Jonas Danielsen

Drivers of Interregional Migration

An empirical analysis of domestic migration in Norway in the period 2000-2014

Master's thesis in Economics
Supervisor: Hildegunn E. Stokke
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Norwegian University of Science and Technology
Faculty of Economics and Management
Department of Economics

NTNU
Norwegian University of
Science and Technology

Preface

This thesis marks the end of my economics studies at NTNU, and it is a gratifying feeling that I soon will be an economist. I want to thank professor Hildegunn E. Stokke for her excellent guidance throughout the whole process of this thesis. Her suggestions, comments and feedback have been crucial for the thesis to be finished. I also want to thank the department of economics for a rewarding study period.

I want to thank the lunch club for all the rewarding and entertaining lunch breaks, not only during the period of this thesis, but for making the last 5 years at Dragvoll so enjoyable. A special thanks goes out to the *actual* lunch club, which is an even more rewarding, entertaining and special group of people. You know who you are. I would also like to thank Lana for proofreading the thesis, your input is greatly appreciated. The biggest thank you goes to Mia, for always being there, supporting me and encouraging me, through all ups and downs.

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Jonas Danielsen

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1 Introduction

What factors determine where we move? That is the question I want to explore in this thesis. It is a question that has been on the mind of researchers for a long time. There is no unified theory of why people migrate. Sociologists and economists have very different opinions about why people emigrate, and politicians and policymakers seem to have yet another set of views (Bodvarsson & Van den Berg, 2013). Migration is often considered to be one of the three key demographic processes in the study of populations, along with fertility and mortality. Arguably, migration is the most social process, and the demographic process most associated with choice (Gillespie, 2017).

The economic analysis of migration dates all the way back to Adam Smith (1776), where he observed that there is greater spatial dispersion of wages[1] than there is of commodity prices. Smith suggested that migration has the potential to respond to the spatial disequilibrium in labour markets. Clearly, there are additional reasons as to why people choose to migrate. My objective is to find what drives domestic migration in Norway in the 21st century. There is no clear consensus in the academic economic literature on what is the main driver of domestic migration. One of the most common hypotheses is that amenities[2] matter to a lesser degree in Europe than what is the case in the US, whether this is the case in Norway as well is something i want to explore.

The main problem facing most municipalities and regions in Norway with regards to domestic migration is outward migration. I want to get a better understanding of not only what characterises the regions with most in-migration, but also what characterises the regions that have the most out-migration. Growth in the overall population should be of focus to authorities of all areas, as this can be a solution to raise tax incomes because of more possible tax payers.

[1]Meaning that wages differ both between urban and rural areas, but also internationally between countries.

[2]Amenities can be defined as the pleasantness or attractiveness of an area. Examples of amenity-variables can be the quality of public goods, the presence of natural beauty (coastline, mountains etc.) or the quality of the local cultural supply.

1.1 Problem and main results

This thesis' intention is to analyse which characteristics of the regions in Norway are important in deciding the appeal of each region toward migrants. Are migrants mainly influenced by economic factors, such as the wage level or job opportunities, or are other factors more important? Are the drivers of interregional migration the same in the whole of Norway, or are there distinct features with regards different types of regions such as city-regions?

Specifically, the analysis will be based on collected migration data, regarding domestic migration between 2000-2014. To explain the migration, the analysis will use both economic variables, sociodemographic features and amenities . All variables have been collected for each region and most in the full term 2000-2014. This means that I have a balanced panel data set.

The main results I find is that economic factors seem to be the main clear drivers of domestic migration in Norway, and more specifically, the unemployment rate is the only variable significant in all model formulations. I find many interesting results regarding both socioedemographic factors and amenities when running simple OLS-regressions, but after controlling for time-invariant region fixed effects I find that it is mostly the economic factors that are significant and can be said to be drivers of interregional migration in Norway in the period 2000-2014.

1.2 Structure

The thesis consists of 7 chapters. Chapter 2 introduces a theoretical framework in which migration can be analysed, and reviews earlier literature and empirical studies, both international studies and research from Norway. Chapter 3 explains the classification of the "economic regions" in Norway and presents analysis of the descriptive statistics regarding all included variables. Chapter 4 presents the econometric framework and challenges that may arise, as well as specification of the model used for the empirical analysis. Chapter 5 presents the results obtained from the regressions performed and gives interpretations based on the results. Chapter 6 expands the analysis by performing similar regressions on a different set of regional divisioning, by dividing Norway into 46 regions instead of 89 which is the division in the main analysis. Chapter 7 contains closing remarks and a summary in addition to a discussion on the shortcomings of the thesis and suggestions for future research.

2 Earlier Litterature and Empirical Studies

There has been done substantial research on the reason why we migrate, and what leads to increased or decreased interregional migration. In this chapter I will first outline a theoretical framework based on a locational choice spatial equilibrium approach which provides the theoretical basis for my empirical analysis. Further, I will review earlier empirical studies, both international and studies done in Norway. The focus will be on the results with regards to economic, sociodemographic and amenity variables.

2.1 Theoretical framework

Studies on migration have a long history. Economic analysis of migration can be traced back to Adam Smith (1776). Smith observed that there is greater spatial dispersion of wages, than there is of commodity prices. Smith suggested that this equilibrium in the labour markets can be responded to by migration (Bodvarsson & Van den Berg, 2013). The first known empirical analysis of migration was done by the geographer Ernst Georg Ravenstein (1885). He outlined several generalizations about migration on the basis of data material from European and North American countries. One of the key insights from his paper, which is still a prevailing idea today, is that migration is usually based on economic motives. Ravenstein did however acknowledge that his generalized ”laws” were not all-encompassing as the laws are ”continually being interfered with by human agency” (Ravenstein, 1885).

The neoclassical economic perspective which I will use as a basis for my empirical specification, is based on migration being caused by geographic wage differentials. This does not, however, tell the whole story. People often migrate because of reasons that are not eonomically motivated. Factors such as family connections in certain areas, or a spouse’s personal connection to any given area, are often the main reason why someone choose to migrate to any given location. A good approach to analyse the drivers of migration might be to use surveys to ask migrants why they choose to migrate. One example is the study done by Carlsen (2005), where he analysed a survey consisting of 60 000 respondents. Data unavailability precludes me from doing a similar analysis. I analyse primarily on the basis of macro data with regards to both the dependent variable which is net migration and the explanatory variables.

My goal in this thesis is to find which factors are most important in explaining locational choices by individuals. The following theoretical framework is based on theory first devised by Jennifer Roback (1982). She provided a theoretical model to measure "Quality of Life"-factors[3]. The conventional wisdom before Roback's paper was that housing prices is the only factor affected by amenities. This means that residents living in less desirable regions were compensated by lower housing prices. One problem with this line of reasoning is that interregional differences also affects other economic agents than consumers, such as firms, which in turn also affects consumers. The fundamental requirement in her model is the migration equilibrium. Migration equilibrium means that consumers will be equally well off in all possible locations. If this requirement does not hold, consumers will move to locations offering higher utility. This means that housing prices are either bid up or incomes are being pushed down(Brueckner, 2011).

This theory has later been expandend by many researchers, including Ferguson et al. (2007). They developed a theoretical model which tried to explain individuals' location decisions when various communities are accessible. The central behavioural criterion they set forth was that every individual wants to maximize her/his onw utility. When making a decision whether to move or not, each individual has to weigh both the pecuniary and nonpecuniary benefits of moving versus the associated costs of remaining in their current location. Ferguson et al. (2007) assume that:

1. Individuals maximize utility (U). Expected utility is defined for every possible location i where each individual can migrate (or stay), $i = 1, 2, 3, ...n$

2. Individuals can rank any two locations based on their expected utility, and the preference rankings are transitive.[4]

3. Individuals derive utility from location-specific attributes.[5]

[3]Roback (1982) defines "Quality of Life"-factors as being a sum of multiple economic and amenity-variables such as wages, temperature, crime rates etc.

[4]Meaning that the preference towards each region is continually changing, and the rankings change as well.

[5]In my analysis, I have broadly defined these attributes as either being economic conditions, sociodemographic cirmustances or amenities, and these are all given a set of control variables.

Following Faggian et al. (2011) and Rodríguez-Pose & Ketterer (2012) and their theoretical approaches, I will now model net migration in a similar manner. I do this through household and firm adjustments to spatially varying productivity, and location specific and non-economic factors. This provides the theoretical basis for my empirical analysis.

To analyse the migratory pull of different regions, I model regional net migration as determined by households' and firms' reaction to differences in productivity and non-economic local attributes such as sociodemographic factors and amenities.

Following a neoclassical framework developed by Sjaastad (1962) I assume that conditions with perfect competition is present, perfect labour- and capital mobility, full employment, a homogenous supply of labour, perfect information and transparency, and an absence of transportation costs. Households and firms are thereby assumed to be mobile and their locational preference is solely dependent on utility or profit maximisation across the available areas.

The net present returns between any region j and i that shape the behaviour of companies can be given as:

$$\frac{1}{(1+d)^t}\int_t^{\infty}\Pi_t^j \geq \frac{1}{(1+d)^t}\int_t^{\infty}\Pi_t^i \tag{2.1}$$

Equation 2.1 says that the company's profit, as given by the company's profit function, must be higher in region j at time t for the firm to stay in region j. Π_t^i can be expressed as $\Pi_t^i = \Pi_t^i(w_t^i, l_t^i, R_t^i)$,[6] d represents the discount rate. It is expected that companies maximise both present and expected profits, given by Π across all available locations. Company profits will be dependent on wages, rental costs and exogenous features coming from socioeconomic and natural features. This can be features such as human capital endowments, abundant natural resources etc. Firms decide to locate in areas with higher profits, until the current and expected profits are the same across all regions in the long run. Following this theoretical reasoning the locational choice of companies will play a big role in shaping the economic characterising each individual region (Rodríguez-Pose & Ketterer, 2012).

[6] Profits are negatively correlated with wages(w^i)and land rents(l^i). The impact of exogenous features such as socioeconomic or natural features (R_t^i) is likely to depend on the specifics of the feature and on the firm's activities (Faggian et al., 2011).

Utility specific to each region from an individual's point of view can be portrayed as being dependent on consumption of goods, non-traded housing services and non-economic attributes, hereby referred to as amenities. This can be written as the following net present utility:

$$V^i = \frac{1}{(1+d)^t} \int_t^{\infty} V_t^i(G_t^i, D_t^i, Z_t^i) \tag{2.2}$$

Where G_t^i, D_t^i and Z_t^i refers to the consumption of goods, housing and amenities respectively. Each individual also has a lifetime budget constraint given by:

$$\frac{1}{(1+d)^t} \int_t^{\infty} G_t^i + p_t^i D_t^i \leq \frac{1}{(1+d)^t} \int_t^{\infty} w_t^i e_t^i \tag{2.3}$$

Where p_t^i is house prices, w_t^i is average wages and e_t^i is the probability of being employed in region i.

Equation (2.3) has to be accounted for if the individual wants to move to region i. Region-specific wages and employment opportunities for migrants are likely to be influenced both by territorially embedded socioeconomic features boosting productivity and wages.

Maximising equation (2.2) under the assumption of constrained resources given by equatipon (2.3) will result in:

$$U^n(p^n, Z^n, w^n, e^n, S^n), n : i, j \tag{2.4}$$

The regions indirect utility will be positively related to the presence of amenities, given by Z^n, household income, given by w^n, the likelihood of finding a job e^n, as well as sociodemographic regional features given by S^n. It will be affected negatively by housing costs, given by p^n.

Differentials between the indirect utility between region i and region j ($\Delta U^{ji} = U^j - U^i$) will then trigger migration flows.

Migration flows can further be affected by psychological and pecuniary costs of moving, given by C^{ij}.[7] If $\Delta U^{ji} - C^{ij} > 0$, the individual will move to region j because the utility of moving exceeds the costs. If $\Delta U^{ji} - C^{ij} < 0$ the individual will continue to reside in region i because the costs are greater than the benefits of moving.

[7] C^{ij} is the net present value of the pecuniary and psychological moving costs from region i to region j (Rodríguez-Pose & Ketterer (2012))

By assuming that people "vote with their feet"[8] as given by Ferguson et al. (2007), it is possible to assess a region's attractiveness towards potential migrants by analysing in- and out-flow of economic agents.[9] The population stock in region i at time t_0 is given by (P^i_{t0}) and can be expressed as:

$$P^i_{t0} = P^i_{t1} + M^{ij}_{t1} - M^{ij}_{t1} + d^i_{t1} - b^i_{t1} \tag{2.5}$$

Where P^i_{t1} denotes individuals who did not move between t_0 and t_1, or where $\Delta U^{ij}_t < 0$ or $\Delta U^{ij}_t > 0$ and $C^{ij}_t > |\Delta U^{ij}_t|$. Here, M^{ij}_{t1} refers to the number of migrants moving away from region i to any region j. M^{ij}_{t1} describes the number of movers from any region j to region i. d^i and b^i_{t1} denotes deaths and births occuring between t_0 and t_1.

The total population change in region i occuring in the period t_0 to t_1 can be expressed as:

$$P^i_{t1} - P^i_{t0} = M^{ij}_{t1} + b^i_{t1} - M^{ij}_{t1} - d^i_{t1} \tag{2.6}$$

If I rearrange and standardise (2.2) by the population stock at time t_0 I get the net migration rate of region i, which indicates the utility differential s across different territories. This is given by:

$$netmig^i_{t1} = \frac{(M^{ij}_{t1} - M^{ij}_{t1})}{P^i_{t0}} = \frac{(P^i_{t1} - P^i_{t0} - b^i_{t1} + d^i_{t1})}{P^i_{t0}} \tag{2.7}$$

The net migration rate of a region, similar to what is done by Rodríguez-Pose & Ketterer (2012) can be expressed as the following structural form equation:

$$netmig_{it} = \beta_0 + \beta_1 w_{it} + \beta_2 e_{it} + \beta_3 S_{it} + \beta_4 Z_{it} \tag{2.8}$$

I combine this with the data I have collected, to obtain the following model:

$$netmig_{it} = \beta_0 + \beta_1 E_{it} + S_{it} + A_{it} \tag{2.9}$$

Where E_{it}, S_{it} and A_{it} are region- and time-specific vectors denoting economic, sociodemographic and amenity-type regional attributes. This is used in chapter 4.2.3 as the

[8] Meaning that people express their opinion by leaving or entering a location.

[9] This is similar to what is done by Nakajima & Tabuchi (2011).

theoretical foundation which will be used to obtain the base model in my regression analysis.

The difference between equation 2.8 and 2.9 is that wages and job opportunities are now expressed as a part of the vector E_{it}. Data limitations have prevented me from including housing costs in the empirical implementation of the model, which is found in section 4.2.3 .

2.2 Empirical studies

In this section I will go through empirical studies done on migration, mostly studies that focus on interregional migration. The following subsection is divided on the basis of results obtained regarding economic, sociodemographic and amenity variables. This is the same divisioning that I do in my own empirical analysis.

2.2.1 Economic variables

As outlined in the theoretical framework, it is normally assumed that migration occurs because of economic agents who ”vote with their feet”, and decide upon where to locate based on utility maximations, with regards to multiple factors, including pecuniary considerations.It seems reasonable to expect that economic variables will be important in determining a regions attainment to attract migrants.

A reasonable assumption is that the wage level of a region is a driver of net migration, and a higher wage level is expected to lead to higher in-migration. Rodríguez-Pose & Ketterer (2012) examine which variables affect the appeal of regions in Europe towards migrants, they find solely positive effects of the wealth in each region.[10] Therefore, they conclude that regional wealth acts as a fundamental territorial pull factor for migrants. Additionally they assert that a higher standard of living and potentially higher earnings are important aspects in determining the attractiveness of a given territory. There have been done studies on the importance of wages on migration flows in Norway. Carlsen et

[10]Their variable regarding the wage level is defined as Regional GDP PPS X 1000 (Gross Domestic Product per person in Purchasing Power Standards).

al. (2013) find solely positive effects coming from higher wages. [11]

Employment opportunities should also act as a pull towards in-migration in any region. It is difficult to get a reliable empirical method to test the exact effect of employment opportunities. This is partly because of the ”jobs versus people” problem. It is difficult to pinpoint whether people follow newly created jobs into regions, or whether jobs follow newly arrived migrants. Partridge & Rickman (2003) find that it is slightly more likely that people are following jobs, but that this varies greatly by period and region.

Another approach is to look at unemployment. Unemployment should act as a push effect, as opposed to job oppurtunities, and lead to out-migration for the regions concerned. Carlsen et al. (2007) looked at both unemployment and employment opportunities in regions in Norway from 1988-2004.[12] Their results show that an increase in the regional unemployment level has a negative effect on net migration in each region, while an increase in the regional supply of vacancies increases net migration in each region. By creating interaction terms, they also find that the effect varies during different economic situations. They find that sensitivity regarding the economic situation is greater than the average in the European Union. Another finding is that the unemployment rate has a greater effect in times of prosperity, and that the regional vacancy rates has the biggest effect during economic downturns.

The sectoral composition of the total workforce can be a factor that affects migration between regions. The percentage of the labour force employed in the primary sector can be seen as an indicator of low productivity (Caselli & Coleman II, 2001). As I will discuss more thoroughly in chapter 3 there has been a tendency towards higher rates of urban residence and the population moving away from rural areas with high rates of agricultural employment. Rodríguez-Pose & Ketterer (2012) find that people employed in agriculture negatively influence net migration. Thus, they conclude that having a high percentage of workers in the agricultural sectors makes the region less attractive.

The effect of having a large presence of the secondary sector, explicitly the industry,

[11] They analyse on the basis of the growth rate of regional average earnings. Their motivation is based on this giving more satisfying statistically significant results compared to wage level effects.

[12] Unemployment is defined as regional unemployment as a percentage of the workforce and employment opportunities is defined as the access to vacancies in percentage of the work force at the county level.

mining and oil and gas sector is unclear. Historically, the secondary sector would attract migrants, as this sector earlier was the one with the highest employment opportunities. This was analysed by Ravenstein (1885) when he noted that most migrants coming from a long distance, came because of the presence of industrial jobs. More recent examples exist, such as the migration from England to Scotland in the 1980s because of jobs in the oil industry (Champion et al., 1998).

In Norway there has also been an influx of immigrants because of secondary sector jobs. Napierała & Trevena (2010) discuss how falling employment opportunities in Poland's construction sector, and the contrary situation in Norway have led to an influx of polish migrants to Norway.[13] How the secondary sector possibly affects domestic interregional migration is however unclear. On one hand, it should act as a pull factor for in-migrants because of high paying jobs, especially in regions where a high percentage of jobs are available in the oil and gas sector. If the region has a large presence of other secondary sectors, such as mining or industry, the effect does not seem to be obvious.

2.2.2 Sociodemographic variables

By looking through a neoclassical economic perspective, migration is a consumer driven process. It is underpinned by geographic wage differentials, and this is the solitary reason why people choose to move (Gillespie, 2017). By taking this approach to analysing migration flows, aggregate rates of migration can be predicted by purely measuring economic variables such as income, unemployment etc., as discussed above. Clearly, this is not the whole story of why people choose to migrate.. This is why it may be important to include variables describing sociodemographic factors, as this can explain some of the reasons without economic motivation. Examples of sociodemographic factors can be the age composition of the population, the education level of the population or the population density.

In the period analysed in this thesis, the clear trend is that migration is highest into the regions of Norway that have the highest population density (Kommunal- og moderniseringsdepartmentet, 2016). This means that Norway has experienced a clear trend towards

[13] In fact, employing over 26 000 polish workers in the years 2000-2010, they argue that the difference in income (being three times higher in Norway than Poland) being an important factor.

urbanisation, and that people to a higher degree than before move into cities or urban areas.

The connection between urbanisation and productivity gains leading to higher wages have been studied by many economic researches. An example from Norway is the study done by Carlsen et al. (2016) where they found that cities have higher wages than less populated areas. They found that Oslo and the six other largest labour market regions measured by population had 19 percent and 13 percent higher wages than the remaining regions.[14] The fact that wages are higher in cities is often termed as the urban wage premium, and is believed to arise from talented and educated individuals sorting into cities.

Another explanation is agglomeration economies, meaning that cities promote interactions that increase productivity, through the sharing of inputs, risk and specialisations. Cities can also improve the quality of matches between employers and workers, in addition cities can improve knowledge accumulation. Empirically, the existence of agglomeration economies has been confirmed.[15] The question is whether people migrate to cities because of the population density itself, or if the reasons are one of the indirect effects coming from living in a city, such as the urban wage premium.

Studies, such as Rodríguez-Pose et al. (2015) find no significant influence on regional net migration, and in their study of European regions, they find that agglomeration is not an essential driver of regional migration directly in Europe. Prelimanary regression experiments from Carlsen (2000) who examines regions in Norway also find that population density do not affect net migration.

Education level is another sociodemographic variable that I expect will have an effect on net migration. Carlsen et al. (2013) find that highly educated workers are considerably more mobile than workers with little education. Education level is also believed to be closely related to higher wages and lower unemployment rates. The question is then whether a higher education level in any given region directly affects the net migration rate.

[14] The other six labour market regions are: Bergen, Stavanger/Sandnes, Trondheim, Lillestrøm, Drammen and Bærum/Asker.

[15] See Ciccone & Hall (1996).

The last sociodemographic variable I have decided to focus on, due to the limited scope of this thesis, is the region's share of young people. The motivation is that regions with a higher share of younger citizens are more likely to experience a migration outflow because of lower migration barriers. According to the human capital model[16], the likelihood of migration is decreasing with age, this is reflected in the smaller expected lifetime gain from moving for older people (Zimmermann, 2005).

2.2.3 Amenities

The amenity of any given region can be defined as the pleasantness or attractiveness of the region. Amenities should affect net migration, but as with many variables it is a question whether amenity variables affect net migration directly. Roback (1982) showed both housing prices and wages are affected by amenities. Amenity-variables makes the area concerned more enjoyable to live in. If an area has relatively lower value of amenities, it should be less enjoyable to live in the area.

One variable which is usually thought of as being a negative amenity is the crime rate. Many studies have found that the crime rate negatively affects in-migration. Cebula & Alexander (2006) who studies internal migration in the US over the period 1999-2002 finds that higher crime-rates leads to higher out-migration flows. It is questionable if crime-rates has relevance when analysing internal migration flows in Norway, Carlsen et al. (2013) finds contradictory and insignificant effects of higher crime rates on the migration rate in their study of migration flows. The contradictory results is that they find that a higher crime rate negatively affect migrants with tertiary education, and positively affects migrants with upper secondary education. But, as said, both results are statistically insignificant.

Weather can be a big factor in deciding to migrate into a region. Rappaport (2007) studied regional population growth in regions in the US during the period 1970-2000, and concluded that migration flowed towards regions with the most pleasant climate. Studies from Europe find similar results. Cheshire & Magrini (2006) finds that cities within countries that have better weather systematically tended to gain population in the period

[16] Referring to the analysis of the skills of workers as a form of capital in which workers make a variety of investments during their lifetime(Acemoglu & Autor, 2011).

1980-2000. Carlsen et al. (2007) also find a positive effect from their study of Norwegian regions. They found that a higher average summer temperature had a significant and positive effect on net migration in all their model formulations.

Amenities that are provided by the public authorities should also affect migration in and out of the regions. Carlsen (2005) examines survey data of Norwegian households and finds that municipal services such as cultural services, primary education and health care are important for migration plans.

Natural amenities other than weather can also be important in the decision to migrate. One clear advantage of natural amenities in general, is that they often are completely exogenous from migration. However, there may be some negative effects coming from an increased population. It can deteriorate the local environment, and cause air pollution because of increased traffic. Other variables are not affected by migration. One such variable is if the regions has a coast or not. Rodríguez-Pose & Ketterer (2012) find a positive effect of a region having a coast. This means that migrants seem to appreciate a coastline, and that this may influence positively when deciding whether moving to a region or not.

3 Data Presentation

In this chapter I present the data used for the analysis. The purpose of the data is to analyse which factors lead to migration in and out of regions in Norway. First, I will give an overview of the "economic regions" I use to classify regions in Norway, then I will give a general overview of the historical and current migration situation in Norway. I will present the actual data obtained and present descriptive statistics and give some preliminary hypotheses on how the different variables will affect migration, based on the theory and literature review in chapter 2 and my own considerations.

The data collected is mainly from SSB and NSD.[17] The data collected have different characteristics and consideration, which will be discussed later. Primarily, the data is from the years 2000-2014, and it has been sorted into a balanced panel data set. For a complete and clear overview of all variables, see table 3 at the end of this chapter.

3.1 Regions in Norway

For the purpose of this thesis, I am analysing migration between regions in Norway. The regions this is based on is Statistics Norway's "Classification of Economic Regions" from SSB (2000). The motivation behind this classification is to create a regional division between the levels of county and municipalities. At the time of this publication it was 426 municipalities and 19 counties in Norway (Krossli (2017)). In contemporary Norway these numbers are continuously changing as multiple municipalities and counties have plans to or are enquiring into merging.

The reasoning behind dividing Norway into economic regions is also to get a clearer grouping of areas with a common labour market and trade region, which are meant to represent the true *economic* regions, and is also largely based on commuting flows between municipalities. The regions are meant to be practical for statistical purposes. They correspond to the regional level that the EU has defined as the NUTS4,[18] one consequence

[17]SSB refers to “Statistisk Sentralbyrå” or “Statistics Norway” which is the official public provider of statistics in Norway. NSD refers to “Norsk senter for forskingsdata” and their database on statistics on municipalities called “NSDs Kommunedatabase”.

[18]Nomenclature of Territorial Units for Statistics, originally from the french wording "nomenclature des unités territoriales statistiques".

of this is that the regions can not cross county-borders(SSB, 2000). This makes for some odd situations, as many municipalities in neighboring counties should be a part of a region on the other side of the county borders. By examining table 10, the top two regions with regards to *netmig*, Jessheim/Eidsvoll and Stjørdalshalsen can both be argued to be a part of the regions Oslo and Trondheim respectively.

3.2 Descriptive statistics

In this section I present descriptive statistics to give an overview of all the included variables. First I present descriptive statistics regarding the dependent variable, followed by a general overview of migration in Norway. Then I present descriptive statistics regarding the explanatory variables. I also include some commentary on the included data, and my expectation regarding how each variable affects the net migration rate.

3.3 Dependent variable

Table 1: Descriptive statistics dependent variable

Variable	**Obs**	**Mean**	**Std. Dev.**	**Min**	**Max**
netmig	1335	-3.05645	6.357766	-27.226	24.67304

The dependent variable in this thesis is net domestic migration divided by the population in the region per 1000 inhabitants, formally, the formula is given by:

$$netmig_{it} = \frac{\text{Net Migration}_{\text{it}}}{\text{Population}_{\text{it}}} \times 1000 \tag{3.1}$$

This formulation is identical to the one Rodríguez-Pose & Ketterer (2012) used in their analysis of interregional migration in Europe.

As seen in Table 1, there is great dispersion within the numbers, with a standard deviation over six. Most regions have have had outward domestic migration. This is concurrent with the fact that the bottom two-thirds of regions based on population on average have experienced out-migration.[19]

[19]See table 10 in the appendix for average numbers regarding each individual region.

3.4 Migration in Norway

I want to get a better understanding of what factors lead to in- and out-migration to and from regions in Norway. I do this with data that is relative to each regions population and growth, as I want to find causal effects of each variable. One clear tendency in Norway in the later years, including my time period 2000-2014 is urbanisation. Meaning that people to a higher degree are moving into more central and urban regions.

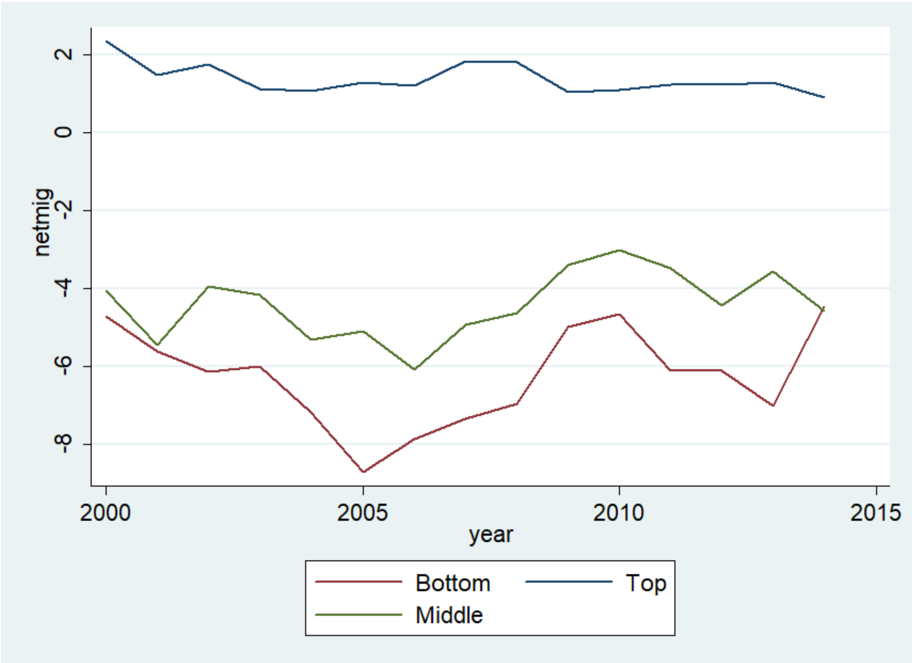

Figure 1: Average of *netmig*, divided into three categories based on population.

In figure 1, I have categorised the regions into three categories based on the total population.[20] The graph shows that the top 30 regions based on population have generally seen a pronounced higher in-migration than the less populated regions. In fact, both the middle and bottom third of regions based on population have actually experienced a distinct outward migration on average. This points to the clear tendency that on average, there is a clear urbanisation process taking place in Norway.

[20]The regions are ranked into three groups by total population. The "Top" graph is 1-30, "Middle" is 31-60 and "Bottom" is 61-89. See table 15 in the appendix for a complete overview.

3.5 Explanatory variables

Table 2: Descriptive statistics explanatory variables

Variable	Obs	Mean	Std. Dev.	Min	Max
lnwage	1335	12.58075	0.20952	12.10409	13.24723
unem	1335	2.780624	1.074766	0.644045	8.732923
primary	1335	5.760183	3.840296	0.144061	17.79607
industry	1335	13.65592	5.725118	3.563391	29.14405
popdens	1335	43.7376	142.6473	0.730986	1397.249
edu	1335	16.59706	4.493874	4.074494	39.61192
young	1335	12.69446	0.900114	10.32797	18.43855
crime	1157	66.7028	24.21282	26.82392	207.7122
kindg	1246	82.70389	10.3458	44.01484	102.8369
coast	1335	0.741573	0.437934	0	1
temp	1335	-1.99694	3.384912	-9.72222	4.044445
cult	1246	4.080142	1.029849	1.88669	8.9

Based on the theory and earlier empirical studies, which is discussed in chapter 2, there are many possible explanatory variables that can explain net migration in a given region. I have chose to include three categories of variables, namely economic variables, sociodemographic factors and amenities.[21]

Economic variables

The economic explanatory variables I have included are gross wages, unemployment rates and shares of the workforce employed in the primary and secondary sector.

Wages: Reported as the variable *lnwage* and is given as the natural logarithm of the mean gross wage for every resident 17 years or older and living in the respective region. The reason I have transformed the wages into a logarithmic scale is because it makes it easier to interpret, this is further explained in section 5.1. I suspect that higher wages will act as positive pull factor towards net migration. By just looking generally at the data for mean values for every region, the regions with the highest wages are typically the major cities in Norway or adjacent regions.[22] Higher wages should be a major pull factor to attract in-migrants.

[21]See table 3 for the exact definitions of each variable included.
[22]See table 12 in the appendix for mean values for every region.

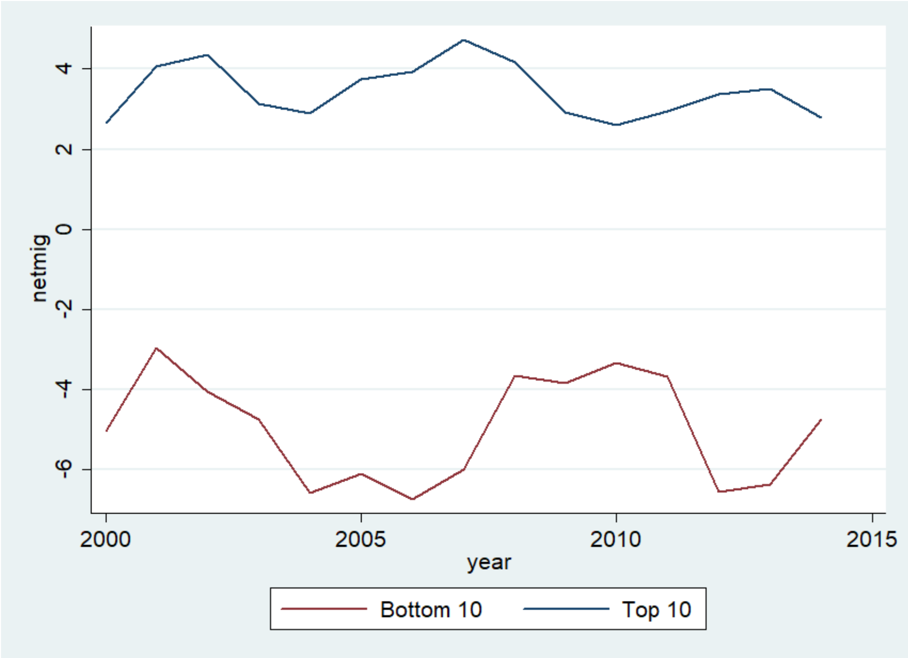

Figure 2: Average migration in regions based on wages

In figure 2, I have reported the average migration in the top 10 and bottom 10 regions based on average wages, as defined by *lnwage*.[23] It appears that the regions with the highest wages are clearly experiencing higher net migration than regions that have the lowest wages. Whether these patterns is caused by variations in the wage level between regions needs to be further analysed.

Unemployment: Given by the variable *unem*, it is defined as registered unemployment in the region divided by the work force in the region. Formally given by:

$$unem_{it} = \frac{\text{Unemployed}_{\text{it}}}{\text{Work force}_{\text{it}}} \tag{3.2}$$

Norway is generally characterised by low unemployment but it is still plausible that unemployment rates may influence the net migration rate, and it is plausible to think that shocks to the labour market can influence net migration.

[23] See table 12 to see which regions are included in figure 2. It is region 1-10 and 79-89 as sorted by *lnwage*.

Figure 3: Average migration in regions based on unemployment

In figure 3, I have reported the average migration in the top 10 and bottom 10 regions based on average unemployment rates.[24] The 10 regions with the lowest mean unemployment have a higher net migration rates in all but one of the included years.[25] The relationship between unemployment and migration seems more unclear than what is the case with wages.

The effect of the *change* in the unemployment, should however be a big factor in determining migration flows. In figure 4 I have plotted the net migration rate as defined by equation 3.1 against the unemployment rate in the region of Jæren. This is only one specific example, but it seems that when the unemployment rate drops in the years 2005-2008 the net migration rate increases similarly. The opposite happens in the years 2008-2010, unemployment rate increases and the net migration rate drops. Whether there exists an causal relationship needs to be analysed.

[24]See table 12 in the appendix to see which regions are included.
[25]In 2011 the net migration rate is higher in the Top 10 regions.

Figure 4: Net migration and unemployment in Jæren

Share of workforce in primary sector: Because of the low productivity associated with the primary sector, it is believed that this will negatively affect the net migration rate for any given region. Thus, I have included data for every region, containing the share of the work force employed in any of the primary sectors. Namely agriculture, forestry and fishing. This is formally given as

$$primary_{it} = \frac{\text{Employed in the primary sector}_{\text{it}}}{\text{Work force}_{\text{it}}} \tag{3.3}$$

The mean share of the work force working in primary sectors is about six percent. The regions with a high share of primary-sector employees are typically sparsely populated regions with the absence of any urban agglomeration of significance. At the low-end spectre of the *primary* data the largest cities and adjacent areas can be found.[26]

Share of workforce in secondary sector: The share of the work force employed in the secondary sector is defined equivalently as the primary sector work force. The difference is that it now is the workers employed in industry, mining, oil and gas sector who are

[26]See Table 12 in the appendix.

accounted for, it is given by:

$$industry_{it} = \frac{\text{Employed in secondary sector}_{\text{it}}}{\text{Work force}_{\text{it}}} \tag{3.4}$$

The effect of the employment share in the secondary sector is not obvious. One argument is that it should lead to out-migration, as people tend to seek employment in tertiary sectors because of higher wages. On the other hand, it can be argued that a high percentage of industrial job opportunities will lead to people moving into areas that are away from areas with a relatively higher degree of primary sector jobs.

What also should be considered is that many secondary sector jobs in Norway are high paying jobs in the oil and gas industry. Whether having a large share of workers in the secondary sector is a major pull factor for regions in Norway is uncertain. With the high earning-possibilities of the oil sector in Norway I expect that it will be a pull factor and lead to a higher net migration rate.

Sociodemographic variables

The sociodemographic factors that I have included is the population density of each region, the education level and the share of young people.

Population density: Given as the total population in the region divided by the total surface area.

$$popdens_{it} = \frac{\text{Population}_{\text{it}}}{\text{Km}^2_{\text{it}}} \tag{3.5}$$

These numbers vary greatly, and range from Oslo where it lived almost 1400 inhabitants per square kilometer in 2014 to Grong where it lived under one inhabitant per square kilometer in the same period. Because of urbanisation, I expect population density to be a pull factor, and lead to a higher net migration rate.

Education level: Given as the share of the population in each region who has higher education, meaning one to five years of a college or university education.

$$edu_{it} = \frac{\text{Higher educated persons}_{\text{it}}}{\text{Population}_{\text{it}}} \tag{3.6}$$

The numbers range from values in Oslo and Bærum/Asker in 2014 being as high as over

39 percent, and as low as under nine percent in Rørvik and Nord-Gudbrandsdalen in 2000. A higher percentage of the population having higher education should lead to higher in-migration. As discussed in section 2.2.2 , the education level is closely linked to wages, because people with higher education often also have higher wages. By examining the correlation matrix found in table 8 in the appendix , this seems to be the case in my data set as well, as the correlation between *lnwage* and *edu* is high, with a value of 0.6503.

The share of young people: The variable *young* is given as the share of the population who is aged between 15-24 in each region.

$$young_{it} = \frac{\text{Population aged 15-24}_{\text{it}}}{\text{Population}_{\text{it}}} \tag{3.7}$$

The numbers across all the regions do not vary greatly, but there are some differences. It ranges from a mean rate of about 14 percent in Jæren and Egersund to a mean rate of about 11 percent in Kongsvinger and Oslo.

Having a large part of the population being young should lead to out-migration, as young people are believed to relocate more than people who are older and settled down with families(Zimmermann, 2005). I expect that this also should have an effect on interregional migration in Norway. There is a possible problem of endogeneity with this variable. The more young people who move to the region, then the variable *young* will be higher, which means that the value of the coefficient to the variable might be overestimated.

Amenities

As discussed, there is great uncertainty whether amenities will have any effect at all on migration in Norway. I believe that the effect will be minimal, mainly because the difference is believed to be small between the regions. The variables characterised as "amenities" are crime rates, kindergarten coverage, presence of a coast, mean temperature in January and public expenses used on culture.

Crime: Defined as total reported violations of the law in the region standardized by the regions population. Formally given as:

$$crime_{it} = \frac{\text{Reported crimes}_{\text{it}}}{\text{Population}_{\text{it}}} \times 1000 \tag{3.8}$$

There is great dispersion in the numbers, ranging from mean numbers per year in Oslo at around 157 to Ulsteinvik at a rate of around 31. As previously mentioned, it is believed that crime rates should have minimal effects on migration to and from regions in Norway. By looking at table 14 found in the appendix, the regions with the highest rate of crime are Oslo and adjacent regions and many regions characterised by having large urban areas. Carlsen et al. (2013) examined the potential effects of the murder rate upon the net migration rate, grouped by the education level of the migrants. They found a negative, but insignificant effect. They found that migrants with tertiary education reacted stronger than migrants with upper secondary education.

I do not think that the crime rate is important in deciding migration flows in Norway. However, it is plausible to think that some people may take relatively higher crime rates in the cities as opposed to other areas into consideration when deciding on where to locate.

Kindergarten coverage: The variable is calculated as the share of kids aged between one to five who have a spot in a kindergarten.

$$kindg_{it} = \frac{\text{Kids in kindergarten aged 1-5}_{\text{it}}}{\text{Population aged 1-5}_{\text{it}}} \tag{3.9}$$

In Norway as a whole this number has been steadily increasing in the period 2001-2014 and has increased from around 67 percent on average in 2001 to around 91 percent on average in 2014.[27] Having a high degree of kindergarten coverage should act as an attractive attribute in the region of interest. This means that there is a greater possibility to get a spot in the local kindergarten if this is needed

Presence of a coastline: A number of American studies have looked at the presence of a coastline as being a positive amenity that should lead to higher in-migration. I have specified the variable *coast* as a dummy variable, taking the value of one if the region in question has a coastline in any of its municipalities, or taking the value zero if there is no coastline present. In total, there are 66 out of the total 89 regions that have a coast. Norway is a relatively large and outstreched sparsely populated country by the ocean, and when divided into 89 regions most of them do have a coast. I therefore expect that the

[27] This is not based on the average of the whole population, but rather as the average of the 89 regions included in my data set.

presence of a coast should have limited effects in deciding peoples locational preferences. If the analysis was done at the municipality level, I suspect that there is a greater chance that this effect could have been shown more clearly. A problem with this variable is that it is time-invariant, meaning that it is constant over time. This means that I am not able to analyse the effect of having a coastline in the fixed effect model.

Temperature: Ciccone & Hall (1996) argue that areas with natural features such as a pleasant climate will attract workers because it raises productivity, and as a factor in itself. The data I have collected is average temperature in January. Due to data unavailability, I have only collected data for the period 1994-2002, meaning that I only have one observation per region. This means that I can not include *temp* in the fixed effects model. A logical expectation is that the higher the temperature is in January, the more people will want to move there, as higher temperature is usually associated with a more pleasant climate. By looking more closely at the variables,[28] it is apparent that the regions with higher temperature are typically the regions in the south by the coast, and the coldest regions are either in the northern part of Norway or inland away from the coast. This suspicion is further reinforced by looking at table 8 in the appendix, where it can bee seen that the correlation value between *coast* and *temp* is about 0,65. This can possibly cause some problems when analysing both variables at the same time, because it may be difficult to separate the effects of each variable.

Public cultural supply Public culture expenses, *cult*, is defined as the net average government culture expenses as a percentage of the regions total net government expenditure.

$$cult_{it} = \frac{\text{Net government cultural expenses}_{\text{it}}}{\text{Total net government expenses}_{\text{it}}} \tag{3.10}$$

Culture is an amenity for most individuals. Combes et al. (2010) argue that the cultural facilities are better in bigger city regions, and that this is a reason for individuals to move into urban areas. Intuitively, this is easy to agree with. In Norway, it is also common to believe that cities have a "better" cultural provision than remote regions. There is although a problem when it comes to quantifying the overall access to culture. When looking at the government culture expenses in every region, there is little correlation with

[28]See Table 14 in the appendix for all values. Note that the temperature data are mean values for the years 1994-2002.

regions that are intuitively thought of as regions with extensive cultural offerings. The two regions with the highest average value of *cult* is Rjukan and Kirkenes, not two regions generally thought of as cultural ”strongholds” in Norway.[29] This may be due to the fact that because even though these places are small in population, they often have public cultural centres. Since my numbers are relative to population, such investment in public cultural facilities make a bigger impact in low populated regions. I suspect that public cultural expenses is not a major factor in deciding migration flows in Norway.

[29] See Table 14 in the appendix for all mean values.

Table 3: Data sources and exact definitions of the variables

Variable	Abbreviation	Exact Definition	Source
Dependent variable			
Net migration rate	*netmov*	Total net domestic migration standardized by the regions population (per 1000 inhabitants)	Migration numbers from SSB Population numbers from NSD
Economic variables			
Wages	*lnwage*	The natural logarithm of the mean gross wage for every resident 17 years or older in the region	Wage numbers from SSB Population numbers from NSD
Unemployment	*unem*	Registered unemployed in the region divided by the work force	SSB
Primary Sector	*primary*	Share of workforce employed in agriculture, forestry and fishing	NSD
Secondary Sector	*industry*	Share of workforce employed in industry, mining, oil and gas sector	NSD
Sociodemographic variables			
Population density	*popdens*	Total population in the region divided by the total surface area	NSD
Education level	*edu*	Share of population with higer education (1-5 years of college/university)	Education levels from SSB Population numbers from NSD
Share of young people	*young*	Share of population aged 15-24 years	Age levels from SSB Population numbers from NSD
Amenities			
Crime	*crime*	Total reported offenses standardized by the regions population (per 1000 inhabitants)	NSD
Coverage of kindergartens	*kindg*	Share of kids aged 1-5 years with spot in public kindergarten	SSB
Presence of coast	*coast*	Dummy variable if the region has coastline	NSD
Temperature	*temp*	Average january temperature in celsius during period 1994-2002)	Metoroligical institute of Norway (The "eklima-database")
Public culture expenses	*cult*	Net average government culture expenses (as a percentage of the regions total net government expenditure)	Culture expenses from SSB Population numbers from NSD

Note: Most of the variables have been collected at the municipality level, meaning that the summation have been done by my own calculations. All variables have been collected for the timeframe 2000-2014, with the following exceptions:Crime rates are only available for the years 2002-2014, Kindergarten coverage is only available for the years 2001-2014, Cultural expenses is only available for the years 2001-2014. The presence of a coast and temperatures are both time-invariant meaning that I only have one observation per region. This means that these variables are not a part of the fixed effects regressions.

4 Empirical Challenges and Estimation Approach

In this chapter I will discuss potential econometrical challenges that may arise because of the nature of the data and the model specification. I discuss how the problems may be solved, or can be accounted for. In section 4.2.3 I will present the base model which is based on the theoretical foundation in chapter 2 and where the econometrical challenges are accounted for.

4.1 Econometrical challenges

As outlined in chapter 3, I have collected data for the 89 labour market regions in Norway in the period 2000-2014. This means that I have a balanced panel data-set that includes observations for each separate region over the same time period, and that I have variation in two dimensions, namely time and regions.

My main goal for the analysis is to find a causal relationship between the interregional migration and the explanatory variables. This means that a change in the explanatory variable will cause a change in migration, *ceteris paribus*.[30] Since the structure of my data set is panel data it is possible to utilise the variation both over time and between regions. One possibility is to apply the method of pooled OLS.[31] Since OLS utilises all variation, all available information will affect the results, which is an advantage. However, there is still som challenges present related to the data set, which I will now bring to attention.

To derive the base model and examine the challenges with OLS, I will use the following model as a starting point:

$$y_{it} = \beta_0 + X_{it}\beta + u_{it} \tag{4.1}$$

where

$$u_{it} = \eta_i + \varepsilon_{it} \tag{4.2}$$

y denotes the net migration rate. $i = 1, 2, ..., 89$ are the economic regions in Norway and

[30]Latin for "other(relevant) factors being equal". This plays an important role in all economic causal analysis, this is outlined in Wooldridge M (2013).

[31]Referring to Ordinary Least Squares, since variation through both dimensions is present, it is often labelled as "pooled".

$t = 2000, 2001, ..., 2014$ is the time frame. X_{it} is a row vector of all included explanatory variables, β is the associated coefficient vector.[32] u_{it} is a composite stochastic error term.

To illuminate some of the problems embedded in OLS, I assume that the error term can be decomposed to a region specific error term, η_i, and an idiosyncratic error term, ε_{it} as illustrated in equation (4.2). The region specific error term picks up all unobservable factors that affect net migration, which are constant for every individual region and do not vary over time. The idiosyncratic error term picks up all unobserved variation that affects net migration both within and between regions.

As outlined, the starting point for my analysis is OLS. This method's main goal is to minimise the sum of squared residuals. If the estimates produced are to be "BLUE"[33] then some conditions needs to be met.[34] If any of these conditions are violated, the estimates might be skewed, this could result from measurement error, omitted variables, simultaneity or misspesification. I will now explain these problems and what can be done to take them into account.

4.1.1 Error of measurement

If the observed value of a variable deviates from the true value, there is an error of measurement. The consequence of this depends on whether the measurement error is related to the dependent variable or the explanatory variable. Random measurement errors are usually not a problem if they are few and small. If the error is large, this will result in a higher error term variance, which can lead to a higher estimated variance for the estimators. This can result in in rejection of estimates that in fact have an impact. Systematic errors of measurement in a explanatory variable is often a bigger problem, as it can lead to a bias towards zero in the dependent variable.

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[32] $X_{it} = \begin{bmatrix} X_{1it} & X_{2it} & \cdots & X_{jit} \end{bmatrix}$ is a row vector with the dimension $\begin{bmatrix} 1 & x & j \end{bmatrix}$ and $\beta = \begin{bmatrix} \beta_1 \\ \beta_2 \\ \vdots \\ \beta_j \end{bmatrix}$ is the associated column vector with the dimension $\begin{bmatrix} j & x & 1 \end{bmatrix}$.

[33] Best Linear Unbiased Estimators. Meaning that in addition to being an unbiased linear estimator, it is also the estimator with the lowest variance.

[34] See Wooldridge M (2013).

My data set is prone to measurement errors to some degree. One variable that it is reasonable to think suffers from error of measurement, is the crime rate. It is reasonable to think that crimes are being under-reported. This problem should however exist in all regions, so it might not create a problem for my analysis. Overall I do not think measurement errors is a big problem, because all numbers are macro-variables and they come from reliable sources.

4.1.2 Omitted variable bias

If any relevant variable is omitted from the model, which is correlated with an included explanatory variable, there is a risk that the estimators will be biased. The omitted variable will partly be captured by the error component. Since the omitted variable is correlated with some of the explanatory variables, it will be correlated with the error term and thus violate the assumption of exogenous explanatory variables causing biased estimates. This problem can arise from inaccessible data, or ignorance.

As derived in equation (4.2), I have expressed the error term as consisting of two parts, namely an idiosyncratic component ε_{it} and a region varying component η_i. An assumption for OLS to give consistent and unbiased results is that the explanatory variables are uncorrelated with each component of the error term, formally written as:

$$E(X_{it}|\varepsilon_{it}) = 0 \tag{4.3}$$

$$E(X_{it}|\eta_i) = 0 \tag{4.4}$$

Even though the idiosyncratic error term is not correlated with the explanatory variables, there could still be a problem of omitted variable bias. One possible example that I have not included in my data set is the presence of higher education institutions. This should attract in-migration and is unique to the specific region it is located. If equation (4.4) does not hold the result will be $E(X_{it}|\eta_i) \neq 0$ and there will be a problem of heterogeneity. This is because of unobserved time-invariant factors between the regions. To address this issue, I will use the fixed effects method for estimation, the model is outlined in section 4.2.2.

4.1.3 Misspesification of model

A special case of the omitted variable bias is when a regression model suffers from a functional form misspecification. This is when the model does not properly account for the relationship between the dependent variable and explanatory variables. For example, if the true relationship between migration and the effect of higher wages is given by a positive, but decreasing relationship, the model will be misspecified if the squared term of wages are not included. This is something that is not controlled for in my analysis, because of the limited scope of this thesis.

4.1.4 Simultaneity

If one or more explanatory variables are determined at the same time as the dependent variable, then there is a simultaneity problem. This can result in endogenous explanatory variables, leading to the explanatory variable being correlated with the error term. The consequence of this in OLS is bias and inconsistency in the estimates (Wooldridge M (2013)).

There are multiple explanatory variables included which are possibly inherent with simultaneity. As discussed in chapter 4, it is difficult to be certain whether jobs follow people, or people follow the jobs. This means that my variable *unem* may have a simultaneity bias, as out-migration may affect the rate of unemployment. The link between wages and migration is also ambiguous. It could be that higher in-migration leads to higher wages and not the other way around.

I can illustrate the problem of simultaneity by expanding the simple equation 4.1 with a variable lnW_{it} denoting wages, and ignoring the other explanatory variables.

$$y_{it} = \beta_0 + \beta_1 lnW_{it} + u_{it} \tag{4.5}$$

$$lnW_{it} = \alpha_0 + \alpha_1 y_{it} + \alpha_2 \rho_1 + v_{it} \tag{4.6}$$

The estimation of 4.5 will be a problem because lnW_{it} correlates with the error term u_{it}, and the estimated model will not be equal to the true model. In this situation, both wages, lnW_{it}, and net migration, y_{it} will be endogenous variables, while ρ_1 will be an exogenous variable.

There is a chance that I have a problem of simultaneity in my data set. Possible variables that might suffer from simultaneity is wages and unemployment, and that they might are decided simultaneously with net migration. One way to fix the problem of simultaneity is by the IV/2SLS method, where an instrument variable is included. This method is based on finding a variable that acts as an instrument that can help explain the dependent variable. According to Wooldridge M (2013) there are primarily two criteria needed for an instrument to be relevant. First, the the instrument can not be correlated with the stochastic error term in the structural equation. Secondly, the error term needs to be correlated with the endogenous dependent variable for it to be relevant. The main problem with the IV/2SLS is to find variables that meet these two criteria, and for my data set I have not found one.

4.2 Econometric framework

As reviewed in section 4.1.2 it is plausible to think the OLS-estimation has a problem of heterogeneity since I have a panel data structure with the 89 labour market regions in Norway. By running a simple OLS regression all the variations in the data will be accounted for. This means that variables unique to each region and unique to each year will not be controlled for. This will be controlled for by running the fixed effects model. This is outlined in section 4.2.2.

4.2.1 Year dummies

A simple OLS-regression will not control for aggregate variables such as inflation, economic growth and population growth. This results in these variables affecting net migration and disrupting the results so that the regression results does not produce a good estimate of the causal relationship. To control for this, I include year dummies in my analysis, one for each of the years 2000-2014, excluding the base year 2000.

4.2.2 Fixed effects model

To control for factors that are unique to each region, I transform the model, so that it consists of deviations from every region's mean. By doing this I am able to isolate variations within each region when estimating the final model. This means that the individual component of the error term seen in equation 4.2, the time-invariant unobserved differences between regions are transformed away from the model, and I remove the problem of heterogeneity between the cross section units.

To illustrate this I combine equation 4.1 and 4.2 so that:

$$y_{it} = \beta_0 + X_{it}\beta_1 + \eta_i + \varepsilon_{it} \tag{4.7}$$

Since the individual component of the error term is constant over time, it can be expressed as a part of the constant term, β_0, so that:

$$\delta_i = \beta_0 + \eta_i \tag{4.8}$$

The new constant term is denoted by δ_i. The next step is to compute the individual means for each variable by computing the following transformations:

$$\bar{y_i} = \frac{1}{T}\sum_{t=1}^{T} y_{it} \tag{4.9}$$

$$\bar{X_i} = \frac{1}{T}\sum_{t=1}^{T} X_{it} \tag{4.10}$$

$$\bar{\varepsilon_i} = \frac{1}{T}\sum_{t=1}^{T} \varepsilon_{it} \tag{4.11}$$

$$\bar{\delta_i} = \frac{1}{T}\sum_{t=1}^{T} = \frac{1}{T}T\delta_i = \delta_i \tag{4.12}$$

By combining equation (4.9)-(4.12) the result is:

$$\bar{y_i} = \delta_i + \beta_1\bar{X_i} + \bar{\varepsilon_i} \tag{4.13}$$

If I subtract equation 4.13 from equation 4.7, I have performed the within-transformation, the specification of the model is now given by

$$y_{it} - \bar{y}_i = \beta_0 + \beta^{FE}(X_{it} - \bar{X}_i) + \varepsilon_{it} - \varepsilon_i{}^{35} \tag{4.14}$$

This is the fixed effect model, by using this, only the variations within each region are considered and the problem of heterogeneity is eliminated. The estimator will now give unbiased estimates even when the error term correlates with the explanatory variables and $E(\eta_i|X) \neq 0$. It is reason to believe that time-invariant differences between regions are present in my panel data set, which means that the fixed effects model seems like a better approach in order to explain why people migrate, as opposed to an OLS-estimation. One disadvantage of the fixed effects method is that variation over time is needed to get precise estimators. Since less variation is now considered than what is the case in OLS, higher standard errors should be expected.

[35] When the fixed effects method is implemented in STATA, the following equation is estimated:

$$\bar{y}_i + \bar{y} = \beta_0 + \beta_1^{FE}(X_{it} - \bar{X}_i + \bar{X}) + (\varepsilon_{it} - \bar{\varepsilon}_i + \bar{u}) + \bar{\varepsilon} \tag{4.15}$$

The extra terms are global means for each variable, see Gould (1997) for a more in-depth analysis.

4.2.3 Model specifications

The first regressions I report, is done by a simple Pooled-OLS specification with the addition of time dummies. As reviewed, there are multiple problem inherent with OLS, but it can still be useful to analyse the results, and use them as a comparison to later model-formulations. The Pooled-OLS model is given by:

$$netmig_{it} = \beta_0 + \beta_1 X_{it} + \sum_{t=1}^{14} \phi_t + \varepsilon_{it} \tag{4.16}$$

Where X_{it} is a vector of all explanatory included, and the corresponding column vector β_1 of coefficients. ϕ_t is the time dummies, one for each of the years 2000-2014 with the exception of the reference year 2000. The second regression I report, is done by the fixed effects-model, and is given by:

$$netmig^{*} = \beta^{FE} X_{it}^{*} + \sum_{t=1}^{14} \phi_t + \varepsilon^{*} \tag{4.17}$$

where * indicates that the variable is within-transformed.

5 Results

In this chapter, I present the results of the empirical analysis. All regressions have been done in the statistical software STATA. The first results presented are done by using pooled OLS with time fixed effects. As discussed in section 4.2.2, there is reason to believe that there is a problem of heterogeneity if factors unique to each region are not controlled for. These results are still commented on, and changes occuring when using the fixed effects model will be commented on in section 5.3. Dummies for each year are included in all regressions, but will not be included in the reported tables.

5.1 Interpreting the results with regards to *netmig*

When analysing the results from the OLS and fixed effects estimations, it is useful to go through how to interpret the coefficient with regards to the dependent variable *netmig*. As noted in equation 3.1, the dependent variable is given by:

$$netmig_{it} = \frac{\text{Net migration}_{\text{it}}}{\text{Population}_{\text{it}}} \times 1000$$

Meaning that the percentage change in the population coming as a result of net migration is given by:

$$\%\Delta[\text{Population}] = \frac{netmig_{it}}{1000} \times 100 = \frac{netmig_{it}}{10} \qquad (5.1)$$

The mean value of *netmig*, as seen in table 1, is about -3. This means that on average, the net out-migration in each region leads to a decrease in the population by $\frac{-3}{10} = 0,3$ percent.

Since the explanatory variables are specified differently, the interpretations differ. Many of the variables are given as a percentage of either total population or the work force. The coefficients to these variables interpretation is straightforward. One percentage point increase in these variables will lead to the coefficient's value change in *netmig*. So, if the coefficient to *unem* is -1 this means that a one percentage point increase in the unemployment rate will lead to a decrease in *netmig* by the value of one. The change in the population of the specific region will then be decrease in the total population of 0,1 percent. As an example, this would mean a decrease in the population in Oslo of about 650 persons.[36]

The interpretation of population density, crime, presence of a coast and temperature is in the same manner. The difference is that the coefficient value is not the effect of one percentage point increase, but rather the effect of one $\frac{\text{Population}}{\text{Km}^2}$, one reported offense per 1000 inhabitant, having a coast or one degree celsius increase.

Since wages are given in logarithmic form,[37] the interpretation of the coefficient value, β related to the dependent variable, *netmig*, is given by:

$$\Delta netmig \approx \left(\frac{\beta}{100} \times (\Delta \text{wage}) \right) \tag{5.2}$$

This means that if the coefficient belonging to *lnwage* is 20, a one percent increase increase in wages will lead to

$$\frac{20}{100} \times 1$$

meaning an increase in *netmig* by 0,2. This means an increase in the total population of the region by 0,02 percent. For reference, this would mean an increase in the population in Oslo by around 130 inhabitants.

5.2 OLS

I present and analyse the results of the model formulated in equation (4.16), the results are presented in table 4. To analyse effects from the OLS regressions I use model (12) found in table 4 as a starting point for the discussion. The reason i include all reported models, is to show the stability of coefficients when variables are added. As discussed in chapter 4, there are many challenges inherent with the pooled OLS approach, because of that, my main focus will be the fixed effects regressions presented in section 5.3.

Most of the economic variables have the preceding signs as expected. The effect of wages,

[36] Based on the fact that the region Oslo had 647 676 inhabitants in the year 2014. See table 15 in the appendix for mean numbers.

[37] See Wooldridge M (2013) for more information on interpretation of logarithmicly specified variables.

lnwage is positive and significant. It has a value of $22,78$. This means that a one percent increase in wages will lead to an increase in *netmig* of 0,2278. This means that a one percent increase in wages will, according to this model, lead to an increase in the population of any given region by 0,02278 percent. For illustrations, this would mean an increase of about 150 persons in the region of Oslo.

The effect of unemployment is negative as expected, it has a value of $-0,602$ meaning that a one percentage point increase in *unem* will lead to a decrease in domestic migration, *netmov*, by $0,602$, or a decrease by 0,0602 percent. This result is not surprising, as unemployment should act as a "push"-effect towards out-migration in each region.

The share of the workforce employed in the primary sector has a negative but negligible effect. An increase in the share by one percentage point will lead to a reduction of *netmov* by 0,0545. The variable *industry* reports small and insignificant results. The result is difficult to interpret explicitly, and somewhat surprising. As I discussed in 3, the high earning possibilities of the oil sector should lead to "industry-regions" being attractive towards migrants. One plausible explanation is that the effect of *industry* is nullified by the effect of wages.

The sociodemographic variables give differing results. Population density, *popdens*, reports surprising results, as the effects are negative and significant. The effect of *popdens* on *netmov* is -0,0107 meaning that an increase in the population density of 1 person per square kilometer will lead to a decrease in *netmov* by 0,0107. This might be due to multicollinearity with other variables. There is reason to suspect that the "big-city effects" are being captured by *primary*, and thus neglects the effects I attain from population density.

Education has the expected result, with a positive preceding sign. *edu* has a value of $0,214$ meaning that a one percentage point increase in the share of the population with higher education will lead to 0,214 increase in in-migration to the region of interest.

The share of young people in the region, *young* report the expected results, and the value of *young* is -1.115 meaning that a one- percentage point increase in the share of young people in the region will lead to just over one percent decrease in domestic in-migration per 1000 inhabitant, or a decrease in the total population of the particular region of 0,1115 percent. As discussed in chapter 2, having a relatively young population typically leads to out-migration as younger people typically are more inclined to move.

Variables containing amenities report some surprising results. *crime* has significant positive results . With a value of 0,0813 this means that an increase in reported crimes per 1000 inhabitants per year of 10 crimes will lead to an increase in domestic in-migration of 0,813. This result is counter-intuitive, and it is also here reasonable to suspect multicollinearity, or omitted variables that are correlated with *crime*, maybe some ”big city effects”. The regions with a high crime-rate are usually the larger cities[38]. Thus, there is reason to suspect some of the same correlation-issues as discussed above.

The problem is reverse when it comes to coverage of kindergartens. The coefficient value for *kindg* is -0,0972. This means that an increase in kindergarten-coverage by one percentage point will lead to a a decrease in *netmov* of 0,0972, which is counter-intuitive. The problem here seems to be that many of the regions with a higher coverage of kindergartens typically experience domestic out-migration. The same can be said about net average government culture expenses, where the coefficient value is -1,924 meaning that an increase in net cultural expenses as a percentage of the regions total net government expenditure will lead to a decrease in *netmov* of 1,919. I also suspect that this effect is the same as what is observed in kindergarten coverage. The last variable included, average January temperature, reports insignificant results.

[38]See table 14 for complete mean values of amenities per region.

Table 4: OLS

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dependent variable	netmig	netmig	netmig	netmig	netmig	netmig	netmig	netmig	netmig	netmig	netmig	netmig
lnwage	26.22***	25.68***	21.55***	10.98***	11.25***	12.43***	13.03***	16.17***	15.90***	22.44***	23.08***	22.78***
	(14.63)	(14.05)	(8.20)	(4.00)	(4.13)	(4.36)	(4.45)	(5.40)	(5.35)	(7.94)	(8.16)	(7.93)
unem		-0.277	-0.336	-0.659***	-0.665***	-0.614**	-0.635***	-0.653**	-0.607**	-0.833***	-0.600**	-0.602**
		(-1.49)	(-1.79)	(-3.58)	(-3.64)	(-3.29)	(-3.38)	(-3.24)	(-3.04)	(-4.42)	(-2.93)	(-2.94)
edu			0.126*	0.00836	0.0192	0.0616	0.0391	0.162*	0.254***	0.208**	0.208**	0.214**
			(2.19)	(0.15)	(0.34)	(0.96)	(0.57)	(2.34)	(3.55)	(3.09)	(3.10)	(3.16)
primary				-0.542***	-0.503***	-0.483***	-0.492***	-0.165*	-0.0785	-0.0317	-0.0509	-0.0545
				(-10.06)	(-9.30)	(-8.63)	(-8.65)	(-2.37)	(-1.09)	(-0.47)	(-0.76)	(-0.80)
young					-0.874***	-0.958***	-0.909***	-0.811***	-1.063***	-1.377***	-1.073***	-1.115***
					(-4.61)	(-4.81)	(-4.40)	(-3.78)	(-4.85)	(-6.65)	(-4.61)	(-4.58)
popdens						-0.00219	-0.00220	-0.00731***	-0.00887***	-0.0113***	-0.0105***	-0.0107***
						(-1.38)	(-1.38)	(-4.32)	(-5.19)	(-7.01)	(-6.46)	(-6.48)
industry							-0.0284	0.0123	0.00724	-0.0150	0.00449	-0.00591
							(-0.90)	(0.38)	(0.22)	(-0.49)	(0.14)	(-0.17)
crime								0.0749***	0.0705***	0.0848***	0.0812***	0.0813***
								(7.95)	(7.51)	(9.57)	(9.10)	(9.10)
kindg									-0.145***	-0.102***	-0.0966**	-0.0972**
									(-4.60)	(-3.44)	(-3.26)	(-3.28)
cult										-1.904***	-1.929***	-1.924***
										(-12.66)	(-12.84)	(-12.78)
coast											-1.226**	-1.377**
											(-2.82)	(-2.74)
temp												0.0438
												(0.60)
Constant	-323.8***	-316.4***	-267.2***	-131.3***	-124.2***	-138.4***	-145.4***	-197.7***	-182.8***	-254.7***	-266.3***	-261.8***
	(-14.72)	(-14.03)	(-8.40)	(-3.92)	(-3.73)	(-3.97)	(-4.07)	(-5.36)	(-4.98)	(-7.30)	(-7.61)	(-7.31)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effect	No	No	No	No	No	No	No	No	No	No	No	No
No. of regions	89	89	89	89	89	89	89	89	89	89	89	89
Observations	1335	1335	1335	1335	1335	1335	1335	1157	1157	1157	1157	1157
R^2	0.148	0.149	0.152	0.213	0.225	0.226	0.227	0.274	0.287	0.375	0.380	0.380

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

5.3 Fixed effects

Table 5 reports the results based on the estimations outlined in equation 4.17. I have included the same variables, with the exception of the presence of a coast and the temperature in January, as I only have available data for one period per region. Meaning that these variables do not change within each region, and can not be included in the fixed effects regression. As opposed to the regressions performed using pooled OLS, most of the variables included are now statistically insignificant. This makes sense, as all time-invariant variations between regions have been eliminated because of the within-transformation of the model. If the variables do not change enough from year to year, it means that there is not enough variation. This can lead to imprecise estimators and insignificant coefficient.

The only variables that have relatively stable coefficient values and are statistically significant are wages, unemployment and crime rates. I use model (3) found in table 5 as a basis for the discussions of the effects.

Compared to the results found in the OLS-regressions, the effect of wages are weaker, as the coefficient value of *lnwage* is now 14.20 compared to 22.78 in the OLS-regression. This means that a one percent increase in wages will lead to an increase in *netmig* by 0,14, or an increase in the total population by 0,014 percent. The effect is still positive and statistically significant, meaning that there seems to be a statistically significant relationship. Thus, it seems that higher wages do lead to higher in-migration.

This result is somewhat consistent with the results found in Rodríguez-Pose & Ketterer (2012) and Carlsen et al. (2013), as they both find significant and positive results with regards to wages. It is difficult to directly compare the estimates, as they have different empirical specifications with regards to both net migration and wages.

The effect of unemployment is negative and relatively stable in all fixed effects model formulations. The effect is actually stronger in the fixed effects model than in the OLS-formulation, and it has a higher reported t-value. The effect is about -0.8 compared to about -0.6 in the OLS-regression. This means that a one percent increase in the unemployment rate will lead to a decrease in the domestic migration rate, *netmov*, by 0.8. Thus, the labour market seems to be important in influencing the migration decision. Carlsen et al. (2007) find similar results. Although the results can not be directly compared due to different variable- and econometric specification, the findings are the same, with increased unemployment leading to to higher out-migration.

The effect of the crime rate is opposite to the results in the OLS-formulation. The reported coefficient is -0.0304, meaning that an increase of the crime rate per thousand inhabitant of one will lead to an decrease in the net in-migration by 0.0304. This is surprising, as the effect was opposite in the OLS-regression. The effect is not strong, but it is statistically significant. I suspected that crime rates would not be important in deciding domestic migration in Norway. It seems that regions which have experienced an increase in crime rates, or a relatively smaller decrease than the other regions have experienced a lower net migration rate.

The other economic variables all produce insignificant results. The share of the workforce employed in the primary sector has a positive but negligible effect. This is difficult to interpret, and is weaker than the results found by Rodríguez-Pose & Ketterer (2012), who finds an effect of 0,6948 with a similar model formulation.[39] The variable *industry* reports small and insignificant results. This is difficult to interpret explicitly. As discussed in chapter 3, the high earning possibilites of the oil sector should lead to ”industry-regions” being attractive toward migrants. One plausible explanation is that the effect of *industry* is nullified by the effect of wages.

None of the sociodemographic variables produce significant results. Population density, *popdens*, reports surprising results, as the effects are negative. There might be some multicollinearity with other variables. By examining the correlation matrix found in table 8 in the appendix, it might be possible that the correlation with *edu* of about 0,6 the source of the problem. It may also be that the population, and in turn the population density does not grow enough. Another explanation may be that population density in itself has no direct effect on net migration, this is similar to what was found in Carlsen (2000) who also found no significant influence of population density on net migration. Education

[39] Net migration is defined equivalently with my model-formulation, and their analysis is also based on a fixed effects estimation. Their agricultural composition is a share of their ”social-filter”, but the exact effect of the agricultural composition is mentioned in the text, see Rodríguez-Pose & Ketterer (2012) p.549.

has the expected result, with a positive effect, but the result is insignificant. The share of young people in the region, *young* have the expected results, but is insignificant. As discussed in 2, having a relatively young population typically leads to out-migration as younger people typically are more inclined to move.

The remaining amenity-variables have insignificant and negligible results. *kindg* produces negative results, which is counter-intuitive. One possible explanation is that it often is relatively easier to improve the kindergarten coverage in regions that are comparatively "worse" off than other regions. Meaning that regions who improved from a lower base, improved by a higher *degree* than regions that are "better". As discussed in 3 the kindergarten coverage in Norway as a whole is substantially higher in 2014 than what was the case in 2000. The variable *cult* also produces insignificant and negligible result, but the preceding sign, which is positive, is as expected.

Table 5: Fixed effects model

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent variable	netmig	netmig	netmig	netmig	netmig	netmig	netmig	netmig	netmig	netmig
lnwage	20.40***	9.215*	14.20**	14.44**	14.78**	13.81**	12.79*	12.37*	11.30*	11.20*
	(5.31)	(2.14)	(3.11)	(3.16)	(3.10)	(2.84)	(2.51)	(2.38)	(2.14)	(2.11)
unem		-1.116***	-0.799***	-0.792***	-0.788***	-0.822***	-0.840***	-0.812***	-0.835***	-0.835***
		(-5.56)	(-3.72)	(-3.68)	(-3.65)	(-3.76)	(-3.81)	(-3.53)	(-3.62)	(-3.62)
crime			-0.0304*	-0.0299*	-0.0294*	-0.0282*	-0.0296*	-0.0288*	-0.0276*	-0.0276*
			(-2.46)	(-2.42)	(-2.34)	(-2.23)	(-2.31)	(-2.23)	(-2.13)	(-2.13)
edu				0.0929	0.0926	0.116	0.126	0.126	0.146	0.146
				(0.88)	(0.88)	(1.07)	(1.15)	(1.16)	(1.32)	(1.32)
primary					0.0440	0.0536	0.0574	0.0704	0.0880	0.0908
					(0.26)	(0.31)	(0.33)	(0.40)	(0.50)	(0.52)
young						-0.249	-0.254	-0.271	-0.322	-0.320
						(-1.00)	(-1.02)	(-1.07)	(-1.25)	(-1.25)
popdens							-0.00645	-0.00650	-0.00781	-0.00802
							(-0.67)	(-0.67)	(-0.81)	(-0.82)
industry								0.0467	0.0231	0.0242
								(0.44)	(0.21)	(0.22)
kindg									-0.0290	-0.0288
									(-1.19)	(-1.17)
cult										0.0413
										(0.18)
Constant	-252.4***	-112.0*	-173.7**	-178.0**	-182.6**	-167.9**	-154.9*	-150.5*	-134.6*	-133.6*
	(-5.35)	(-2.11)	(-3.07)	(-3.13)	(-3.06)	(-2.73)	(-2.41)	(-2.31)	(-2.02)	(-2.00)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of regions	89	89	89	89	89	89	89	89	89	89
Observations	1335	1335	1157	1157	1157	1157	1157	1157	1157	1157
Within R^2	0.0627	0.0857	0.0802	0.0809	0.0809	0.0818	0.0822	0.0823	0.0836	0.0836

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

6 Robustness

In this section I perform a robustness check by running the fixed effects model found in equation 4.17 on an alternative division of regions. Then I run the fixed effects model as found in model (3) in table 5 and add dummy variables for the top five populated regions in Norway to check if the effects differ in urban areas as opposed to the other 89 regions. Lastly i discuss shortcomings with the thesis, and include suggestions for future similar research.

6.1 Alternative grouping of regions

One main concern of the analysis is the the division into labour market regions as defined by Statistics Norway. Although it makes more sense to analyse with regards to these 89 regions, as opposed to the 435 municipalities currently present in Norway, there are still some problems inherent with the way Statistics Norway define the labour market regions. The main criticism from my side is that these regions can not cross county bounders, which makes for some odd results. By looking at table 10, the two top regions with regards to in-migration is Jessheim/Eidsvoll and Stjørdalshalsen. Intuitively I believe that these regions have the top spots not because people want to move into these areas specifically, but because of their close proximity to the city regions of Oslo and Trondheim specifically.

Bhuller (2009) made an alternative grouping of municipalities into labour market regions. Instead of having 89 regions, he put them into 46 regions. The main difference between his divisioning and the original one is that the regions can now cross county lines. This should mean that the regions more clearly represent the true labour market regions, as workers often commute over county lines in Norway. The clear examples are the above mentioned Oslo and Trondheim, where many commuters live in adjacent counties Akershus and Nord-Trøndelag. I will now use these regions as a robustness check for the results from the fixed effects model found in table 5.3.

6.1.1 Results

I have performed the same regression with the same specifications as the one found in table 5, meaning that I have run a fixed effects model with yearly fixed effects as outlined in equation 4.17. All the variables have been manually added together from the region- and/or municipality level[40].

The main result is that unemployment is still negative and significant, wages and crime rates are however no longer significant. Furthermore, the share of young people and presence of industry are now significant, and report negative and positive effects respectively. I will base the following analysis on the model (10) reported in table 6.

The fact that unemployment is still negative and significant strengthens the hypothesis that the unemployment rate is important in influencing domestic migration flows in Norway. The coefficient value is comparable with the regressions done on the original division of regions.

Wages still influence the net migration rate positively but the effects are now weaker, and not statistically significant in any of model formulations which also includes the unemployment rate. This is somewhat surprising, and it weakens the conviction of the wage level being important in deciding migration flows in Norway.

The variable, *industry*, is now positive and significant. As discussed in section 2.2.2 and 3.5, the effect of the share of the workforce in the secondary sector seemed uncertain. *industry* has a coefficient value of 0.317, meaning that an increase in industry jobs of one percentage point will lead to an increase in *netmov* of 0.317. This could be because of the fact that many regions in Norway with a high percentage of jobs in the secondary sector, should have a large presence of jobs in the high paying oil and gas sector. This could explain why *industry* instead of *lnwage* is now statistically significant, and by examining table 8 and 9 it is evident that the preceding sign of the correlation between wages and industry changes in the alternative regions.

[40]The only exception is the regions Haugesund and Sunnhordland. In the the alternative classification, the municipality of Sveio should now be a part of the region Haugesund instead of Sunnhordland, but this has not been possible because of data-issues. Since all variables are relative to population, this should not be a problem for the overall analysis.

The share of young people in the regions is also negative and significant. The coefficient value is -0.634, meaning that an increase of one percentage point in people aged 15-24 will lead to a decrease in *netmov* by 0.634. This is as expected, and the same results was found by Rodríguez-Pose & Ketterer (2012) in their study of migration between European regions.

The unemployment rate is negative and statistically significant in all model formulations, both with the original divisioning of regions and in the alternative divisoning. This strenghtens the hypothesis that it is a driver of interregional migration in Norway. One possible reason as to why this might be robust, is because the event of losing a job can force an individual away from a region. As discussed in section 2.1, reasons for a person to migrate may be familiar connection that is hard to quantify and fit into a panel data set. The consequences of losing a job may be that individuals or households are forced to move away, and the variable *unem* is probably the only variable in my data set that *forces* people to move away from a region.

Table 6: Fixed effects model, alternative regions

Model	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent variable	netmig	netmig	netmig	netmig	netmig	netmig	netmig	netmig	netmig	netmig
lnwage	24.60***	9.197	7.181	5.513	5.374	7.482	7.482	8.689	7.705	7.338
	(5.13)	(1.68)	(1.31)	(0.96)	(0.94)	(1.20)	(1.20)	(1.38)	(1.22)	(1.16)
unem		-1.281***	-1.086***	-1.138***	-1.148***	-0.744**	-0.744**	-0.724**	-0.768**	-0.767**
		(-5.46)	(-4.44)	(-4.56)	(-4.60)	(-2.75)	(-2.74)	(-2.67)	(-2.81)	(-2.81)
industry			0.285**	0.289**	0.306**	0.322**	0.322**	0.337**	0.303*	0.317*
			(2.67)	(2.71)	(2.85)	(2.61)	(2.61)	(2.71)	(2.40)	(2.48)
young				-0.279	-0.286	-0.526	-0.523	-0.578	-0.628*	-0.634*
				(-1.04)	(-1.07)	(-1.77)	(-1.75)	(-1.92)	(-2.07)	(-2.08)
popdens					-75.63	-91.49	-91.44	-88.13	-101.0	-101.6
					(-1.50)	(-1.66)	(-1.66)	(-1.60)	(-1.81)	(-1.82)
crime						-0.0149	-0.0149	-0.0106	-0.0103	-0.00936
						(-0.93)	(-0.93)	(-0.65)	(-0.63)	(-0.57)
edu							-0.00747	-0.00535	0.0158	0.0191
							(-0.09)	(-0.06)	(0.18)	(0.22)
primary								0.248	0.299	0.320
								(1.25)	(1.48)	(1.57)
kindg									-0.0423	-0.0421
									(-1.35)	(-1.34)
cult										0.228
										(0.76)
Constant	-305.2***	-112.5	-92.74	-68.73	-35.17	-52.20	-52.15	-70.02	-48.83	-45.36
	(-5.19)	(-1.67)	(-1.37)	(-0.96)	(-0.47)	(-0.64)	(-0.64)	(-0.85)	(-0.58)	(-0.54)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of regions	46	46	46	46	46	46	46	46	46	46
Observations	690	690	690	690	690	598	598	598	598	598
Within R^2	0.101	0.142	0.152	0.153	0.156	0.147	0.147	0.149	0.152	0.153

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

6.2 Effects of populated areas

In this section, I explore whether net migration rate has the same drivers in the top five regions based on population than what is the case with all 89 regions on average. As outlined in section 3.4, one clear tendency in contemporary Norway is the process of urbanisation. I want to check if the net migration rate is affected differently in these urban areas.

I base the analysis on model (3) found in the fixed effects model in table 5. So the explanatory variables I include are wages, unemployment rates and crime rates. To check whether the effects differ in the urban areas, I create a dummy variable which takes the value of one if the observations are from the regions of Oslo, Bergen, Stavanger/Sandnes, Trondheim or Lillestrøm. This is the top five regions based on population, as found in table 15.

The full model will now be given by:

$$\begin{aligned} netmig_{it} &= \beta_0 + \beta_1 lnwage_{it} + \beta_2 unem_{it} + \beta_3 crime_{it} \\ &+\delta_1 lnwage_{it} \times \text{Top 5}_i + \delta_2 unem_{it} \times \text{Top 5}_i + \delta_3 crime_{it} \times \text{Top 5}_i + u_{it} \end{aligned} \tag{6.1}$$

Here, δ are the coefficient values for the variables that are included, and are multiplied with the dummy variable Top 5 that take the value of one if the observations are from one of the top five regions.

The estimation results of this regression can be found in table 7. The main variables *lnwage*, *unem* and *crime* all have comparable values to what I found in the main model in section 5.3. The variables multiplied with dummy variable have an added ×Top 5. The only statistically significant difference of being in one of the top five regions is the difference in the effect of wages. To find the effect i calculate:

$$\beta_1 + \delta_1 \times d_i = 12,97 + (-8,467) \times 1 = 4,503$$

This is noticeably lower than the result in the main fixed effects regression. Thus, it seems that wages is less important in cities, and that other variables are relatively more important in driving net migration in the highest populated regions in Norway.

6.2.1 Results

Table 7: Fixed effects model, dummies included for the 5 most populated regions

	(1)
	netmig
lnwage	12.97**
	(2.80)
unem	-0.892***
	(-4.09)
crime	-0.0309*
	(-2.42)
lnwage×Top 5	-8.467*
	(-2.38)
unem×Top 5	0.532
	(0.90)
crime×Top 5	-0.0470
	(-1.04)
Constant	-151.9**
	(-2.65)
Year fixed effects	Yes
Region fixed effects	Yes
No. of regions	89
Observations	1157
Within R^2	0.0901

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

6.3 Shortcomings and future research

A main problem with much of the analysis is endogeneity concerns. Variables such as wages, unemployment, education levels and so on are prone to endogenity concerns. It is not clear whether jobs, wages etc. follow people, or if people choose to migrate beacuse of these factors are better in the area they are moving. Partridge & Rickman (2003) found that it is slightly more likely that people are following jobs than vice versa, this is reassuring. It makes my main result of unemployment being important slightly more credible. It is still reason to believe that many of the included variables have endogeneity problems. As mentioned in section 4.1.4 one possible solution is to include an instrument variable. The main challenge with this approach is to find an instrument that meets the criteria of being uncorrelated with the error term, but still being correlated with the endogenous variable.

Another problem with the analysis is that I try to explain the migration decision, which is a personal decision made by individuals on the basis of macro data. This is fundamentally problematic, as individuals rarely make decisions on the basis of macro data. This is a known problem, and studies such as Carlsen (2005) have addressed this problem by looking at survey data containing more than 70 000 responses regarding a range of local amenities and reports on the intentions of migrating.

For future research it would be interesting to include housing prices. Because of data unavailability, I was not able to include these. Other variables regarding amenities would also be interesting to include in future analyses. As discussed in section 3.5, it is highly questionable whether my included variable on public cultural expenses truly reflect the quality of culture in the region of interest.

Another extension of the analysis done, is to extend the time period beyond 2014. The major oil price drop in recent years has spiked unemployment rates in many regions in Norway, and it would be interesting to analyse whether this has affected the drivers of domestic migration flows within Norway.

7 Conclusion

The goal of this thesis was to find which characteristics of the regions in Norway are important in deciding the appeal of each region towards domestic migrants. The main conclusion is that economic variables seem to be the most important factor for deciding migration flows between regions, and that the unemployment rate is the only variable which is significant in all model formulations.

Wages also seem to be important in deciding migration flows, but the credibility of this result is somewhat weakened by the fact that the effect is not statistically significant when the amount of labour market regions are reduced from 89 to 46.

I also found that wages seem to be less important in driving migration flows to the most populated regions. And it seems that other factors relatively more important.

Sociodemographic factors are not found to be important, although it seems to be a possibility that regions with a high percentage of young people are more prone to experience out-migration.

Amenities does also not seem to be important in deciding migration flows, but there seems to be a possibility that higher crime rates may lead to higher out-migration. One possible explanation as to why amenities are insignificant, is because amenities are difficult to quantify, and find good measures for.

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Appendix

I have included tables containing miscellaneous statistics. As mentioned in the text, the data's origin is Statistics Norway (SSB), the Norwegian centre for research data (NSD) and the Meterological institute of Norway. See table 3 for the definition on the variables used in the analysis.

All numbers relative to population have been calculated relative to the population numbers from NSD.

Specifically, data collected from SSB is: Migration data, Wage data Registered unemployed workers, Education levels, Age levels , Kindergarten data and Cultural expenses data.

Data collected from NSD is: Population data, Employment in agriculture, forestry and fishing, Employment in industry, mining, oil and gas sector, Surface area data, Coastline data.

The only data collected from the meterological institute of Norway is data on average January temperature in celsius during the period 1994-2002.

All the data have undergone extensive revision on my part, as much of the data has been calculated from municipality level into region level relative to each region's population. Any errors or miscalculations in the data are probably my fault.

Table 8: Correlation matrix

	netmov	unem	popdens	lnwage	edu	young	temp	crime	primary	industry	coast	kindg	cult
netmov	1												
unem	-0.0565	1											
popdens	0.2017	0.0566	1										
lnwage	0.2264	-0.3753	0.2841	1									
edu	0.3125	-0.1462	0.6087	0.6503	1								
young	-0.1253	-0.1819	-0.1875	0.3418	0.1568	1							
temp	-0.074	0.0281	-0.0061	0.0712	-0.037	0.4541	1						
crime	0.37	0.2802	0.4289	-0.0362	0.2465	-0.3174	-0.1681	1					
primary	-0.4239	-0.001	-0.3079	-0.4307	-0.5705	0.069	0.0264	-0.5241	1				
industry	-0.0264	-0.1061	-0.1929	-0.0834	-0.2517	0.1215	0.5524	-0.156	-0.0201	1			
coast	-0.0717	0.2229	0.1247	0.0837	0.1587	0.4121	0.6487	-0.0266	-0.1142	0.2229	1		
kindg	-0.0862	-0.3665	-0.0522	0.6208	0.289	0.2467	-0.0581	-0.3047	0.039	-0.1862	-0.0414	1	
cult	-0.201	-0.1063	-0.01	-0.0211	-0.0142	-0.1794	-0.1411	0.1148	-0.0383	-0.033	-0.1525	0.0298	1

Table 9: Correlation matrix, alternative regions

	netmov	unem	popdens	lnwage	edu	young	crime	primary	industry	kindg	cult
netmov	1										
unem	0.0028	1									
popdens	0.3379	0.1265	1								
lnwage	0.2282	-0.382	0.1537	1							
edu	0.4744	-0.1698	0.2339	0.664	1						
young	-0.0638	-0.1787	0.0582	0.5126	0.3456	1					
crime	0.3918	0.3279	0.3429	-0.0769	0.1698	-0.3027	1				
primary	-0.5217	0.0132	-0.2789	-0.417	-0.571	-0.1195	-0.5279	1			
industry	0.1743	-0.1958	0.0618	0.0324	-0.0718	0.1276	-0.1655	-0.1276	1		
kindg	-0.0652	-0.433	-0.1025	0.7097	0.3924	0.3513	-0.3127	0.0273	-0.1606	1	
cult	-0.1659	-0.0663	-0.2158	-0.0258	0.0066	-0.1566	0.2999	-0.0889	-0.093	-0.0401	1

Table 10: *netmig* per region, mean values 2000-2014

Order	Region	netmov	Order	Region	netmov
1	Jessheim/Eidsvoll	14.61052	50	Rørvik	-3.92696
2	Stjørdalshalsen	6.032327	51	Surnadal	-4.25566
3	Halden	5.87507	52	Vest-Telemark	-4.62103
4	Lillestrøm	5.777713	53	Voss	-4.86592
5	Fredrikstad/Sarpsborg	5.293785	54	Brønnøysund	-4.97341
6	Moss	5.263655	55	Mo i Rana	-4.97684
7	Sande/Svelvik	4.037935	56	Sunnhordland	-5.17464
8	Askim/Mysen	3.9202	57	Flekkefjord	-5.21292
9	Holmestrand	3.911169	58	Ørsta/Volda	-5.29184
10	Drammen	3.880376	59	Tynset	-6.02741
11	Jæren	3.621023	60	Førde	-6.23028
12	Follo	3.506316	61	Harstad	-6.28901
13	Tønsberg/Horten	3.339093	62	Midt-Gudbrandsdalen	-6.30325
14	Trondheim	2.531968	63	Alta	-6.50181
15	Hamar	2.16218	64	Namsos	-6.55964
16	Sandefjord/Larvik	2.109235	65	Setesdal	-6.71573
17	Kristiansand	2.059305	66	Kirkenes	-6.72627
18	Hønefoss	1.866416	67	Sogndal/Årdal	-6.75801
19	Bergen	1.62657	68	Mosjøen	-7.04413
20	Arendal	1.529417	69	Nord-Gudbrandsdalen	-7.07247
21	Hadeland	1.527823	70	Nord-Troms	-7.09793
22	Bærum/Asker	0.74596	71	Vesterålen	-7.14559
23	Stavanger/Sandnes	0.446823	72	Ulsteinvik	-7.31569
24	Røros	0.437098	73	Valdres	-7.69542
25	Kongsberg	0.37011	74	Nordfjord	-7.79705
26	Lillehammer	0.237579	75	Lofoten	-8.35522
27	Kongsvinger	0.157922	76	Finnsnes	-8.40799
28	Mandal	0.042634	77	Lyngdal/Farsund	-8.6971
29	Lillesand	0.014029	78	Narvik	-9.50823
30	Oslo	-0.05889	79	Hallingdal	-9.53004
31	Gjøvik	-0.21491	80	Hammerfest	-10.5365
32	Skien/Porsgrunn	-0.31458	81	Sandnessjøen	-10.624
33	Oppdal	-0.69896	82	Høyanger	-10.7024
34	Elverum	-0.71299	83	Odda	-10.7611
35	Notodden/Bø	-0.98013	84	Florø	-10.7745
36	Tromsø	-1.14708	85	Grong	-12.9129
37	Orkanger	-1.30063	86	Andselv	-13.8588
38	Levanger/Verdalsøra	-1.50664	87	Rjukan	-14.1012
39	Haugesund	-1.71603	88	Sunndalsøra	-15.5209
40	Ålesund	-1.77111	89	Vadsø	-16.4408
41	Kragerø	-2.12007			
42	Kristiansund	-2.1345			
43	Risør	-2.52326			
44	Brekstad	-2.56339			
45	Egersund	-2.73467			
46	Steinkjer	-2.86483			
47	Frøya/Hitra	-3.0011			
48	Molde	-3.51129			
49	Bodø	-3.77285			

Table 11: *netmig* in alternative grouping of regions, mean values 2000-2014

Order	Region	netmig
1	Sør-Østfold	5.383222
2	Oslo	2.972111
3	Vestfold	2.865704
4	Hamar	2.155975
5	Trondheim	1.988862
6	Kristiansand	1.08854
7	Arendal	1.080461
8	Bergen	0.972068
9	Stavanger	0.68589
10	Kongsberg	0.363352
11	Lillehammer	0.236686
12	Kongsvinger	0.157331
13	Gjøvik	-0.21457
14	Sør-Telemark	-0.52972
15	Elverum	-0.71018
16	Øst-Telemark	-0.98024
17	Haugesund	-1.71396
18	Ålesund	-1.76521
19	Tromsø	-1.90227
20	Kristiansund	-2.13269
21	Midt-Trøndelag	-2.20422
22	Molde	-3.50657
23	Bodø	-3.76507
24	Tynset/Røros	-3.89006
25	Sunnhordaland	-5.1677
26	Indre Helgeland	-5.66922
27	Harstad	-6.28086
28	Søndre Sunnmøre	-6.46628
29	Alta	-6.48879
30	Sognefjord	-6.75271
31	Gudbrandsdalen	-6.76634
32	Namsos	-6.80062
33	Lister	-7.05617
34	Vesterålen	-7.14119
35	Nordvest-Telemark	-7.49185
36	Valdres	-7.6953
37	Nordfjord	-7.79397
38	Ytre Helgeland	-7.9886
39	Lofoten	-8.34679
40	Sunnfjord	-8.34723
41	Narvik	-9.50115
42	Hallingdal	-9.52136
43	Nordmøre	-10.0697
44	Hammerfest	-10.5276
45	Midt-Troms	-10.7875
46	Vadsø	-12.7173

Table 12: Economic variables, mean values 2000-2014

Order	Region	*lnwage*	Region	*unem*	Region	*primary*	Region	*industry*
1	Bærum/Asker	12.993374	Vadsø	5.5391	Rørvik	15.267	Sunnhordland	26.727
2	Oslo	12.833752	Alta	4.5681	Tynset	14.692	Egersund	26.148
3	Stavanger/Sandnes	12.811736	Nord-Troms	4.3637	Oppdal	14.221	Ulsteinvik	26.11
4	Follo	12.784997	Lofoten	4.3333	Grong	13.163	Kongsberg	25.878
5	Lillestrøm	12.727637	Hammerfest	4.315	Nord-Gudbrandsdalen	13.095	Sunndalsøra	25.497
6	Jæren	12.711782	Vesterålen	4.162	Brekstad	12.548	Lyngdal/Farsund	24.286
7	Kongsberg	12.699092	Risør	3.909	Lofoten	12.327	Frøya/Hitra	24.13
8	Bergen	12.697785	Sandnessjøen	3.809	Surnadal	12.233	Høyanger	21.479
9	Drammen	12.675548	Skien/Porsgrunn	3.7674	Brønnøysund	12.224	Stavanger/Sandnes	21.117
10	Jessheim/Eidsvoll	12.671278	Fredrikstad/Sarpsborg	3.6897	Sandnessjøen	11.64	Jæren	21.043
11	Ulsteinvik	12.656069	Oslo	3.592	Nord-Troms	11.527	Ålesund	20.597
12	Ålesund	12.655079	Halden	3.5551	Frøya/Hitra	11.483	Halden	20.192
13	Tønsberg/Horten	12.650871	Arendal	3.547	Midt-Gudbrandsdalen	11.062	Odda	19.923
14	Trondheim	12.649931	Levanger/Verdalsøra	3.4436	Valdres	10.337	Risør	19.9
15	Hønefoss	12.648928	Kragerø	3.4023	Steinkjer	9.8323	Florø	19.558
16	Sande/Svelvik	12.642466	Kongsvinger	3.3755	Nordfjord	9.3747	Flekkefjord	19.067
17	Tromsø	12.639526	Steinkjer	3.3405	Høyanger	9.2101	Nordfjord	18.879
18	Haugesund	12.639109	Sandefjord/Larvik	3.3287	Orkanger	8.9394	Haugesund	18.617
19	Kristiansand	12.638606	Kristiansund	3.3185	Jæren	8.8519	Mandal	17.887
20	Egersund	12.633835	Mo i Rana	3.2846	Levanger/Verdalsøra	8.5024	Surnadal	17.522
21	Moss	12.625831	Kristiansand	3.2692	Vesterålen	8.4049	Skien/Porsgrunn	17.511
22	Sandefjord/Larvik	12.623436	Brekstad	3.1807	Hammerfest	7.724	Røros	17.498
23	Molde	12.621585	Florø	3.1595	Førde	7.7111	Molde	17.179
24	Sunnhordland	12.619988	Narvik	3.1351	Vadsø	7.5297	Lillesand	17.174
25	Florø	12.615881	Kirkenes	3.13	Namsos	7.4883	Gjøvik	16.671
26	Lillesand	12.61168	Trondheim	3.1109	Ulsteinvik	7.1781	Mosjøen	16.373
27	Holmestrand	12.607385	Bodø	3.1041	Finnsnes	7.0792	Orkanger	16.308
28	Bodø	12.606744	Moss	3.0556	Alta	6.9679	Sogndal/Årdal	16.207
29	Hallingdal	12.604553	Tønsberg/Horten	2.9859	Sunnhordland	6.8361	Holmestrand	16.076
30	Skien/Porsgrunn	12.601587	Haugesund	2.9777	Voss	6.7083	Fredrikstad/Sarpsborg	15.945
31	Arendal	12.601056	Harstad	2.9651	Egersund	6.4901	Kragerø	15.938
32	Flekkefjord	12.590341	Elverum	2.9537	Ørsta/Volda	6.4633	Rjukan	15.641
33	Lillehammer	12.588077	Rørvik	2.9419	Sunndalsøra	6.2994	Ørsta/Volda	15.17
34	Hadeland	12.585787	Lyngdal/Farsund	2.9411	Florø	6.2526	Kristiansund	15.017
35	Førde	12.584434	Namsos	2.8947	Sogndal/Årdal	6.0309	Sande/Svelvik	14.949
36	Kristiansund	12.581751	Finnsnes	2.8688	Elverum	5.944	Mo i Rana	14.909
37	Sogndal/Årdal	12.579273	Drammen	2.8646	Hallingdal	5.9399	Arendal	14.762
38	Stjørdalshalsen	12.577166	Ulsteinvik	2.8593	Røros	5.8928	Levanger/Verdalsøra	14.516
39	Askim/Mysen	12.577058	Frøya/Hitra	2.8555	Vest-Telemark	5.7897	Sandefjord/Larvik	14.243

Continued on next page

Table 12 – Continued from previous page

Order	Region	*lnwage*	Region	*unem*	Region	*primary*	Region	*industry*
40	Kirkenes	12.575943	Bergen	2.809	Kongsvinger	5.7551	Kristiansand	14.165
41	Lyngdal/Farsund	12.574229	Notodden/Bø	2.7648	Setesdal	5.7137	Bergen	14.146
42	Vadsø	12.573191	Holmestrand	2.7262	Kristiansund	5.5628	Hønefoss	13.989
43	Høyanger	12.565095	Sunnhordland	2.6994	Molde	5.2606	Stjørdalshalsen	13.252
44	Hammerfest	12.564818	Orkanger	2.6976	Mosjøen	5.1535	Kongsvinger	13.233
45	Fredrikstad/Sarpsborg	12.564267	Stjørdalshalsen	2.6678	Odda	4.9559	Moss	12.862
46	Rjukan	12.561724	Hamar	2.6418	Andselv	4.8121	Rørvik	12.686
47	Andselv	12.559207	Grong	2.6264	Mandal	4.659	Notodden/Bø	12.648
48	Mandal	12.558508	Tromsø	2.6048	Gjøvik	4.6487	Steinkjer	11.96
49	Hamar	12.55774	Midt-Gudbrandsdalen	2.584	Flekkefjord	4.5202	Askim/Mysen	11.836
50	Nordfjord	12.555316	Lillesand	2.5839	Askim/Mysen	4.5079	Finnsnes	11.727
51	Ørsta/Volda	12.555017	Mandal	2.5809	Stjørdalshalsen	4.4149	Drammen	11.703
52	Odda	12.554114	Askim/Mysen	2.5795	Lillehammer	4.2478	Oppdal	11.48
53	Sunndalsøra	12.55262	Hønefoss	2.5618	Hamar	4.2367	Setesdal	11.376
54	Setesdal	12.549992	Mosjøen	2.5489	Lyngdal/Farsund	4.2134	Sandnessjøen	11.35
55	Narvik	12.54323	Setesdal	2.5453	Notodden/Bø	4.0984	Hamar	11.322
56	Voss	12.541697	Jessheim/Eidsvoll	2.5417	Bodø	3.983	Lofoten	10.346
57	Notodden/Bø	12.538834	Sande/Svelvik	2.5245	Harstad	3.8206	Namsos	10.33
58	Alta	12.538383	Stavanger/Sandnes	2.5054	Hadeland	3.6197	Vesterålen	10.269
59	Halden	12.536734	Rjukan	2.486	Ålesund	3.6012	Tynset	10.174
60	Gjøvik	12.534528	Brønnøysund	2.484	Tromsø	3.5768	Elverum	10.055
61	Namsos	12.53244	Lillestrøm	2.437	Mo i Rana	3.4388	Nord-Gudbrandsdalen	9.9298
62	Mo i Rana	12.531919	Nord-Gudbrandsdalen	2.4196	Rjukan	3.0503	Førde	9.8493
63	Mosjøen	12.529471	Gjøvik	2.4177	Haugesund	2.7526	Hadeland	9.5196
64	Vest-Telemark	12.527633	Ålesund	2.4075	Sande/Svelvik	2.7484	Brekstad	9.3543
65	Vesterålen	12.52532	Ørsta/Volda	2.364	Kongsberg	2.7458	Midt-Gudbrandsdalen	9.2671
66	Finnsnes	12.523048	Flekkefjord	2.3574	Hønefoss	2.7105	Vadsø	9.075
67	Levanger/Verdalsøra	12.521452	Nordfjord	2.2739	Kirkenes	2.7069	Trondheim	9.0736
68	Frøya/Hitra	12.51891	Voss	2.2706	Kragerø	2.61	Hallingdal	8.9503
69	Røros	12.517038	Odda	2.247	Holmestrand	2.4889	Voss	8.9144
70	Rørvik	12.51698	Molde	2.2291	Risør	2.3563	Hammerfest	8.6749
71	Lofoten	12.515301	Vest-Telemark	2.1684	Lillesand	2.3409	Tønsberg/Horten	8.5335
72	Orkanger	12.511572	Lillehammer	2.1583	Stavanger/Sandnes	2.3201	Brønnøysund	8.4675
73	Elverum	12.510726	Follo	2.1499	Narvik	2.2106	Vest-Telemark	8.0241
74	Sandnessjøen	12.50926	Sunndalsøra	2.1493	Halden	2.179	Grong	7.9759
75	Midt-Gudbrandsdalen	12.508572	Andselv	2.0988	Arendal	2.1089	Bodø	7.9758
76	Kragerø	12.505194	Hadeland	2.0973	Jessheim/Eidsvoll	2.0682	Harstad	7.9294
77	Brekstad	12.505126	Egersund	2.0364	Sandefjord/Larvik	1.978	Lillestrøm	7.9062
78	Valdres	12.505102	Surnadal	2.003	Trondheim	1.9344	Lillehammer	7.3005
79	Risør	12.501986	Oppdal	2.0022	Moss	1.8178	Narvik	7.2971

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Table 12 – Continued from previous page

Order	Region	*lnwage*	Region	*unem*	Region	*primary*	Region	*industry*
80	Oppdal	12.500875	Kongsberg	1.9836	Fredrikstad/Sarpsborg	1.6732	Kirkenes	7.1548
81	Kongsvinger	12.498579	Høyanger	1.861	Drammen	1.6197	Alta	7.1399
82	Steinkjer	12.492884	Røros	1.7961	Bergen	1.5261	Jessheim/Eidsvoll	7.0605
83	Brønnøysund	12.491325	Bærum/Asker	1.7454	Skien/Porsgrunn	1.3445	Valdres	6.9875
84	Surnadal	12.472622	Førde	1.6833	Lillestrøm	1.3188	Bærum/Asker	6.8638
85	Nord-Troms	12.466729	Jæren	1.6633	Tønsberg/Horten	1.2488	Nord-Troms	6.3049
86	Tynset	12.466421	Tynset	1.5543	Follo	1.0042	Follo	5.7527
87	Harstad	12.461679	Hallingdal	1.4306	Kristiansand	0.9773	Oslo	5.6872
88	Grong	12.453276	Sogndal/Årdal	1.411	Bærum/Asker	0.5455	Tromsø	5.685
89	Nord-Gudbrandsdalen	12.445239	Valdres	1.3985	Oslo	0.2119	Andselv	5.167

Table 13: Sociodemographic variables, mean values 2000-2014

Order	Region	*popdens*	Region	*edu*	Region	*young*
1	Oslo	1230.292	Bærum/Asker	34.32352	Jæren	14.32444
2	Bærum/Asker	548.9205	Oslo	33.12915	Egersund	14.23591
3	Follo	189.9036	Follo	25.40689	Førde	14.20384
4	Tønsberg/Horten	154.0341	Trondheim	24.77692	Ørsta/Volda	14.09124
5	Fredrikstad/Sarpsborg	110.0464	Tromsø	23.59401	Sunnhordland	14.02472
6	Moss	105.0523	Lillehammer	22.5903	Kristiansand	13.78972
7	Kristiansand	104.1282	Bergen	22.56488	Nordfjord	13.74292
8	Sandefjord/Larvik	92.46285	Kongsberg	22.53027	Alta	13.74276
9	Jæren	83.96811	Stavanger/Sandnes	22.49698	Haugesund	13.70392
10	Bergen	74.35477	Tønsberg/Horten	21.5865	Lyngdal/Farsund	13.63378
11	Stavanger/Sandnes	72.38743	Kristiansand	20.52606	Andselv	13.58846
12	Lillestrøm	67.78167	Ørsta/Volda	19.67708	Mandal	13.58473
13	Drammen	61.8328	Bodø	18.98693	Lillesand	13.53375
14	Sande/Svelvik	61.40897	Arendal	18.96764	Levanger/Verdalsøra	13.47544
15	Skien/Porsgrunn	57.27775	Lillesand	18.63996	Sandnessjøen	13.44611
16	Holmestrand	51.56335	Førde	18.41217	Setesdal	13.3697
17	Jessheim/Eidsvoll	44.26105	Sogndal/Årdal	18.39148	Ulsteinvik	13.34881
18	Ulsteinvik	34.22801	Kirkenes	18.361	Stavanger/Sandnes	13.3355
19	Trondheim	32.88013	Drammen	18.33879	Molde	13.26157
20	Askim/Mysen	31.64314	Lillestrøm	18.07409	Flekkefjord	13.22841
21	Hamar	31.64003	Levanger/Verdalsøra	18.07385	Arendal	13.21413
22	Halden	30.82476	Alta	18.01979	Bodø	13.21276
23	Haugesund	29.84824	Hamar	17.98613	Florø	13.20907
24	Kristiansund	28.9027	Moss	17.92357	Harstad	13.20562
25	Ålesund	27.93375	Notodden/Bø	17.78859	Namsos	13.1758
26	Arendal	25.6466	Hønefoss	17.68804	Ålesund	13.16833
27	Hadeland	22.02723	Ålesund	17.65133	Rørvik	13.13659
28	Gjøvik	21.532	Voss	17.50122	Trondheim	13.05401
29	Lofoten	19.43562	Sandefjord/Larvik	17.479	Tønsberg/Horten	13.02868
30	Harstad	18.53534	Namsos	17.08581	Bergen	13.01418
31	Risør	18.30783	Molde	17.05974	Steinkjer	12.99985
32	Sunnhordland	18.26696	Skien/Porsgrunn	17.03226	Voss	12.94803
33	Hønefoss	17.10844	Andselv	16.88591	Sogndal/Årdal	12.93054
34	Lyngdal/Farsund	16.65131	Halden	16.81166	Nord-Troms	12.91687
35	Lillesand	16.04539	Holmestrand	16.72335	Lofoten	12.91359
36	Lillehammer	15.95692	Stjørdalshalsen	16.67782	Narvik	12.91202
37	Levanger/Verdalsøra	15.30561	Fredrikstad/Sarpsborg	16.52686	Brønnøysund	12.88202
38	Molde	14.30111	Hammerfest	16.27881	Notodden/Bø	12.81301
39	Ørsta/Volda	13.89114	Harstad	16.27516	Brekstad	12.81162
40	Sandnessjøen	12.74161	Elverum	16.16742	Vest-Telemark	12.79575
41	Egersund	12.73763	Mandal	16.11444	Risør	12.76091
42	Vesterålen	12.14344	Narvik	16.09979	Orkanger	12.75902
43	Mandal	11.37373	Tynset	15.98219	Høyanger	12.75712
44	Kongsvinger	10.80605	Vest-Telemark	15.8193	Tromsø	12.68933
45	Kragerø	10.78502	Røros	15.6872	Oppdal	12.66913
46	Tromsø	10.43828	Nordfjord	15.65607	Finnsnes	12.66404

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Table 13 – Continued from previous page

Order	Region	*popdens*	Region	*edu*	Region	*young*
47	Stjørdalshalsen	10.36796	Gjøvik	15.65126	Tynset	12.63351
48	Notodden/Bø	10.33575	Steinkjer	15.61336	Skien/Porsgrunn	12.60502
49	Florø	10.13262	Mo i Rana	15.33752	Stjørdalshalsen	12.60377
50	Frøya/Hitra	9.127878	Kristiansund	15.27935	Kristiansund	12.56579
51	Førde	8.599045	Sunnhordland	15.15329	Lillehammer	12.56092
52	Nordfjord	8.284772	Setesdal	15.14567	Vesterålen	12.54562
53	Orkanger	8.068552	Sunndalsøra	15.11977	Mosjøen	12.50205
54	Finnsnes	7.440318	Vadsø	15.10484	Mo i Rana	12.50098
55	Kongsberg	7.095389	Risør	15.1012	Sunndalsøra	12.49857
56	Brekstad	6.971948	Odda	15.03706	Surnadal	12.44661
57	Rørvik	6.596033	Jessheim/Eidsvoll	14.93996	Grong	12.40346
58	Bodø	6.519964	Haugesund	14.91952	Kragerø	12.38792
59	Steinkjer	6.254473	Sande/Svelvik	14.75177	Askim/Mysen	12.38678
60	Namsos	5.940486	Jæren	14.64553	Sandefjord/Larvik	12.32135
61	Voss	5.829688	Flekkefjord	14.41912	Vadsø	12.28244
62	Flekkefjord	5.351545	Mosjøen	14.36866	Hammerfest	12.27412
63	Narvik	5.135087	Frøya/Hitra	14.35438	Odda	12.24468
64	Mo i Rana	5.092294	Florø	14.22129	Follo	12.24445
65	Sunndalsøra	5.085303	Hadeland	14.20712	Halden	12.21244
66	Midt-Gudbrandsdalen	4.37197	Sandnessjøen	14.10516	Hamar	12.19931
67	Surnadal	4.284882	Kragerø	14.07342	Kirkenes	12.17593
68	Høyanger	4.208065	Lyngdal/Farsund	14.06429	Hallingdal	12.15117
69	Brønnøysund	4.138841	Valdres	14.05289	Sande/Svelvik	12.14391
70	Elverum	3.628845	Høyanger	14.04778	Nord-Gudbrandsdalen	12.0532
71	Hallingdal	3.464587	Ulsteinvik	13.95315	Frøya/Hitra	12.04731
72	Valdres	3.347226	Vesterålen	13.61014	Hadeland	12.03429
73	Sogndal/Årdal	3.20683	Brønnøysund	13.51869	Bærum/Asker	11.97441
74	Rjukan	3.026586	Grong	13.47106	Drammen	11.96385
75	Oppdal	2.85387	Oppdal	13.45294	Hønefoss	11.94959
76	Odda	2.68941	Orkanger	13.37792	Fredrikstad/Sarpsbor	11.93484
77	Mosjøen	2.490541	Rjukan	13.33848	Lillestrøm	11.87527
78	Røros	2.434934	Askim/Mysen	13.28074	Kongsberg	11.85087
79	Kirkenes	2.431563	Finnsnes	13.22576	Valdres	11.84737
80	Andselv	2.125161	Lofoten	13.21648	Holmestrand	11.75632
81	Vest-Telemark	2.034331	Nord-Troms	12.86961	Gjøvik	11.69434
82	Nord-Gudbrandsdalen	1.980112	Surnadal	12.84003	Elverum	11.69066
83	Setesdal	1.666709	Egersund	12.66829	Jessheim/Eidsvoll	11.67481
84	Tynset	1.639882	Midt-Gudbrandsdalen	12.34928	Moss	11.67028
85	Nord-Troms	1.61551	Kongsvinger	12.26436	Røros	11.55234
86	Alta	1.582693	Brekstad	12.21689	Midt-Gudbrandsdalen	11.49622
87	Vadsø	1.581738	Hallingdal	11.72969	Rjukan	11.23502
88	Hammerfest	1.239119	Rørvik	11.03013	Oslo	11.16595
89	Grong	0.760677	Nord-Gudbrandsdalen	10.641	Kongsvinger	11.14143

Table 14: Amenities, mean values 2000-2014

Order	Region	*crime*	Region	*kindg*	Region	*coast*	Region	*temp*	Region	*cult*
1	Oslo	157.4277	Brønnøysund	93.80849	Ålesund	1	Ulsteinvik	4.044445	Rjukan	7.2
2	Jessheim/Eidsvoll	134.6838	Kirkenes	93.17143	Alta	1	Sunnhordland	3.455556	Kirkenes	6.585714
3	Tønsberg/Horten	114.5838	Levanger/Verdalsøra	93.15071	Andselv	1	Odda	3.455556	Setesdal	6.481753
4	Halden	111.5639	Røros	89.65428	Arendal	1	Molde	3.444444	Odda	5.99896
5	Sandefjord/Larvik	102.4614	Stjørdalshalsen	89.14477	Bærum/Asker	1	Ålesund	3.266667	Hammerfest	5.831805
6	Kristiansand	101.4575	Sogndal/Årdal	88.89205	Bergen	1	Haugesund	3.044445	Vest-Telemark	5.82295
7	Kragerø	100.0321	Kongsberg	87.63616	Bodø	1	Bergen	2.655555	Stavanger/Sandnes	5.79226
8	Skien/Porsgrunn	98.16868	Sandnessjøen	87.53391	Brekstad	1	Jæren	2.544444	Vadsø	5.595012
9	Arendal	98.14174	Frøya/Hitra	87.12321	Brønnøysund	1	Stavanger/Sandnes	2.544444	Hallingdal	5.483773
10	Kirkenes	90.78412	Notodden/Bø	86.91489	Drammen	1	Lyngdal/Farsund	2.422222	Sunndalsøra	5.229146
11	Holmestrand	89.30505	Høyanger	86.87409	Egersund	1	Høyanger	2.322222	Oppdal	5.16908
12	Elverum	89.21684	Brekstad	86.85164	Finnsnes	1	Ørsta/Volda	2.033333	Haugesund	5.115502
13	Notodden/Bø	88.52215	Kristiansund	86.55	Flekkefjord	1	Sunndalsøra	1.944444	Bærum/Asker	5.094274
14	Hammerfest	88.35981	Tynset	86.53181	Florø	1	Sandnessjøen	1.333333	Røros	5.070754
15	Kristiansund	87.90953	Setesdal	86.52203	Follo	1	Arendal	1.233333	Nord-Gudbrandsdalen	4.981774
16	Fredrikstad/Sarpsbor	86.07527	Ulsteinvik	86.4611	Førde	1	Mandal	1.166667	Brekstad	4.719462
17	Hallingdal	85.11929	Florø	86.28868	Fredrikstad/Sarpsbor	1	Florø	0.944444	Midt-Gudbrandsdalen	4.708547
18	Moss	84.11673	Orkanger	86.17144	Frøya/Hitra	1	Nordfjord	0.944444	Sogndal/Årdal	4.628474
19	Mosjøen	80.96328	Hallingdal	86.09342	Halden	1	Brekstad	0.811111	Bodø	4.605111
20	Risør	80.54255	Lillehammer	85.51884	Hammerfest	1	Frøya/Hitra	0.811111	Sandefjord/Larvik	4.575821
21	Haugesund	80.30571	Sunndalsøra	85.51502	Harstad	1	Risør	0.8	Jæren	4.563637
22	Stavanger/Sandnes	79.62924	Vesterålen	85.50525	Haugesund	1	Lofoten	0.533333	Kristiansand	4.555193
23	Mandal	78.62995	Tromsø	85.44186	Holmestrand	1	Mo i Rana	0.522222	Surnadal	4.55206
24	Setesdal	78.55581	Sunnhordland	85.40026	Høyanger	1	Sandefjord/Larvik	0.5	Grong	4.532956
25	Hønefoss	77.60673	Follo	85.23303	Jæren	1	Tønsberg/Horten	0.5	Tromsø	4.489491
26	Trondheim	77.34507	Rørvik	85.08255	Kirkenes	1	Brønnøysund	0.433333	Bergen	4.445473
27	Mo i Rana	77.08037	Hammerfest	84.99935	Kragerø	1	Rørvik	0.433333	Mo i Rana	4.436226
28	Bergen	76.56961	Bærum/Asker	84.82256	Kristiansand	1	Mosjøen	0.433333	Follo	4.394493
29	Alta	75.96257	Lofoten	84.72139	Kristiansund	1	Flekkefjord	0.233333	Trondheim	4.341135
30	Drammen	75.26674	Surnadal	84.7074	Levanger/Verdalsøra	1	Egersund	0.233333	Skien/Porsgrunn	4.293734
31	Tromsø	74.8436	Midt-Gudbrandsdalen	84.57627	Lillesand	1	Surnadal	0.033333	Egersund	4.266732
32	Askim/Mysen	73.92023	Elverum	84.54462	Lofoten	1	Kristiansund	0.033333	Drammen	4.222289
33	Vadsø	73.83858	Ørsta/Volda	84.53673	Lyngdal/Farsund	1	Kristiansand	-0.04444	Mosjøen	4.195679
34	Vest-Telemark	73.65259	Bodø	84.47747	Mandal	1	Lillesand	-0.04444	Namsos	4.182087
35	Lillesand	70.09565	Grong	84.46994	Mo i Rana	1	Bodø	-0.23333	Stjørdalshalsen	4.156632
36	Kongsvinger	69.28568	Namsos	84.46766	Molde	1	Førde	-0.33333	Andselv	4.141699
37	Follo	68.70285	Vadsø	84.34414	Mosjøen	1	Finnsnes	-0.71111	Flekkefjord	4.132541
38	Hamar	66.30766	Valdres	83.79418	Moss	1	Orkanger	-0.77778	Frøya/Hitra	4.104188
39	Bærum/Asker	65.74334	Rjukan	83.67143	Namsos	1	Vesterålen	-0.85556	Florø	4.054902

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Table 14 – continued from previous page

Order	Region	*crime*	Region	*kindg*	Region	*coast*	Region	*temp*	Region	*cult*
40	Kongsberg	65.38458	Hamar	83.66995	Narvik	1	Stjørdalshalsen	-0.93333	Narvik	4.03687
41	Lillestrøm	64.67002	Stavanger/Sandnes	83.43395	Nordfjord	1	Levanger/Verdalsøra	-0.93333	Sande/Svelvik	4.003365
42	Andselv	64.02203	Nord-Troms	83.36404	Nord-Troms	1	Harstad	-1.31111	Høyanger	3.993613
43	Odda	63.96575	Nordfjord	83.33054	Odda	1	Hammerfest	-1.42222	Tynset	3.986241
44	Lyngdal/Farsund	63.20498	Vest-Telemark	83.1123	Orkanger	1	Sogndal/Årdal	-1.43333	Askim/Mysen	3.985327
45	Stjørdalshalsen	62.87141	Skien/Porsgrunn	83.09155	Ørsta/Volda	1	Setesdal	-1.52222	Notodden/Bø	3.973089
46	Levanger/Verdalsøra	62.69033	Ålesund	83.08556	Oslo	1	Halden	-2.06667	Jessheim/Eidsvoll	3.880122
47	Bodø	62.54303	Nord-Gudbrandsdalen	82.97438	Risør	1	Skien/Porsgrunn	-2.08889	Lillehammer	3.828464
48	Oppdal	61.09615	Mosjøen	82.97145	Rørvik	1	Kragerø	-2.08889	Nord-Troms	3.818081
49	Finnsnes	60.5932	Mo i Rana	82.9688	Sande/Svelvik	1	Narvik	-2.16667	Lillestrøm	3.792842
50	Narvik	59.34634	Finnsnes	82.72732	Sandefjord/Larvik	1	Moss	-2.31111	Risør	3.786357
51	Gjøvik	58.72881	Alta	82.4811	Sandnessjøen	1	Fredrikstad/Sarpsbor	-2.31111	Alta	3.782561
52	Flekkefjord	58.36966	Trondheim	82.45546	Skien/Porsgrunn	1	Oslo	-2.83333	Kongsberg	3.770108
53	Hadeland	58.33366	Molde	82.29279	Sogndal/Årdal	1	Hadeland	-2.83333	Orkanger	3.742858
54	Nord-Gudbrandsdalen	57.07338	Holmestrand	81.81677	Stavanger/Sandnes	1	Drammen	-2.83333	Valdres	3.733396
55	Jæren	56.91565	Lillestrøm	81.49263	Steinkjer	1	Voss	-2.83889	Hamar	3.730927
56	Valdres	56.84946	Steinkjer	81.21305	Stjørdalshalsen	1	Namsos	-2.92222	Mandal	3.701493
57	Sande/Svelvik	55.16633	Narvik	81.13468	Sunndalsøra	1	Follo	-2.94444	Ålesund	3.688365
58	Rjukan	55.1382	Harstad	80.8544	Sunnhordland	1	Tromsø	-3.21111	Arendal	3.665929
59	Nord-Troms	55.11249	Gjøvik	80.70686	Surnadal	1	Bærum/Asker	-3.27778	Tønsberg/Horten	3.636721
60	Lillehammer	54.89978	Voss	80.50566	Tønsberg/Horten	1	Steinkjer	-3.77778	Moss	3.634269
61	Frøya/Hitra	53.85218	Hadeland	80.45009	Tromsø	1	Trondheim	-3.88889	Elverum	3.58847
62	Tynset	53.45924	Sande/Svelvik	80.34285	Trondheim	1	Oppdal	-3.97778	Oslo	3.578571
63	Florø	53.19894	Haugesund	80.25411	Ulsteinvik	1	Vadsø	-4.04445	Gjøvik	3.551586
64	Egersund	52.42859	Kongsvinger	80.22051	Vadsø	1	Tynset	-4.23333	Fredrikstad/Sarpsbor	3.540354
65	Voss	49.80644	Odda	79.84075	Vesterålen	1	Askim/Mysen	-4.4	Voss	3.525824
66	Molde	49.74652	Førde	79.74076	Voss	1	Grong	-4.55556	Sunnhordland	3.511265
67	Harstad	49.52391	Drammen	79.70878	Askim/Mysen	0	Kongsvinger	-4.98333	Holmestrand	3.501269
68	Sandnessjøen	49.48913	Arendal	79.6944	Elverum	0	Kongsberg	-5.15556	Finnsnes	3.489179
69	Midt-Gudbrandsdalen	49.04707	Askim/Mysen	79.63521	Gjøvik	0	Holmestrand	-5.15556	Steinkjer	3.4535
70	Ålesund	48.24999	Kragerø	79.50181	Grong	0	Sande/Svelvik	-5.15556	Molde	3.439968
71	Orkanger	48.22265	Tønsberg/Horten	79.47913	Hadeland	0	Notodden/Bø	-5.15556	Lyngdal/Farsund	3.43864
72	Lofoten	46.43896	Oppdal	79.41855	Hallingdal	0	Lillestrøm	-5.16667	Kragerø	3.430263
73	Sogndal/Årdal	45.24566	Andselv	79.37287	Hamar	0	Jessheim/Eidsvoll	-5.22222	Levanger/Verdalsøra	3.3182
74	Høyanger	45.06469	Oslo	79.28571	Hønefoss	0	Rjukan	-5.88889	Lofoten	3.21695
75	Grong	44.94584	Moss	78.87858	Jessheim/Eidsvoll	0	Hamar	-6.21111	Ulsteinvik	3.16825
76	Vesterålen	44.45936	Bergen	78.66498	Kongsberg	0	Vest-Telemark	-6.24444	Lillesand	3.14609
77	Steinkjer	43.64676	Sandefjord/Larvik	78.54603	Kongsvinger	0	Nord-Gudbrandsdalen	-6.38889	Vesterålen	3.121197
78	Førde	43.51374	Hønefoss	77.84588	Lillehammer	0	Alta	-6.4	Hadeland	3.115331
79	Røros	42.74355	Jessheim/Eidsvoll	77.81543	Lillestrøm	0	Midt-Gudbrandsdalen	-6.73333	Brønnøysund	3.107334

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Table 14 – continued from previous page

Order	Region	*crime*	Region	*kindg*	Region	*coast*	Region	*temp*	Region	*cult*
80	Sunndalsøra	42.23314	Flekkefjord	77.36945	Midt-Gudbrandsdalen	0	Nord-Troms	-6.86667	Nordfjord	3.097359
81	Brekstad	41.59205	Kristiansand	77.12903	Nord-Gudbrandsdalen	0	Lillehammer	-6.97778	Sandnessjøen	3.065279
82	Namsos	40.63773	Risør	77.01713	Notodden/Bø	0	Gjøvik	-6.97778	Halden	2.950743
83	Sunnhordland	40.41524	Fredrikstad/Sarpsbor	76.2178	Oppdal	0	Valdres	-7.06667	Ørsta/Volda	2.911419
84	Nordfjord	39.33248	Lillesand	75.903	Rjukan	0	Hallingdal	-7.07222	Kongsvinger	2.829103
85	Rørvik	38.86853	Halden	74.9174	Røros	0	Andselv	-7.44444	Rørvik	2.699639
86	Brønnøysund	38.15652	Jæren	74.8456	Setesdal	0	Hønefoss	-8	Førde	2.645664
87	Ørsta/Volda	35.9974	Egersund	73.87636	Tynset	0	Røros	-8.12222	Kristiansund	2.615692
88	Surnadal	34.99123	Lyngdal/Farsund	71.93882	Valdres	0	Elverum	-8.56667	Hønefoss	2.584966
89	Ulsteinvik	31.48976	Mandal	71.84816	Vest-Telemark	0	Kirkenes	-9.72222	Harstad	2.568225

Table 15: Mean population 2000-2014 by region

No.	Region	Population	No.	Region	Population
	Top				
1	Oslo	562634.8	45	Hammerfest	24777.67
2	Bergen	379977.3	46	Lofoten	23896.87
3	Stavanger/Sandnes	243686.4	47	Notodden/Bø	23762.53
4	Trondheim	220273.2	48	Mandal	23663.2
5	Lillestrøm	184370.5	49	Alta	23502.8
6	Drammen	164838.5	50	Stjørdalshalsen	22980.6
7	Bærum/Asker	161797.3	51	Egersund	22886.53
8	Fredrikstad/Sarpsborg	134549.3	52	Orkanger	21906.6
9	Tønsberg/Horten	112552.7	53	Hallingdal	20245.07
10	Follo	112099.3	54	Nord-Gudbrandsdalen	19590.53
11	Skien/Porsgrunn	108523.1	55	Namsos	19420.53
12	Kristiansand	107538.3	56	Finnsnes	19383.93
13	Haugesund	99118.53	57	Ørsta/Volda	18820.47
14	Ålesund	87629	58	Lyngdal/Farsund	18654
15	Hamar	86478.53	59	Valdres	18095.53
16	Sandefjord/Larvik	86419.2	60	Mosjøen	16461.47
17	Bodø	78222.2		Bottom	
18	Tromsø	78164	61	Flekkefjord	16389.73
19	Arendal	75399.6	62	Voss	16021.73
20	Gjøvik	68323.13	63	Vadsø	15686.93
21	Molde	61977.27	64	Florø	15464.87
22	Jessheim/Eidsvoll	59595.6	65	Tynset	15461.67
23	Sunnhordland	56470	66	Sandnessjøen	15207
24	Moss	54155.93	67	Brekstad	15154.73
25	Kongsvinger	49516.07	68	Andselv	15101.93
26	Askim/Mysen	47327.87	69	Kragerø	14757.87
27	Jæren	46941.27	70	Sande/Svelvik	14557.93
28	Elverum	38699.13	71	Vest-Telemark	14400.73
29	Steinkjer	37776.8	72	Lillesand	13922.4
30	Lillehammer	36903.07	73	Midt-Gudbrandsdalen	13679.07
	Middle		74	Brønnøysund	13239.47
31	Hønefoss	36445.53	75	Holmestrand	12904.93
32	Levanger/Verdalsøra	34902	76	Odda	12735.67
33	Kristiansund	34313.73	77	Nord-Troms	11330.53
34	Mo i Rana	31848.27	78	Sunndalsøra	10416.13
35	Harstad	31504.07	79	Surnadal	9851.267
36	Kongsberg	30711.27	80	Rørvik	9848.133
37	Vesterålen	30474.07	81	Kirkenes	9680.533
38	Halden	29741.6	82	Risør	9423
39	Nordfjord	28767.33	83	Oppdal	9193.467
40	Narvik	28355.87	84	Høyanger	9088
41	Hadeland	28147.47	85	Frøya/Hitra	8435.667
42	Førde	27642.13	86	Setesdal	8132.533
43	Ulsteinvik	26688	87	Røros	7705.467
44	Sogndal/Årdal	26526	88	Rjukan	6204.6
			89	Grong	5407.467