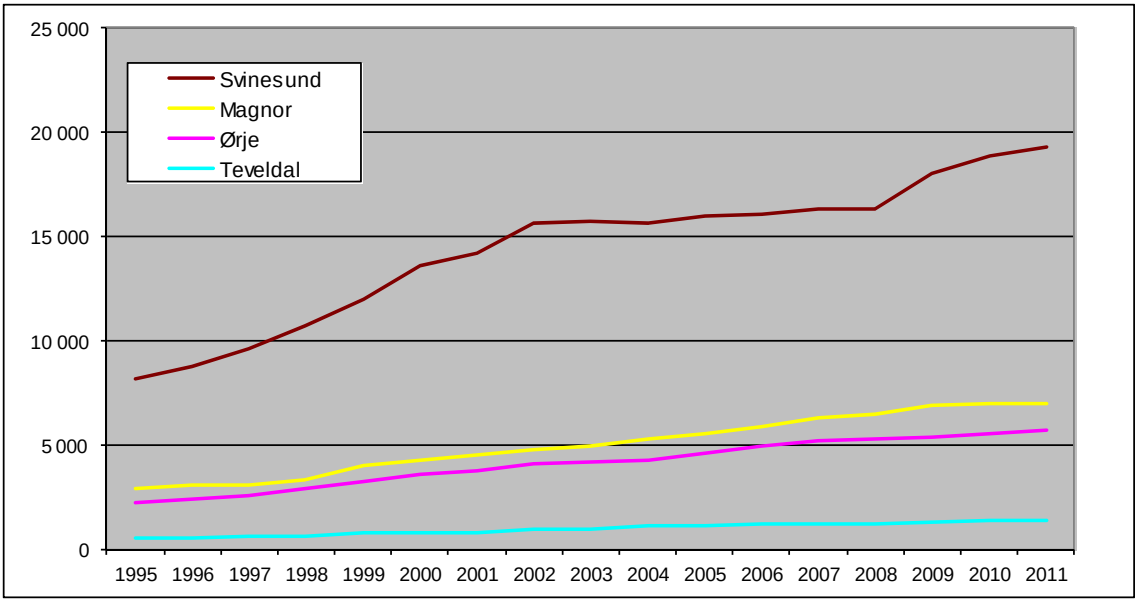
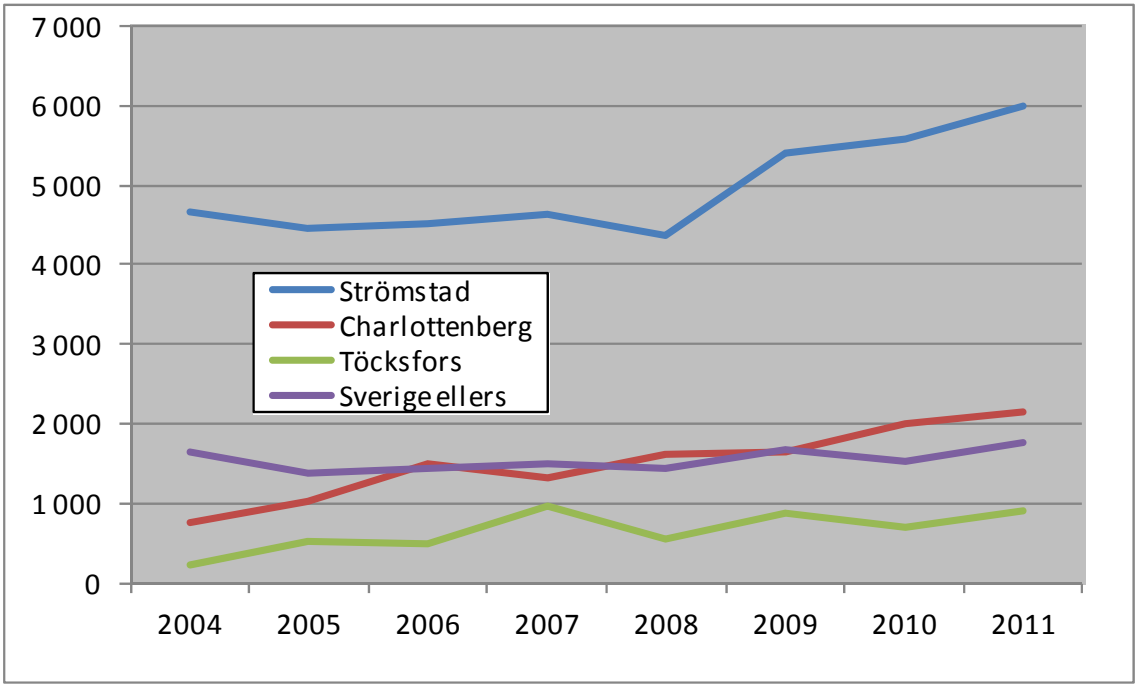


Figure 7: Norwegians trading in Sweden by border crossing. Million NOK per year



3.4 Second homes

A study from 2006 (Inre Skandivanien – en gränsregion under omvandling: Karlstad University Press) showed that a lot of Norwegians have second homes in Sweden, mainly in Värmland County and Västra Götaland Region. Two municipalities in Dalarna, Malung-Sälen and Âlvdalen, were part of the study. In 2004 there were 72 second homes in Malung-Sälen owned by Norwegians and 37in Âlvdalen.

There are not so many Swedes that have second homes in Norway. But a large fraction of Sweeds who have a second home in Norway, have their second home in Hedmark. There was in 2004 440 second homes in Hedmark owned by swedes, of those 327 in Trysil municipality.

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The paper addresses the cross border region between Hedmark County, Norway, and Dalarna County, Sweden. Economic specialization is discussed. An overview of important socio-economic trends and challenges, major threats and opportunities for economic developments are given. Key innovation indicators are presented and innovation actors described. Finally numbers for cross-border interaction, viz. migration, commuting, traffic, trade and second homes, are presented.

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