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Internal Migration in Östergötland

Bachelor Thesis in Economics

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Titel: **Intern migration i Östergötland**

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Sammanfattning

Den är uppsatsen undersöker vilka faktorer som påverkar migrationsflödena mellan kommunerna i Östergötland län och om migrationsflödena i Östergötland kan vara tillämpningsbar till någon av de större migrationsteorierna och modellerna. Östergötland valdes eftersom det är en region som har erfarit hög ekonomisk utveckling, särskilt i kommunerna Linköping och Norrköping. Länet förväntas att ha en fortsatt bra tillväxt p g a framtida planer på utveckling av den lokala och regionala infrastrukturen. Länet har också en god, strategisk lokalisering mellan Stockholm, Göteborg och Malmö/Köpenhamn.

Den empiriska studien bygger på fyra regressioner, där den beroende variabeln är migrationsflöden från utflyttningskommunen till inflyttningskommunen, år 2006. Den empiriska analysen visar ett signifikant samband mellan migrationsflödena och populationsdensitet i både utflyttningskommunen och inflyttningskommunen, samt avståndet mellan utflyttningskommunen och inflyttningskommunen. Därmed kan migrationsflödena i Östergötland sägas vara tillämpningsbar på gravitations modeller, delvis även på ”discrete choice” teori och ”random utility” modeller och den nya ekonomiska geografin.

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Abstract

This thesis examines what factors determine the migration flows between the municipalities in Östergötland and if the migration flows in Östergötland are applicable to any of the major migration theories and models. Östergötland was selected because it is a region that has experienced high economic development, especially in the municipalities of Linköping and Norrköping. The county is also expected to continue to grow due to future plans on developing the local and regional infrastructure. The county also has a strategically good location in between Stockholm, Gothenburg and Malmö/Copenhagen.

The empirical study is based upon four regressions, where the dependent variable is the migration flows from the origin municipalities to the destination municipalities in 2006. The empirical study shows a significant relationship between the migration flows and the population density in both the origin and destination municipality and the distance between the origin and the destination municipality. Thereby the migration flows in Östergötland are in line with the spatial interaction models, partly in line with the discrete choice and random utility models, and the new economic geography.

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1 Introduction

1.1 Background

Migration is defined as the act of a permanent or semi-permanent change of residence. There are two main fractions of migration; internal and external. The former fraction of migration occurs when a person moves within a country. The latter fraction, external migration, occurs when a person moves from one country to another. There are a number of factors influencing an individual's migration decision (Lee, 1966).

Clark and Van Lierop (1987) present an additional division of migration; short- and long-distance moves. The main difference between these two sub-divisions is the reasons related to the move. For short-distance moves, motives that dominate are for example life cycle stages, accessibility to certain services, and housing choice. For long-distance moves labor market reasons dominates the migration decision.

Sweden has throughout the history experienced high rates of migration, both internal and external. During the later part of 19^{th} century and in the beginning of 20^{th} century, Sweden was dominated by agriculture and when years of bad harvest hit Sweden people had to migrate in order to survive. In addition, the families were large and in order to support the whole family, some of the family members had to migrate, both external and internal. Additionally, many people emigrated also due to religious reasons. For instance, numerous citizens emigrated from Sweden to the United States. Internal migration was dominated by rural-to-urban movements. Along with the urbanization in Sweden, an increased social mobility followed. This new mobility weakened the close relationship between the individual and the family. The place of birth became more seldom the place the individual lived in later stages in life (Myrdal & Myrdal, 1934).

Over the last decades there has been a change in the migration pattern in Sweden. During the 1970s and 1980s households have changed their place of residence mainly due to changes in employment. Today, housing environment is a large determining factor. People's movement has been uneven distributed over the country. The population growth has since the 1970s been concentrated to a specific number of municipalities. More than 50% of Sweden's municipalities have experienced a negative net migration. Some of these municipalities have had negative population development during approximately 50 years (Johansson et al, 2007).

There has been a tendency towards increasing regions in Sweden. Large regions show the highest economic growth rate compared to smaller regions. In general when it concerns economic growth in large regions, it is the whole region that is contributing to the growth. In middle-sized regions the economic growth is concentrated to a main city or cities (Johansson et al, 2007). The county of Västra Götaland, which was created by a merge of three counties in 1998, is a successful example of large regions. The development has been extraordinary high after the merge compared the time before the merge (The County Administrative Board of Västra Götaland, 2007).

1.2 Research problem

During the last decades people's mobility pattern has changed and today it is mainly the housing environment that matters when people decide to migrate. Simultaneously, regions are growing extensively, cities are becoming larger and economic centers are becoming more visible. One of these growing regions is the county of Östergötland. The county is considered to be middle-sized region that has experienced high economic development in the main cities and a large in-migration flow to these cities has also taken place. In general, people are more attracted to locations which are more urban and developed than rural location, where for instance the service supply is limited compared to urban areas. At the same time, people are valuing housing environment more and the development of infrastructure has eased people's possibilities to commute instead of migrate.

Östergötland has a strategically good location; it is located in between Stockholm, Gothenburg, and Malmö/Copenhagen. This central location has made it possible for Östergötland to develop in economic terms due to its access to good infrastructure and its closeness to the main economic center of Sweden, Stockholm.

1.3 Purpose

The purpose of this thesis is to find out what determines inter municipal migration flows in Östergötland. The thesis will therefore investigate what the major observable determinants of migration are in the county. Furthermore, if any of the major migration theories and models are applicable to the migration flows in Östergötland.

1.4 Outline

The rest of the thesis is outlined as following: Chapter 2 outlines the theoretical framework of migration theories and models. The framework is presented in four steps. First, the neoclassical migration theory is presented, which give an explanation to the reasons on why people move and how people evaluate different prospective residential locations. Secondly, spatial interaction models are considered from a migration perspective. This part of the theoretical framework focuses on what effect distance and population density has on people's migration decision. Thereafter, random choice models are presented and these models focus on the aspect of specific attributes of prospective residential locations. The theoretical framework ends with a brief presentation of economic development with the new economic geography. In Chapter 3, the county of Östergötland will be presented in more detail to the reader. This part will provide information on the development of the county as a whole and some additional facts about two largest municipalities. Chapter 4 consists of the empirical study and analysis. This section will present how the data is collected and how it is dealt with. The regression equations are specified and provided to the reader and the results of the regressions are also given in this section. Next, an analysis is followed supported by the theoretical framework and the result of the regressions. In the last chapter, Chapter 5, the reader will be given concluding remarks on the thesis.

2 Theoretical Framework.

2.1 Migration theories

2.1.1 Neoclassical migration theory

The neoclassical theory considers the migration as an investment i.e. a change in resource allocation that will contribute to reach maximum production and utility levels (Polese, 1981).

The neoclassical migration theory can be divided into two main strands: macro and micro. The former strand considers mainly geographical differences between regions and therefore the macroeconomic approach takes into account the aspect of resource allocation.. Meanwhile, the latter strand considers the individual migrant's cost-benefit calculation on the act of migration.

From a macroeconomic perspective, the neoclassical migration theory conceives migration as having a dampening effect on regional disparities. People tend to move from regions with a poor economic development and a low demand, to regions with high economic development with a high demand. This movement will result in a rise in income in the former region and a decline in income in the latter region (Shioji, 2001). Regions with different factor endowments have different demand and supply. For example, regions which have a relatively large supply in labor tend to have a larger demand for capital and vice versa. The result of different endowments gives rise to wage differentials and thereby creates incentives for the labor force to move to high-wage regions. Hence, the act of migration will decrease labor supply and increase wages in regions with large endowments in labor. Thus, regions with large capital endowments will experience an increase in labor supply and a decline in wages. If regions have equal wage level migration will never occur and if the wage differentials are present, migration will end when the wages are equalized between regions (Massey et al, 1993).

The second approach, the micro strand of the neoclassical migration theory is mostly concerned with the individual's migration decision. Prospective migrants make a cost-benefit calculation, on whether or not to migrate. If the net return is positive, the migrant will move and vice versa. If the net return is zero, the prospective migrant is indifferent between moving and staying at its current residence (Massey et al, 1993). In accordance with the neoclassical approach, human capital also plays a major role in the probability of migration, in terms of the knowing how human capital will be rewarded in the origin and in the destination respectively (Massey & Espinosa, 1997).

Sjaastad (1962) has identified four different fractions of the migration investment; private costs, public costs, private returns, and public returns. The costs can in turn be divided into money and non-money subdivisions. Private money costs consist of the increase in expenditure due to the act of migration, for example food, lodging, and transportation. In contrast, private non-money costs involve opportunity costs in terms of the income foregone during the traveling and job searching, which depends upon the distance between origin and destination. The opportunity cost is easier to estimate compared to psychological cost, which include the cost of leaving family and friends, as well as familiar surroundings. The psychological costs do have impact on the resource allocation and influences the rate of return on the act of migration. As if all psychic costs were zero, migration flows are assumed to increase. According to Sjaastad (1962), increases in the costs of moving make the probability of migration to decline. The private returns consisting of money and non-money returns are either positive or negative. This fraction of the cost-benefit analysis is about whether or not the act of migration will result in a higher income. The non-money return concerns the preference for the new residence compared to the former residence. Meanwhile, the money return involves a change in nominal earnings, change in costs of employment, and change in prices, or a combination of these three components. However, the returns are complex to estimate (Sjaastad, 1962).

2.1.2 Spatial interaction models of migration

Spatial interaction models are analogous used for gravity models. The origin of spatial interaction models is found in the law of universal gravitation founded by Isaac Newton. The law of gravity implies that there is a single point mass which attracts every other point mass by a force on a line which are combining the two point masses. The force is proportional to the product of the two point masses and inversely proportional to the square to the distance between the two point masses (Encyclopedia Britannica). Spatial interaction models analyze residential mobility in terms of pull and push factors of different locations that represent the force of the origin location, the destination location and the distance in between (Clark & Van Lierop, 1987).

When applying spatial interaction models to migration analysis, the migration flows are influenced and based upon the size of the population of the origin, the population of the destination, and inversely related to the distance between the two locations. The size of the population represents the masses analogy to the original gravity model. A larger population is expected to have a positive effect on migration, due to the pull factor in terms of labor supply and possibilities to social interaction (Foot & Milne, 1984).

Two major ideas of spatial interaction are, as mentioned above, the importance of mass and distance. Interaction increases with mass and decreases with distance (Klaesson, 2001). The negative relationship between distance and spatial interaction has resulted in some behavioral observations which are outlined by Foot and Milne (1984). Quality and quantity of available information declines with distance, the cost of obtaining information increases with distance, and also non-money costs, involved with friends and family dislocation, increase.

Lee (1966) refers to Ravenstein's early work on push and pull factors through Ravenstein's "The Laws of Migration". Already during the 19th century, Ravenstein emphasized the importance of distance and cities for migration movements due to its agglomeration effects. By the first law of migration, Ravenstein highlighted the fact that migration is most frequent at short distances and migrants who proceed long distances are mainly influenced by economic interests. Ravenstein also emphasized the differences in the propensity to migrate between urban and rural areas, where people in rural areas in general have larger propensity to migrate. Moreover, Lee (1966) refers to Ravenstein's identifications of the connection between infrastructure and migration. Development of infrastructure will increase the migration. Furthermore, Ravenstein also highlights the importance of economic motives, for example areas with high taxation rates tend to have a higher out-migration than areas with low taxation rates.

The basic formula of the gravity model is:

$$F = g \cdot \frac{m_1 \cdot m_2}{r^2}, \text{ where} \qquad \text{(Eq.1)}$$

F represent the gravity force between two masses, m_1 and m_2, g is a constant of gravity, and r is the distance (Klaesson, 2001).

Klaesson gives an example of a formula which expresses the flow from location *i* to location *j*. This formula shows how migration can be formulized in a gravity model:

$$F_{ij} = KP_i^{\alpha}P_j^{\beta}D_{ij}^{-\gamma}, \text{ where} \qquad \text{(Eq.2)}$$

F_{ij} represents the flow from location *i* to location *j*, *K* is a constant of proportionality, *P* represents population at location *i* and *j* respectively, *D* represents the distance between location *i* and *j*, and finally α, β, and γ are constants.

One implication of the spatial interaction models is the parameters which can vary over time, which makes the parameters of the models not constant from one time to another. An example of this variation is that the distance between two locations can be reduced due to technological and technical development such as new transportation and traveling innovations. In accordance with the distance-decay function of spatial interaction models, the distance parameter should decrease as media and transportation means improve. The distance-decay function implies in terms of migration that it becomes easier to move from one location to another as the distance declines. Hence, distance does not only include physical but also psychological distance, such as moving from a familiar environment. In Figure 1, the relationship between interaction and distance is depicted. The four curves are four different time sequence. The variable *b* represents the distance-decay parameter and it determines the shape of the curve. As distance decreases, interaction increases (Mikkonen and Luoma, 1999).

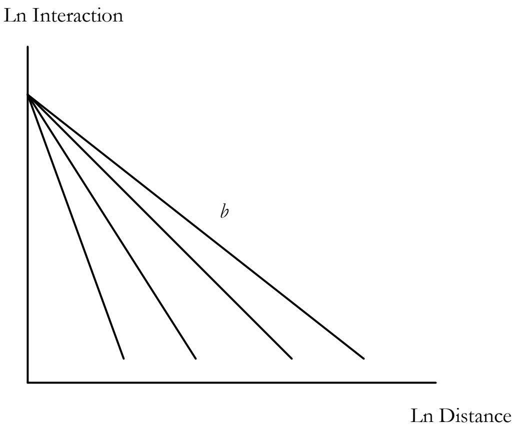

Figure 1. Distance-decay function (Mikkonen and Luoma, 1999)

2.1.3 Discrete choice and random utility models of migration

Discrete choice models are built on a framework where households have a finite number of alternatives of residential choice and these alternatives are distinguished by distinct attributes. The alternative which brings the highest utility level will be chosen by the households. The outcome of the choice is derived from a probability function. (Chattopadhyay, 2000).

A central concept of discrete choice and random utility models is accessibility. The concept of accessibility is defined by Johansson et al. (2002) as a measure of proximity of something desired or something disliked. Johansson et al. (2002) present Weibull's findings on overlapping interpretations of accessibility. Accessibility can then be interpreted as; (i) nearness, (ii) proximity, (iii) the ease of spatial interaction, (iv) potential of opportunities of interaction, and (v) potentiality of contacts with activities. Thereby accessibility measures the attractiveness of a location. In the long run, the accessibility to labor markets will decide the location of residence for people. A region with good access to labor markets, household services and other facilities will have a positive attraction on a household's decision on whether or not to locate their residence to that region. Below in Figure 2, there is a simplified illustration of how accessibility determines peoples' residential and businesses' location choice based upon the supply of labor (Johansson & Klaesson, 2007)

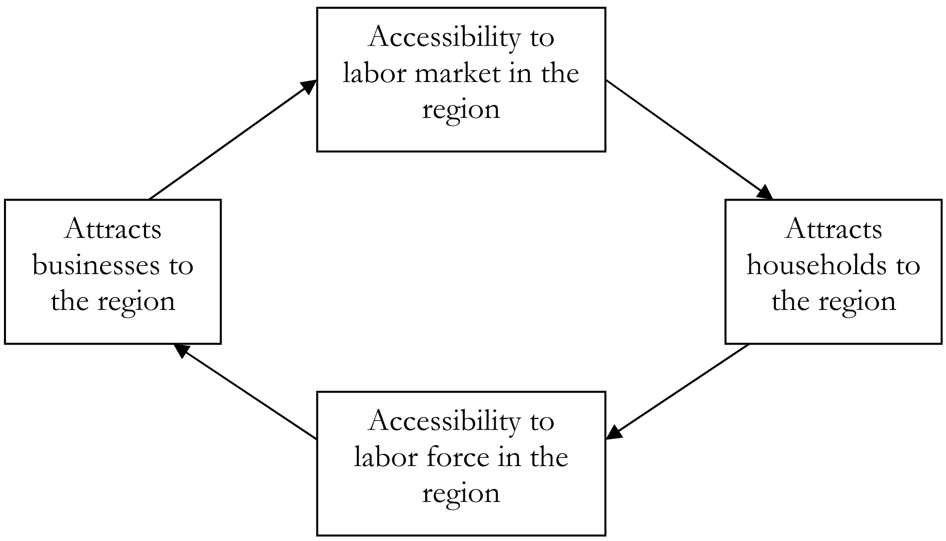

Figure 2. The dynamic of the regional labor market (Johansson & Klaesson, 2007)

Within the framework of the discrete choice and random utility models, there are several approaches; conditional logit model, nested logit model, probit model, and elimination-by-aspects method. The four different approaches are presented below.

The main focus of the logit model is on people's decision to move or not to move. The model can be divided into a simple and a multinomial model. The latter division is mostly used due to its allowance for the variety of locational choice. The model assumes IIA, independence of irrelevant alternatives, which implies that the probability of a choice out of the two alternatives in the model depends only on the attractiveness of these. If new alternatives are introduced, when correlation in the error terms is present, it is not expected to affect the choice probabilities of the alternatives (Clark & Van Lierop, 1987).

The second approach, the nested logit model regards the residential choice as a nested hierarchical process. For instance, if one group of attributes is considered as very important, those are found in the uppermost part of the hierarchy; meanwhile another group considered as less important is located at the lowest level of the hierarchy. Examples of attributes can be taken into account are taxation levels, public service, and dwelling attributes (Chattopadhyay, 2000). By using a hierarchical system of attributes, the choice problem is divided into several stages and conditional choice probabilities are created. By introducing this type of hierarchical process the number of choice situations will be reduced. Clark and Van Lierop (1987) illustrate the hierarchical process in a figure where the households base their choices upon the *N+1* alternatives.

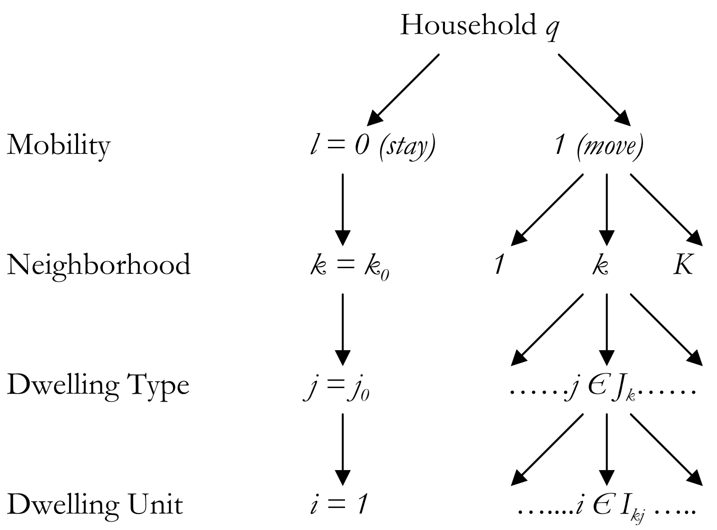

Figure 3. The hierarchial decision process in the nested logit model (Clark and Van Lierop, 1987)

In this illustration the household q will first make a decision on whether or not to move ($l=1$ or $l=0$). If the household decides to move, it will then choose a particular neighborhood ($k \in K$), a particular type of dwelling within the chosen neighborhood ($j \in J$), and finally a particular dwelling unit within in the chosen neighborhood and type of dwelling ($i \in I$). There is interdependency between the choices taken by household q (Clark & Van Lierop, 1987).

The third approach within the framework of discrete choice and random utility models is the probit model. The probit model builds on a similar approach as the previous models in terms of how to deal with the location alternatives. The differences between the probit model and the logit models are that the probit model allows for correlation between the error terms and the variances are therefore allowed to be different. The problem of IIA, disappears and makes the probit model easy to apply to different analyses of housing market and household mobility (Clark & Van Lierop, 1987).

The fourth approach of the framework of the discrete choice and random utility models is the elimination-by-aspects method. This approach differs from the three other models in terms of error terms. The elimination-by-aspects method does not deal with error terms and the method therefore does not make any assumptions on error terms. In contrast, the method assumes that the household makes choices based upon the known and identified attributes of the alternatives. These attributes are scaled in respect to each other in terms of importance and desirability. Features that are not considered as desirable are therefore eliminated and the elimination process leads to a final choice of the alternatives (Clark & Van Lierop, 1987).

There are some equivalence between spatial interaction models and discrete choice and random utility models. Both types of models emphasize the importance of population density. High population density contributes to larger supply of for example services, education, labor, and culture. This state becomes a pull factor when it concerns migration.

2.2 Economic development

2.2.1 New Economic Geography

NEG, New Economic Geography, builds on a number of blocks; economies of scale, trade costs, and mobility of production factors. According to NEG, these blocks contribute to agglomeration. Agglomeration gives proximity for example to the consumers and firms. NEG also emphasizes imperfect markets and when imperfect markets are present the location decision of consumers and firms become more important (Brakman et al, 2001).

According to NEG, people will move due to real wage differentials between regions. In line with the spatial wage structure there is a negative relationship between wages and distances of a location from an economic center. Hence, people tend to move into economic centers, such as larger cities in order to raise their wages. This is also one of the reasons why agglomeration takes place and why rural-to-urban movements are present (Brakman et al, 2001). The importance of wages as pull factors is in line with the ideas of neoclassical migration theory

A central concept of NEG is scale economies. Scale economies can be defined as when more units of an output is produced at larger scale with less input especially concerning costs. When scale economies are present firms have incentives to reconsider its location. Economies of scales are divided into external and internal return to scale (Brakman et al, 2001). When considering external returns to scale the size of the economy as well as the size of the regions are crucial when it concerns aspects such as economic growth and welfare. Thereby NEG highlights the spillovers of external return to scale, such as R & D, knowledge, and expertise, that firms and individuals can obtain by being located in economic centers, s. Smaller regions are more dependent upon economic centers since these regions tend to become specialized in specific sectors or industries. Smaller regions can therefore not offer a large spectrum of products and services to their population and local businesses. The willingness to pay seems to be smaller in smaller regions than in larger regions with economic centers (Johansson et al, 2007).

Internal return to scale refers to the definition of economies of scale presented above in terms of when a firm increases its output and reduces its input. The achievement mainly has an effect on the specific firm. Meanwhile external return to scale for instance occurs within an industry sector, outside the specific firm (Brakman et al, 2001).

Distance is crucial for people as a result of transaction costs. Shorter distance means reduced transaction costs, therefore it is beneficial. Close access to multiple services attracts people to move into these regions in order to reduce their payments for transaction costs (Johansson & Backman, 2007).

According to NEG, there are two main forces which contribute to economic development in regions. Firstly, consumers have a passion for varieties, for example in terms of household services; this aspect is taken into account in NEG. Regions that can offer a larger spectrum of varieties is more attractive to household and thereby prospective migrants. Secondly, businesses' productivity grows as the number of varieties in different business services increases in a region (Johansson & Backman, 2007).

As mentioned in previous section, there is some equivalence between spatial interaction models and discrete choice and random utility models. This connection is also true for new economic geography. According to the new economic geography, consumers have a passion for varieties and in communities with high population the supply of different attributes are often more extensive. This approach is in line with the spatial interaction models and discrete choice and random utility models.

3 The county of Östergötland

Östergötland is a county consisting of 13 municipalities located in the southeast part of Sweden. The county has a population of approximately 416,000 people. Östergötland has a central location in terms of geography, economic activity, and population. Within a distance of 200 kilometers of the central part of the county, 50% of Sweden's population has their permanent residence. The two municipalities, Linköping and Norrköping, have the majority of the population in Östergötland and the main cities of these two municipalities have the highest population density of the county. Norrköping has throughout the history been an important city. During the 19th century Norrköping was one of the largest cities in Sweden and also one of the most important industry centers of the country. Meanwhile, Linköping has developed during the last century into an important and large city due to its strong position in for example economic activity, higher education and R&D. Linköping's development has mainly two sources; SAAB's aircraft manufacture and the University of Linköping. The university is today the sixth largest in Sweden and it has contributed to the development of the technical industry and the public sector. Norrköping has received several head offices of governmental authorities and during the last decade the University of Linköping has established several sections of the university in Norrköping (Östsam Regional Development Council, 2007).

The population of the county has increased with 8% between year 1968 and year 2004, which is the same rate as for whole Sweden. At a closer look on each municipality the populations of Linköping, Norrköping, and Söderköping have increased with 27%, 4%, and 39% respectively during the period 1974-2004. During the same period of time the rest of the municipalities in the county have experienced a negative population growth. Hence, in the central part of Östergötland, where Norrköping and Linköping are located, the population density is high and is increasing compared to the rest of the county and to Sweden. The pattern of increasing population density of the area is similar to other large city areas, such as Stockholm, Gothenburg, and Malmö (Östsam Regional Development Council, 2007).

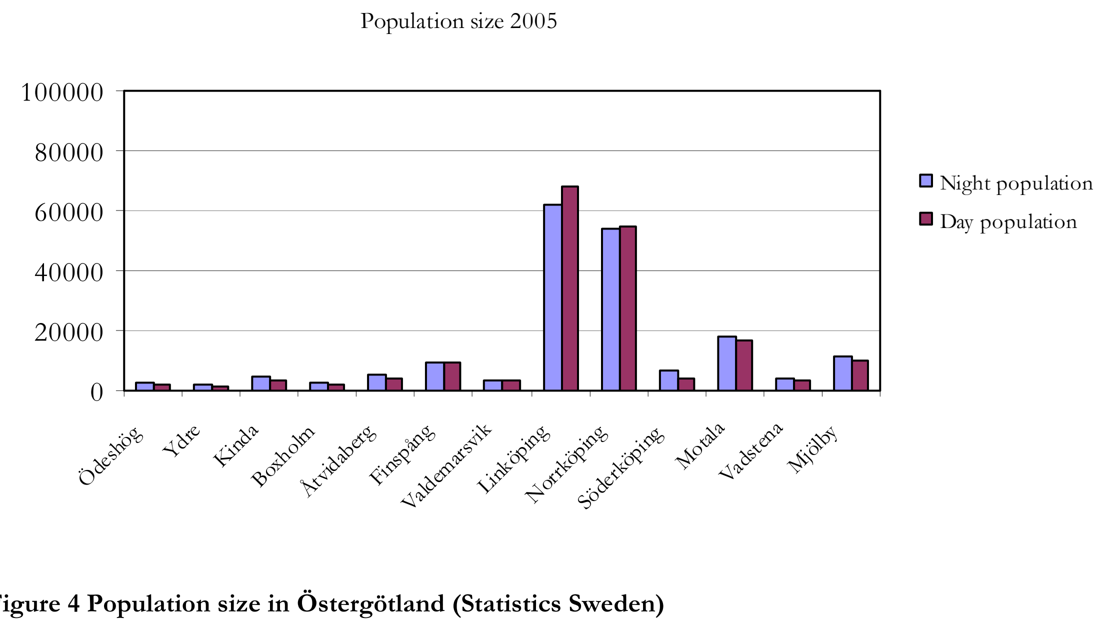

Figure 4 Population size in Östergötland (Statistics Sweden)

In Figure 4, the night and day population in each municipality of year 2005 is presented. The night population includes people in working age, 20-64 years old, who live in the municipality and have an employment either in the municipality or somewhere else. Day population on the other hand includes people in working age who have an employment in the municipality and live in the municipality or somewhere else. Thereby, the night population focuses on where the people live and the day population focuses on where the people have their employment.

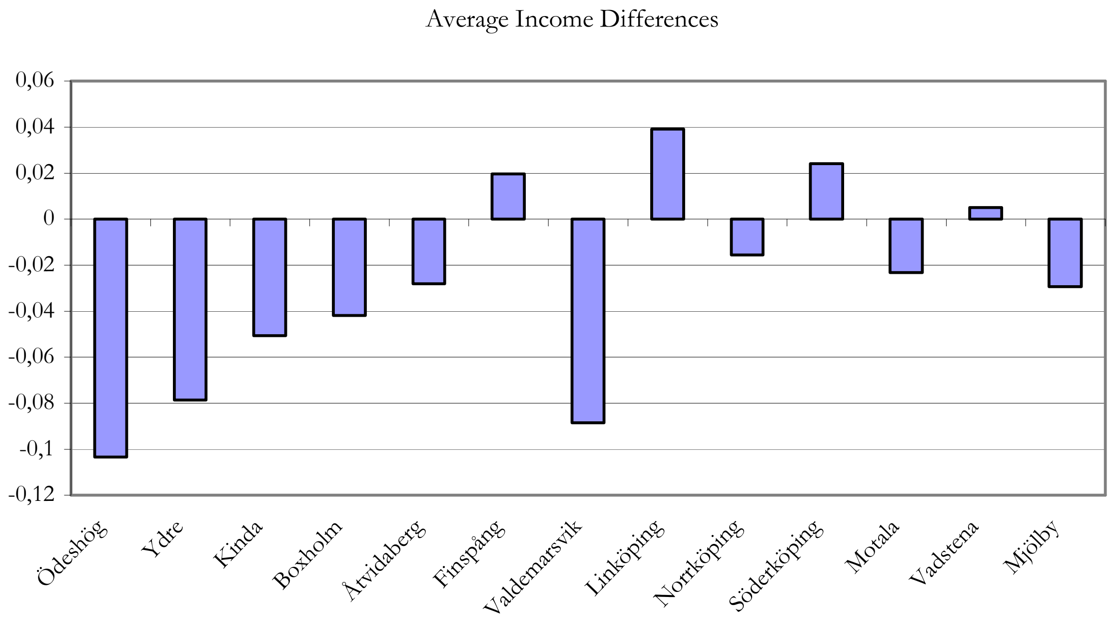

Figure 5 Average income differences in the municipalities of Östergötland (Statistics Sweden)

The average incomes retrieved from labor of year 2005 in the municipalities in Östergötland are within an interval of Sek 188,001 to Sek 217,929. The highest average income is found in Linköping, while the lowest average income is found in Ödeshög. The average yearly income in Östergötland is Sek 209,700. An overview of the percentage difference in average income levels are presented in Figure 5. The y-axis should be interpreted as 0,02 equals 2 percent higher income than the average income and -0,1 equals 10 percent lower income than the average income. The average income represents the yearly average income for employed people in working age 20-64 years old in year 2005.

The two largest cities, Linköping and Norrköping, have many attributes which are usually present in larger city regions, such as an extensive supply of culture, education, and labor market. Motala, Finspång, and Mjölby are three larger towns which also have a relative large supply of services and labor market. Two municipalities which are located close to the centers of Linköping and Norrköping are Söderköping and Åtvidaberg. In these municipalities the main towns have smaller supply of service and smaller labor markets compared to the towns located far away from Linköping and Norrköping. Additional attributes which may influence people's migration decisions are housing prices, taxation levels and employment rates (Östsam Regional Development Council, 2007). These figures from 2005 are presented below in Table 1.

Table 1 Different attributes figures of the municipalities in Östergötland
(The municipalities are randomly ranked)

Municipality	Housing prices	Employment rate (%)	Municipality taxation level (%)
Ödeshög	496,000	77.6	21.50
Ydre	428,000	83	20.65
Kinda	774,000	82	21.15
Boxholm	574,000	77.7	21.15
Åtvidaberg	815,000	78.4	21.65
Finspång	806,000	78.4	21.30
Valdemarsvik	789,000	74.8	21.15
Linköping	1,843,000	72.1	20.40
Norrköping	1,471,000	70.8	21.45
Söderköping	1,248,000	77.7	21.40
Motala	994,000	73.7	21.40
Vadstena	993,000	77.8	21.25
Mjölby	1,014,000	77	21.15

(Statistics Sweden)

From Table 1 the reader can see the differences in house prices. For instance in Linköping the average price for sold houses is Sek 1,843,000, meanwhile in Ydre the average price is Sek 428,000 for a sold one-family house. Considering difference in employment rate in Östergötland, Ydre is the municipality that has the highest employment rate, 83 percent, meanwhile Norrköping has the lowest employment rate, 70,8 percent. The university in Norrköping could be one explanatory factor to the difference in unemployment. One possible reason of this difference is that the number of students living Norrköping is higher than in Ydre. From the table, the reader can also observe that only small differences exist in municipality taxation level between the municipalities.

The migration flows, in terms of net migration, differs between flows on different geographical levels, for instance on national level and regional level. Linköping and Norrköping have experienced a positive net migration flow when taking into account the migration flow on a national level; meanwhile the surrounding municipalities have not experienced the same result. Johansson et al (2007) believes that in order to make the whole region grow, the surroundings of Linköping and Norrköping also have to grow. Norrköping and Linköping have to develop even further and when they reach a level high enough, the rest of the region will also start to grow and experience a positive net migration. Further, it is crucial for the surrounding municipalities to have high to supply of labor and services to secure future regional growth (Johansson et al, 2007). The migration flows within the county during 2006 are slightly different compared to the national flows. There are more municipalities with a positive net migration; Boxholm, Åtvidaberg, Norrköping, Söderköping, Motala, Vadstena, and Mjölby. An overview of the migration flows of 2006 is presented below in Table 2. The surrounding counties are Jönköping, Kalmar, Västra Götaland, Örebro, and Södermanland.

Table 2. Migration flows in Östergötland

Municipality	Out-migr.1	In-migr.1	Net migr.1	Out- migr.2	In-migr.2	Net migr.2	Tot. net migr.
Ödeshög	162	83	-79	62	49	-13	-89
Ydre	24	19	-5	114	69	-45	-50
Kinda	197	192	-5	45	59	**14**	**9**
Boxholm	151	163	**12**	50	26	-24	-12
Åtvidaberg	301	302	**1**	33	28	-5	-4
Finspång	372	357	-15	178	85	-93	-108
Valdemarsvik	377	209	-168	48	47	-1	-169
Linköping	1756	1739	-17	1892	1996	**104**	**87**
Norrköping	1351	1586	**235**	1000	1145	**145**	**380**
Söderköping	341	482	**141**	43	58	**15**	**156**
Motala	594	597	**3**	308	252	-56	-53
Vadstena	169	196	**27**	39	23	-16	**11**
Mjölby	621	722	**101**	94	115	**21**	**122**
Total	6416	6647	231	3906	3952	46	280

Note: a) The bold figures represent positive net migration flows.

Out-migr.1: Total out-migration from one municipality to another municipality within the county
In-migr. 1: Total in-migration from one municipality to another municipality within the county
Net migr.1: Difference between In-migr. 1 and Out-migr.1
Out-migr.2: Total out-migration from one municipality within the county to the surrounding counties
In-migr. 2: Total in-migration from the surrounding counties to one municipality within the county
Net migr.2: Difference between In-migr. 2 and Out-migr.2
Tot. net migr: Summation of Net migr.1 and Net migr.2

(Statistics Sweden)

Östergötland is located strategically good due to its location in between the regions of Stockholm, Malmö/Copenhagen, and Gothenburg. This location has made it possible for the region to have access to good infrastructure in terms of roads and railways. Norrköping is considered to be a central place in terms of transportation due to its access to shipping expressways, railways, and airports. The high level of accessibility to infrastructure in the county is considered an important factor in explaining the regional economical development. The local communication and transportation in Östergötland has developed during the last decades and today there are plenty of inhabitants of the county who are commuting from their residence to their working places (Östsam Regional Development Council, 2007). Plans on further development of the local communication system within the county exist. If realized it will reduce the time of commuting from Linköping to Norrköping from today's 30 minutes to 15 minutes and commuting from all municipalities within Östergötland to either Linköping or Norrköping will be less than 50 minutes. In addition, there are also plans on building a new fast-track railway, Ostlänken, between Stockholm and Linköping. This railway will reduce the travel time Linköping to Stockholm from 100 to 65 minutes and Norrköping to Stockholm from 75 to 50 minutes (Johansson & Backman, 2007). The development of the local communication system is expected to increase the integration between the two cities and thereby increase people's utility through increased accessibility to a wider labor market and larger supply of services. Several studies have shown that there is a certain time limit when it concerns commuting. People are very sensitive to time when the commuting is located in an interval of 20-45 minutes. If the time period of commuting is reduced within this time period there a distinguished increase in commuting in contrast to changes in time periods higher than 45 minutes (Johansson et al, 2002). The planned closeness to Stockholm will also make it possible for people to commute to the capital and still have their permanent residence in Östergötland. There are expectations that the spillover effects of the closeness to Stockholm and the cities in between with the new railway than without will raise the economic growth and the development of Östergötland more. Johansson and Backman (2007) assume that the increased accessibility in the region will attract more households to move into the region and when more households are living in the region, firms will be attracted to move their business into the region, see Figure 2. The authors expect that the labor markets in the city centers will increase with 7000-9000 people and the population will increase with 6000 people in each of the two city centers.

4 Empirical study and Analysis

4.1 Data collection

In the empirical analysis, the choice of variables is based upon the theoretical framework presented in Chapter 2, i.e. neoclassical migration theory, spatial interaction models, discrete choice and random utility models, and new economic geography. The empirical analysis uses cross section data for the 13 municipalities in the county of Östergötland. The dependent variable is the relative migration flow between the municipalities in Östergötland. The independent variables are the day population in the municipality the migrant is moving into, the night population in the municipality the migrant is moving away from, and the third independent variable is the distance between the two municipalities.

The migration data is collected from Statistics Sweden and represents the out-migration flows from one municipality to another during year 2006. Flows consisting of less than 5 people are not recorded by Statistics Sweden. Though, these observations have received an expected quantity. The expected quantity of these observations have been retrieved from an estimated regression, *Expected* m_{ij}, with the migration flows from municipality *i* to municipality *j* as the dependent variable and the independent variables are the night population in *i* and the day population in *j*. The coefficients retrieved from the estimation; β_1 of night population in municipality *i*, $night_i^{\beta 1}$, and β_2 of day population in municipality *j*, $day_j^{\beta 2}$, are thereafter included in the calculation below. The expected quantity of each of the observations has been calculated as:

$$Expected\ m_{ij} = night_i^{\beta 1} * day_j^{\beta 2} \qquad \text{(Eq.3)}$$

The E*xpected* m_{ij} is found in an interval of 0 < 5 migrants

The day and night population are also retrieved from Statistics Sweden. The data is from year 2005. The night population includes people in working age, 20-64 years old, who live in the municipality and have an employment either in the municipality or somewhere else. Day population on the other hand includes people in working age who have an employment in the municipality and live in the municipality or somewhere else.

In order to have comparable migration flows, a relative migration ratio has been calculated. The ration was calculated as:

$$Relative\ migration = m_{ij} / M_i \qquad \text{(Eq.4)}$$

The relative migration ratio is retrieved from the migration flows between municipality *i* and municipality *j*, m_{ij}, divided with the total number of migrants moving out of municipality *i* to all of the municipalities in Östergötland M_i. The migration ratio can therefore be considered as a share of the total out-migration of municipality *i*.

Data on distance is provided by the Swedish Road Administration and is measured in travel time with car between the main towns in the municipalities in minutes.

The average income levels are also retrieved from Statistics Sweden and are measured on yearly basis for people in working age, 20-64 old in 2005 in Sek.

Housing prices are collected from Statistics Sweden and represents the average prices in Sek, of sold permanent one-family houses in each municipality during 2005.

Table 3. Definition of variables, expected sign of the coefficient, and the relation to the theoretical framework

Variables	Definition of the variable	Expected sign of the coefficient	Relation to the theoretical framework
A	Constant		
m_{ij} / M_i	Dependent variable. Relative migration flow from municipality *i* to municipality *j*		
m_{ij}	Migration flows between municipality *i* to municipality *j*		
M_i	Total number of migrants moving out of municipality *i* to all the municipalities in Östergötland		
night	Night population in municipality *i*	-	According to the theoretical framework of spatial interaction models people tend to move from municipalities with low population density into municipality with high population density.
day_j	Day population in municipality *j*	+	According to the theoretical framework of spatial interaction models people tent to move into municipalities with high population density.
$dist_{ij}$	Distance between municipality *i* and *j*	-	According to the theoretical framework of the spatial interaction models the migration flows decline at larger distances and as distance decreases migrations flows are expected to rise.
D1	1 = Yearly income > SEK 210 000 0 = Yearly income < SEK 210 000		According to the neoclassical migration theory and the new economic geography, income levels are expected to be a push factor.
D2	1 = Average prices for sold one-family houses > SEK 1 000 000 0 = Average prices for sold one-family houses < SEK 1 000 000		According to the discrete choice and random utility models migrants evaluate different attributes from a discrete number of choices and the choice which leads to the highest utility level will be chosen. An example of attribute is house prices.
D3	1 = Linköping municipality, Norrköping municipality 0 = The other municipalities in Östergötland beside Linköping and Norrköping		According to the discrete choice and random utility models migrants evaluate different attributes from a discrete number of choices

	and the choice which leads to the highest utility level will be chosen. Linköping and Norrköping provide an extended supply of services compared the other municipalities in Östergötland.

4.2 Estimation models

In the empirical analysis, the choice of variables are based on the theories and models presented in Chapter 2; neoclassical migration theory, spatial interaction models on migration, discrete choice and random utility models on migration, and the new economic geography. The analysis will be based on four regression models and the analysis will be cross sectional.

According to spatial interaction models on migration prospective migrants are attracted to areas with high population density. In addition, distance also has an impact on prospective migrants' migration decision. The migration function, Model 1, based on the framework of spatial interaction models is similar to Equation 2 and is a Cobb-Douglas function. Thus, the function is estimated in its logarithmic form in order to make the estimation linear. In the analysis, variables presented in their logarithmic form will be interpreted as the difference in percentage.

$$\ln(m_{ij} / M_i) = \alpha + \beta_1 \ln night_i + \beta_2 \ln day_j + \beta_3 \ln dist_{ij} + \varepsilon \quad \text{(Model 1)}$$

Due to the use of a relative migration ratio during the estimation process, the result needs to be corrected in order to suit the analysis and the theories. In Equation 4 it is shown how the relative migration ration is retrieved. Regression 1 will therefore be adjusted in the analysis from

$$\ln(m_{ij} / M_i) = \alpha + \beta_1 \ln night_i + \beta_2 \ln day_j + \beta_3 \ln dist_{ij} \quad \text{(Model 1)}$$

to

$$\ln m_{ij} = \alpha + \hat{\beta}_1 \ln night_i + \beta_2 \ln day_j + \beta_3 \ln dist_{ij} \quad \text{(Model 1a)}$$

where,

$$\hat{\beta}_1 = (1 + \beta)$$

Three types of dummies will be used in the estimated models in the following section. The first dummy is income, which will be used to control for higher average income in some of the municipalities which have higher average income. The second dummy is one-family house prices, which are used due to the same cause as the income dummy; that is, some municipalities have experienced higher prices for one-family houses. The third dummy is central municipalities, due to their extended service supply they can offer to their inhabitants compared to the other municipalities in Östergötland.

According to the neoclassical migration theory, prospective migrants make a cost-benefit analysis and thereby income differences and houses prices are suitable variables to use when estimating migration flows. The new economic geography literature also emphasizes the importance of income differences as an important pull factor for prospective migrants. In Model 2 the income dummy will be added to Model 1.

$$\ln(m_{ij} / M_i) = \alpha + \beta_1 \ln night_i + \beta_2 \ln day_j + \beta_3 \ln dist_{ij} + D1 + \varepsilon \quad \text{(Model 2)}$$

In Model 3 the dummy for one-family houses prices will be added to Model 1.

$$\ln(m_{ij} / M_i) = \alpha + \beta_1 \ln night_i + \beta_2 \ln day_j + \beta_3 \ln dist_{ij} + D2 + \varepsilon \quad \text{(Model 3)}$$

According to the random utility and discrete choice models on migration, prospective migrants' migration decision is based upon different forces that attract the migrant from one residential choice to another depending on a number of discrete choices. The chosen alternative generates the highest utility. In Model 4, the dummy for Central municipality will be added to Model 1.

$$\ln(m_{ij} / M_i) = \alpha + \beta_1 \ln night_i + \beta_2 \ln day_j + \beta_3 \ln dist_{ij} + D3 + \varepsilon \quad \text{(Model 4)}$$

4.3 Result

The regression models are estimated with the least squares method. The null hypotheses of the four models are as follows:

H_0: At least one of the independent variables affects the migration flow between municipality *i* and municipality *j*.
H_1: None of the independent variables affects the migration flow between municipality *i* and municipality *j*.

All the models, Model 1- Model 3, are non-linear models and therefore both the dependent; m_{ij} / M_i, and the independent variables; $night_i$, day_j, and $dist_{ij}$, are in their logarithmic form.

Below in Table 4 the result of the estimation of the four different models is presented.

Table 4. Result of Model 1, Model 2, Model 3, and Model 4

Model 1. Based on the theoretical framework of spatial interaction models

Variable	Coefficient	t-Statistic	Standard Error	Probability level
Constant	1.119	0.963	1.162	0.337
ln $night_i$	-0.183	-2.787*	0.066	0.006
ln day_j	0.678	11.525*	0.059	0.000
ln $dist_{ij}$	-2.445	-15.497*	0.158	0.000

R^2 = 0.767 Adjusted R^2 = 0.756 Number of observations = 156

White's Heteroscedasticity Test of Model 1

F-statistic	Probability (F-stat.)	Obs*R-squared	Probability (Obs*R^2)
1.918	0.054	16.500	0.057

Model 2. Based on the theoretical framework of spatial interaction models and neoclassical models

Variable	Coefficient	t-Statistic	Standard Error	Probability level
Constant	1.057	0.905	1.167	0.367
ln $night_i$	-0.183	-2.782*	0.066	0.006
ln day_j	0.689	11.326*	0.061	0.000
ln $dist_{ij}$	-2.445	-15.470*	0.158	0.000
D1	-0.113	-0.725	0.155	0.470

$R^2 = 0.761$ Adjusted $R^2 = 0.755$ Number of observations = 156

White's Heteroscedasticity Test of Model 2

F-statistic	Probability (F-stat.)	Obs*R-squared	Probability (Obs*R^2)
1.488	0.129	18.706	0.133

Model 3. Based on the theoretical framework of spatial interaction models and neoclassical migration models

Variable	Coefficient	t-Statistic	Standard Error	Probability level
Constant	1.108	0.922	1.202	0.358
ln $night_i$	-0.183	-2.777*	0.066	0.006
ln day_j	0.680	8.879*	0.077	0.000
ln $dist_{ij}$	-2.446	-15.379*	0.159	0.000
D2	-0.008	-0.038	0.201	0.970

$R^2 = 0.761$ Adjusted $R^2 = 0.754$ Number of observations = 156

White's Heteroscedasticity Test of Model 3

F-statistic	Probability (F-stat.)	Obs*R-squared	Probability (Obs*R^2)
1.380	0.176	17.498	0.178

Model 4. Based on the theoretical framework of spatial interaction models and random utility and discrete choice models

Variable	Coefficient	t-Statistic	Standard Error	Probability level
Constant	2.402	1.805	1.331	0.073
ln $night_i$	-0.184	-2.825*	0.065	0.005
ln day_j	0.525	5.315*	0.099	0.000
ln $dist_{ij}$	-2.455	-15.690*	0.156	0.000
D3	0.631	1.925***	0.328	0.0561

$R^2 = 0.766$ Adjusted $R^2 = 0.760$ Number of observations = 156

White's Heteroscedasticity Test of Model 4

F-statistic	Probability (F-stat.)	Obs*R-squared	Probability (Obs*R^2)
1.709	0.065	21.103	0.071

*Significant at 1% significant level
** Significant at 5% significant level
*** Significant at 10% significant level

With 156 observations and three independent variables, the degrees of freedom are 153. In Model 2-4 there are four independent variables and thereby the degrees of freedom are 152. According to the calculated values in Table 4, all the coefficients in Model 1 are larger than the critical value in absolute values. Therefore the null hypothesis cannot be rejected. However, the dummy variables in Model 2 and Model 3 are smaller than the critical value in absolute values. In contrast, the dummy variable in Model 4 is larger than the critical value and therefore the null hypothesis for Model 4 cannot be rejected.

R^2 is the coefficient of determination and it expresses the "goodness of fit" in terms of how well the regression fits the data. But R^2 is a nondecreasing function of the number of independent variables, which means that as the number of independent variables increases, the value of R^2 increases. However, the adjusted R^2 corrects for the number of degrees of freedom and therefore eliminates the problem of nondecreasing function (Gujarati, 2003). The adjusted R^2 in Model 1 – Model 4 is within an interval of 0.754 - 0.760.

One important assumption of linear regression estimation is that the error terms have the same variance, the error terms are then homoscedastic. To be able to find out whether heteroscedasticity is present or not, a White-test is processed. If the p-value of Obs*R^2 is less than 5%, heteroscedasticity is present and if the p-value of Obs*R^2 is larger than 5% the error terms are homoscedastic (Greene, 2003)

The p-values of Obs*R^2 of Model 1 – Model 4 are within an interval of 0.057 – 0.178 which are all larger than 5%, thus the conclusion is that the error terms of Model 1 – Model 4 are homoscedastic.

As mentioned in section 4.2, Model 1 will be adjusted to Model 1a in the analysis in order to suit the analysis and the theories better.

This adjustment retrieves the following values:

$$Night_i = 1 - 0.183 = 0.817$$
$$Day_j = 0.678$$

When the result in Table 4 along with the result from Model 1a is interpreted the result becomes more evident. If the night population in municipality *i*, *night$_i$*, increase with 1 person, keeping everything else constant, the migration flow between municipalitiy *i* and municipality *j* will increase with 0.817 percent.

The same adjustment of Model 1 is also applicable when analyzing the second dependent variable, the day population in municipality *j*, *day$_j$*, that is:

$$\ln(m_{ij} / M_i) = \alpha + \beta_1 night_i + \beta_2 \ln day_j + \beta_3 \ln dist_{ij} \text{ (Model 1)}$$

to

$$\ln m_{ij} = \alpha + \beta_1 \ln night_i + \hat{\beta}_2 \ln day_j + \beta_3 \ln dist_{ij} \text{ (Model 1a)}$$

where,

$$\hat{\beta}_2 = (1 + \beta)$$

This adjustment gives us the following values:

$$\hat{\beta}_2 = 1 + 0.678 = 1.678$$
$$\beta_1 = -0.183$$

If the day population in municipality j, day_j, increases with 1 person, keeping everything else constant, the migration flow between municipality i and municipality j will increase with 1.678 percent.

The independent variable for distance between municipality i and municipality j will also take the same adjustment as the two previous variables.

$$\ln(m_{ij} / M_i) = \alpha + \beta_1 night_i + \beta_2 \ln day_j + \beta_3 \ln dist_{ij} \quad \text{(Model 1)}$$

to

$$\ln m_{ij} = \alpha + \beta_1 \ln night_i + \beta_2 \ln day_j + \hat{\beta}_3 \ln dist_{ij} \quad \text{(Model 1a)}$$

where,

$$\hat{\beta}_3 = (1 + \beta)$$

This adjustment gives us the following values:

$$dist_{ij} = 1 - 2.445 = -1.445$$

If the distance between the municipalities i and j increases the relative migration will decrease due to the increase in distance. The plans on further development of the local communication system will probably increase the migration in the region due to the reduction in travel time.

The dummy variable of income in Model 2 does not have any effect on the migration flow between municipality i and municipality j since the dummy variable of income is not significant (0.05 < 0.47).

The dummy variable of one-family house prices in Model 3 does not have any effect on the migration flow between the municipalities in Östergötland. The dummy variable of one-family house prices is not significant (0.05 < 0.970).

The last dummy variable to control for Linköping and Norrköping in Model 4 shows a significant relationship with the dependent variable, $\ln(m_{ij} / M_i)$ due to that the variable is significant at 10 percent (0.10 > 0.0561).

4.4 Empirical Analysis

This section of Chapter 4 will analyze the results retrieved from the estimations made in the section above based upon the theoretical framework in Chapter 2. The aim is to respond to the purpose of the thesis; what are the major observable determinants of migration flows in Östergötland and if any of the major migration theories and models are applicable to the interregional migration in Östergötland.

In Model 1, spatial interaction models are emphasized and the independent variables are; night population in the origin municipality ($night_i$), day population in the destination municipality (day_j), and the distance between the origin and the destination municipalities ($dist_{ij}$). Based on the theoretical framework on spatial interaction models, the result from the estimations is expected to show a negative relationship between the migration flows between municipality i and *j* and $night_i$, and a positive relationship with day_j. People are therefore attracted to municipalities with high population density and tend to move from municipalities with low population density. The result of the model is partly in line with the expectations based on the theoretical framework in Chapter 2. In Table 4, ln $night_i$, is 0.817 and ln day_j is 1.678. Thereby the relationship between the migration flows and the night population is positive and not negative as the theoretical framework states. One explanation could be that the population in Östergötland is not influenced the population density in the origin residential location when it concerns migration decision. In the models; Model 2, Model 3, and Model 4, which follow, the independent variables show a similar result as in Model 1. According to spatial interaction models, it is assumed that migration flows decline at larger distances and as distance decreases migration flows are expected to rise. The third independent variable, $dist_{ij}$, is therefore expected to be negatively related to the migration flow. From Table 4, ln $dist_{ij}$ is -1.445, which is in line with the expectations. The variable for distance, $dist_{ij}$, shows a similar result in Model 2, Model 3, and Model 4. We can, by the result presented above, conclude that the migration flows in Östergötland are to some extent influenced by population density especially in the destination residential location and distance as prospective migrants take their migration decision to move from one municipality to another within Östergötland.

As mentioned in Chapter 2, the discrete choice and random utility models and new economic geography also emphasize the importance of population density. The result is therefore also partly in line with the framework of these two models.

In Model 2, a dummy for income is included. According to the neoclassical migration theory and the new economic geography, income levels are expected to influence migration flows. Higher income levels are assumed to be a pull factor, meanwhile lower income levels are assumed to be a push factor in terms of migration. By observing the result from Model 2 in Table 4, we can conclude that the income dummy had no significant relationship with the migration flows in Östergötland. Therefore, migrants in Östergötland are not influenced by income levels when they decide to move from one municipality to another.

In Model 3, a dummy for one-family house prices is included. According to the discrete choice and random utility models the prospective migrants evaluate different attributes from a discrete number of choices based on which of the choice give the migrant the highest utility. Additionally, the neoclassical migration theory assumes that the prospective migrants make a cost-benefit calculation and thereby one of the future costs can be house prices. By observing the result from Model 3 in Table 4, we can conclude that the dummy for one-family house prices had no significant relationship with the migration flows in Östergötland. Hence, migrants in Östergötland are not influenced by house prices when they decide their future residential location.

In Model 4, a dummy for Linköping municipality and Norrköping municipality is included in the regression. According to the discrete choice and random utility models, prospective migrants' migration decision is partly based upon the access to different attributes. Since Linköping and Norrköping are those municipalities within Östergötland that can offer the largest supply in for example services, culture, and education, those two municipalities are put in a dummy in order to adjust for this attraction force. According to Table 4 there are observable relationship between the dummy for Linköping and Norrköping and the migration flows within Östergötland.

To sum up, the empirical analysis shows that the interregional migration flows in Östergötland are determined to some extent by the population density, especially in the destination residential location as a pull factor, and the distance between the origin and destination.

If and when the planned investments in local and general infrastructure are completed and the travel time is shortened, the result indicates that the movements between municipalities within Östergötland should increase. There is also a large propensity that the migration flows in and out of the county will also increase as the distances will decline.

5 Conclusions

The determinants of migration flows in Sweden have during the last centuries changed. During the 19th and in the beginning of the 20th century, the population was forced to migrate mainly due to economically and family related reasons. During the last decades housing environment and employment changes have become the dominating motives when people take their migration decision. The migration in Sweden has been uneven distributed and this has partly led to a situation where some regions are growing faster than others. One of those growing regions is the county of Östergötland.

The purpose of the thesis was to find out what determines interregional migration flows between the 13 municipalities in Östergötland and if any of the major migration theories and models are applicable to the migration flows in Östergötland. The study has been carried out with focus on the 13 municipalities in Östergötland and the migration flows between those municipalities during 2006. The reasons why Östergötland was chosen as the investigated geographical area was due to its strategically good location, its strong development, especially in Linköping and Norrköping, and the future plans on developing the local and regional infrastructure in the county.

Four different theories and models are presented in the theoretical framework: Neoclassical migration theory; Spatial interaction models; Discrete choice and random utility models; and New economic geography.

The empirical study consists of the migration flows between the 13 municipalities within Östergötland during 2006. The independent variables are night population in the sending municipality, day population in receiving municipality, and the distance in between the municipalities. Dummies are also included in the empirical study, which reflect the differences in income levels, differences in one-family house prices, and adjustment for Linköping and Norrköping, which may have a special attraction force that the other municipalities may not have. The independent variables were retrieved from 2005. The result of the empirical study showed a clear relationship between population density and the migration flows. Both in the origin residential location and in the destination residential location a high population density can be considered as being a pull factor. There is also an evident relationship between distance and migration flows, as the distance become larger the migration flows are lower. However, there were no relationships observed between the migration flows in Östergötland and the income levels, the house prices, or for Linköping and Norrköping.

When referring to the theoretical framework outlined in Chapter 2, it is partly possible to confirm that the migration flows in Östergötland follows the framework of spatial interaction models, partly the framework of discrete choice and random utility models, and partly the new economic geography.

References

Brakman, S., Garretsen, H., and van Marrewijk, C. (2006). *An introduction to geographical economics*. Cambridge: Cambridge University Press.

Chattopadhyay, S. (2000). The effectiveness of McFaddens's nested logit model in valuing amenity improvement. *Regional Science and Urban Economics, Vol.30,* pp.23-43.

Clark, W.A.V. & Van Lierop, W.F.J. (1987). Residential mobility and household location modelling. In P.Nijkamp. (Eds.), *Handbook of Regional and Urban Economics*. (p.97-132). 1st Edition. Volume 1. Elsevier.

Foot, D.K., Milne, W.J. (1984). Net Migration Estimation in an Extended, Multiregional Gravity Model. *Journal of Regional Science, Vol. 24, No. 1,* pp.119-133.

Greene, W.H. (2003) *Econometric analysis*. 5th Edition. Upper Saddle River: Prentice-Hall Pearson Education International.

Gujarati, D.N. (2003) *Basic Econometrics*. 4th Edition. New York: McGraw-Hill.

Johansson, B. & Klaesson, J. (2007) *The Management And Measurement of Infrastructure – 4. Infrastructure, Labour Market Accessibility and Economic Development.* Cheltenham: Edward Elgar Publishing Ltd.

Johansson, B., Klaesson, J., Olsson, M. (2002). Time distances and labor market integration. *Papers in Regional Science, 81,* pp.305-327.

Johansson, B., Backman, M, et al. (2007). *STATSFÖRNYELSE I NORRKÖPING & LINKÖPING: Konsekvenser av Ostlänken.* Jönköping: Institutet för näringslivsanalys vid JIBS.

Johansson, B., Westin, L., Strömquist, U. (2007). *Krympa med värdighet – Förslag till ett forskningsprogam om kommuner med minskande befolkning.* Stockholm: Tyréns Temaplan.

Klaesson, J. (2001). *Spatial Interaction Models and Concepts: A Review of the Gravity Theory.* Jönköping International Business School, Jönköping University.

Lee, E.S. (1966). A Theory of Migration. *Demography, Vol.3, No.1,* pp. 47-57.

Massey, D.S., Arango, J., Hugo, G., Kouaouci, A., Pellegrino, A., Taylor, J.E. (1993). Theories of International Migration: A Review and Appraisal. *Population and Development, Review 19, No. 3.* pp.431-466.

Massey, D.S., Espinosa, K.E. (1997). What's Driving Mexico-U.S. Migration) A Theoretical, Empirical, and Policy Analysis. *The American Journal of Sociology, Vol. 102, No. 4,* pp.939-999.

Mikkonen, K., Luoma, M. (1999). The parameters of the gravity model are changing – how and why? *Journal of Transport Geography 7,* pp.277-283.

Myrdal, A., Myrdal, G. (1934). *Kris i befolkningsfrågan.* 2nd Edition. Stockholm: Albert Bonniers Förlag.

Polese. M. (1981). Regional Disparity, Migration and Economic Adjustment: A Reappraisal. *Canadian Public Policy, Vol. 7, No. 4,* pp.519-525.

Shioji, E. (2001). Composition Effect of Migration and Regional Growth in Japan. *Journal of the Japanese and International Economics, Vol. 15,* pp. 29-49.

Sjaastad, L.A. (1962). The Costs and Returns of Human Migration. *Journal of Political Economy, Vol. 70, No. 5*, pp.80-93.

Internet:
The County Administrative Board of Västra Götaland / Länstyrelsen Västra Götaland
http://www.o.lst.se/

Encyclopedia Britannica
www.britannica.com

Statistics Sweden (Statistiska Centralbyrån)
www.scb.se

The Swedish Road Administration (Vägverket)
www.vv.se

Östsam Regional Development Council
http://www.ostsam.se