Where are we heading?

A study of Lund University graduates and their locational choice between urban, suburban and rural municipalities

May 2022

Authors:

Ingrid Gunnarsson

Clara Ramm-Ericson

Supervisors: Andreas Bergh and Therese Nilsson

Abstract

The migration patterns of newly graduated students have implications for regional development, as the attraction and retention of high-educated individuals is important for the innovation and productivity of the regional labor market. Moreover, imbalances in the migration flows may create or amplify regional discrepancies. The study focuses on the demographic characteristics of the graduates from Lund University moving to urban, suburban or rural municipalities in Sweden after graduation and what regional factors affect the choice of location. Descriptive statistics are presented to analyze the demographic characteristics and a multivariate regression analysis is performed to analyze to what extent regional factors contribute to the choice of location. The independent variables, i.e., the regional factors, reflect the labor market, geography, economy and quality of life of the municipalities. We found three factors to be especially important for the choice of location for graduates from Lund University: labor market opportunities, proximity to Lund, and like-mindedness of the population in the municipality.

Keywords: *graduate migration, urbanity, municipalities, regression analysis.*

Table of Contents

1. Introduction

Imbalances in migration flows between municipalities may create or amplify discrepancies between regions, both economically and socially. A municipality that experiences a relatively larger inflow of individuals has the potential to stimulate regional economic growth while in reverse, a region with consistent and substantial out-migration may struggle to develop or keep basic societal services, such as schools, health care and grocery stores. Regional development is especially dependent on the attraction and retention of high-skilled individuals (Faggian & McCann, 2009), and as young and high-educated individuals in general are more mobile (Borjas, 2020), it is relevant to identify their moving patterns and determinants thereof. In particular, it is interesting to investigate if, and in that case, why there exists an imbalance in the migration flows of graduates to urban, suburban and rural areas, respectively. Since the decision to move in many ways can be seen as a personal investment, it is interesting to analyze the characteristics of the driving forces behind post-graduation mobility. It is also relevant to analyze graduates' incentives to move in order for municipalities to identify relevant guidelines for potential policies and actions to attract and retain young and high-educated individuals.

Previous studies regarding regional migration of university graduates can roughly be divided into two categories, where some research apply a broader national perspective and others choose to more closely follow graduates from a specific university. Prior studies cover both Sweden and other countries, and particularly countries that display notable regional disparities between urban and rural areas. In general, prior research indicates that more developed and densely populated regions are able to retain graduates to a greater extent than more peripherally located municipalities (Faggian, Rajbhandari & Dotzel, 2017; De Cintio & Grassi, 2013). Several less densely populated university cities in Sweden, especially those located in the northern parts, struggle to retain the student population post-graduation (Eklund, Eriksson & Lundberg, 2019; Statistics Sweden, 2020). At the same time, larger university cities such as Stockholm, Gothenburg and Malmö are able to retain a considerable share of their graduates (Statistics Sweden, 2017). Previous research shows that the choice of location after graduation depends on several factors, both regional and individual, such as environmental attributes, labor market structures and demographic characteristics of the graduates (Bjerke & Mellander, 2016, Faggian & McCann, 2009).

This thesis examines internal migration patterns of Lund University graduates and whether these patterns differentiate or accord with theories of labor migration and already observed trends of Swedish and international graduate migration. Through descriptive statistics and multivariate regression analysis, the aim is to answer the following research question:

- What are the demographic characteristics of the graduates from Lund University moving to urban, suburban or rural municipalities after graduation and what regional factors affect the choice of location?

The study is restricted to only include students who graduated with a bachelors' or masters' degree from Lund University in 2015. The decision is made both in regards to available data and to enable comparisons of migration patterns between graduates from different universities. The analysis examines graduates from 2015 in order to examine the location of residence five years after graduation. Due to limitations in time and resources, the regression analysis is restricted to cross-sectional data.

The report is structured in the following way. We will start by giving a brief introduction to the topic of internal migration in Sweden, followed by a presentation of the analytical frameworks of the report which is divided into two parts: previous research within the topic of graduate migration and theories regarding internal migration. Next, we will review our methods, including descriptions of the data, the variables and the framework for the multivariate regression analysis. Finally, we present and discuss the results in regards to the analytical framework and conclude how demographic characteristics together with regional factors may explain why some municipalities are comparatively more attractive to newly graduated students from Lund University.

2. Background

2.1 Lund as a setting of study

Founded in 1666, Lund University has a long academic tradition. The university is internationally recognized as one of the highest ranked universities in Sweden in terms of education and the city has been voted the top choice of international students applying to universities in Sweden (Lund University, 2022). The university has campuses in Lund, Helsingborg and Malmö and all three campuses are located in the densely populated and most southern Swedish region, Skåne, from where a majority of the students (53 %) are recruited (Ladok, 2022). The university additionally attracts students from all parts of the country and 20 % of the student body is represented by international students (Lund University, 2022). The city of Lund is to a great extent influenced by the university; the 44 000 students account for almost a fifth of the total residents in the municipality (Lund University, 2022; Lunds kommun, 2022). The university offers bachelor's, master's and PhD degrees within the faculties economics and management, humanities and theology, law, fine and performing arts, engineering, medicine, science and social sciences.

2.2 Urban-rural migration

The population density in Sweden is among the lowest in the EU, with only around 25 people living on each square kilometer (Eurostat, 2021). However, there are clear differences in the population allocation within the country and between municipalities, with a majority of the population residing in the southern parts of Sweden. According to Statistics Sweden (2022a), the top eight out of the ten most densely populated municipalities are located in the Stockholm area while the other two are the municipalities of Gothenburg and Malmö, Sweden's second and third largest cities. The top ten least densely populated municipalities are the larger municipalities located in the north (Statistics Sweden, 2022a). In the most dense municipality Sundbyberg, located close to Stockholm, each square kilometer houses 6171 residents compared to Sweden's least densely populated municipality Arjeplog with 0.2 inhabitants per square kilometer (Statistics Sweden, 2022a). Population density is the common basis for urban-rural classification of regions, although the use of different methods have led to a small variety in classifications among different authorities.

Changes in the migration patterns have redistributed the population since historical times. In preindustrial Sweden, almost 90 % of the population lived in rural areas (Statistics Sweden,

2015). The industrial revolution induced a reformation of the labor market which sparked the urbanization process, as more people began to seek job opportunities in the cities. As of 2015, about 85 % of the Swedish population lives in urban areas (Statistics Sweden, 2022a) and Faggian and McCann (2009:212) note that "people are becoming increasingly geographically mobile in response to technological change and globalisation." During the past decade, the in-migration rate from rural to urban areas have nonetheless stabilized, i.e., the in-flow is constant and no longer increasing (Statistics Sweden, 2015). Meanwhile, the Royal Swedish Academy of Engineering Sciences (IVA, 2017) observes a growth in suburban areas. IVA (2017) explains that there is a difference between density and proximity, and emphasizes that rural areas located close to urban areas have the possibility to benefit from the urban labor market and economy. Rapid development in information and communication technologies moreover reduces distances which Bjarnason and Edvardsson (2017) argue may affect migration patterns. For instance, commuting opportunities have supported the growth of suburban areas, making it easier to live and work in different municipalities (IVA, 2017; Swedish board of agriculture, 2013). Neighboring municipalities in densely populated areas are thus considered to take part of the same labor market, defined as local labor markets (Statistics Sweden, 2005). There are 87 local labor markets and 64 local labor market regions in Sweden (Statistics Sweden, 2005).

Just as migration patterns have varied over time, they also vary within the population. Young and high-educated people are in general a highly mobile group (Faggian & McCann, 2009; Borjas, 2020) which accords with observed migration trends in Sweden. Statistics Sweden (2022) reports that in 2021, 25 % of all 19-34-year-olds moved within the country, making them the most mobile of all age groups. In comparison, only about 4 % of all 66-85-year-olds moved in 2021 (Statistics Sweden, 2022b). There are several contributing factors to why young people are more mobile that generally relates to being in a less rooted phase of life where they are more likely to move away for instance for studies, work or relationships (Borjas, 2020; Statistics Sweden, 2022b). Statistics Sweden (2022b) however concludes that in general, both younger and older people prefer to not move too far away from home and that the majority who move stays within the same region. At the same time, some studies find that previous migration makes individuals more prone to move further away later in life (Faggian & McCann, 2009; Lovén, Hammarlund & Nordin, 2020).

Universities across Sweden attract students from all parts of the country, but not all students that move to a university city will stay after graduation; some graduates will move back to their home municipality while others will seek opportunities elsewhere (Bjerke & Mellander, 2016). Faggian and McCann (2009) suggest that graduates can be divided into five categories according to their migration patterns: return migrants, repeat migrants, late migrants, university stayers and non migrants. "Return migrants" refers to students who move away to enter university but move back home after graduation (Faggian & McCann, 2009). "Repeat migrants" also move away to study but move on to a new location after graduation, which Faggian and McCann (2009) note is the most commonly observed migration pattern.

Studies have found several influential factors of the in-migration to municipalities. The Swedish board of agriculture (2013) acknowledges that locational attractiveness is a highly subjective matter, although some regional factors in general tend to benefit municipal population growth. These factors can be both connected to the environmental attractiveness of a location, e.g., proximity to the coast or to open landscapes, or to practical locational features such as labor market diversity, proximity to schools and grocery stores, and the quality of social services, infrastructure and communication opportunities (Swedish board of agriculture, 2013).

2.3 Regional effects of imbalanced migration flows

The accumulation of skilled individuals is crucial for regions to develop and stay nationally competitive, and an imbalanced flow of graduates may increase disparities between regions (De Cintio & Grassi, 2013; Jones & Vollrath, 2013). In general, urban areas are characterized by high in-migration and lower out-migration (Statistics Sweden, 2022a; Bjarnason & Edvardsson; 2017). The urbanization process has raised concerns about depopulation of the countryside, as a reduced number of inhabitants makes it economically challenging to sustain both social and commercial services such as schools, hospitals and firms in less populated areas (Glesbygdsverket, 2007). Hjort and Malmberg (2008) find that rural areas are less attractive to young people and that low rural net-migration of young people contributes to the aging of rural areas, generating a higher dependency ratio and making it harder to economically sustain the non-working population. Bjarnason and Edvardsson (2017) note that lack of higher educated individuals in rural areas may pose a threat to regional social, economic and cultural development.

The substantial inflows to urban areas has brought upon both positive and negative implications. While the sparked demand and agglomeration effects have stimulated the economy, a higher concentration of people has led to issues with for example rising prices of housing as well as pollution (Glesbygdsverket, 2007). Yet, Bjarnason and Edvardsson (2017:244) observe that "the concentration of university graduates in urban and metropolitan areas contributes to increased productivity, innovation and entrepreneurship, and helps create dynamic environments rich in amenities and occupational opportunities". Thus the regional attraction and retention of graduates becomes critical in order to stay competitive in an increasingly global and knowledge-based society (Faggian & McCann, 2009).

3. Previous research

Previous research regarding graduate migration, both for Sweden and elsewhere, finds that urban areas are able to both attract and retain a larger share of graduates than rural areas. Other findings include that graduate migration is influenced by the strength of the local labor market, the presence of a university, regional income differences and the quality of life. Regional factors are moreover found to interact with individual characteristics such as the graduate's field of study and family circumstances.

3.1 International studies of graduate mobility

Prior research has sought to map out characteristics, driving forces and effects of graduate mobility. In a study of student migration in Iceland, Bjarnason and Edvardsson (2017) find that decisions to move are based on a complex combination of regional opportunities and personal incentives, backgrounds and networks. In terms of locational factors, regional disparities in labor markets seem to be a key driving force of geographic mobility (Bjarnason & Edvardsson, 2017; De Cintio & Grassi, 2013). Bjarnason and Edvardsson (2017:244) observe that "greater educational and occupational aspirations consistently predict stronger migration intentions among rural youth" and further state that most opportunities for professional careers are concentrated in urban or even global job markets. Faggian and McCann (2009), who conduct extensive research within the field of graduate migration in Great Britain during the 2000s, note that London is prominent at both attracting and retaining students from all over the country, but that areas close to London are able to benefit from the high intensity of London's labor market. Although labor market opportunities are found to be a significant driving force of migration (Bjarnason & Edvardsson, 2017), the authors note that changes in family circumstances, e.g., having children, may alter migratory plans or decisions.

The presence of a university may strengthen regional development through increased human capital (Faggian & McCann, 2009; Bjarnason & Edvardsson, 2017). Faggian and McCann (2009) observe that university cities may benefit both from location-specific knowledge spillover effects from the university and from the inflow of competent young individuals, who after finishing their studies are a potential resource to the labor market. However, Bjarnason and Edvardsson (2017) also point out that whether moved-in students chose to stay or leave after graduation depends on the initial strength of the region. Moreover, Cörvers and

Venhorst (2018) find that labor markets with larger shares of higher and more scientific employment relate to stronger inflows of recent graduates.

A number of studies on graduate migration examine the relation between mobility and income. Kazakis and Faggian (2016) analyze how graduate mobility in the US affected changes in salary, and found that different types of migration had different effects on the salary. The authors conclude that graduates who studied in a municipality other than their home and then later moved to another municipality (repeat migrants) generally saw an increase in salary from migration, while those who did not leave their home municipality until after graduation (late migrants) had a negative effect on their salary from migration (Kazakis and Faggian, 2016). In a study of graduate migration in Italy, De Cintio and Grassi (2013) conclude that repeat and late migrants gained the most from geographic mobility but that university stayers also gained a smaller increase in wage. Moving back home after graduation (return migration) was found to have a slight negative effect on the wage trend (De Cintio & Grassi, 2013). Other studies focus on whether incentives to migrate can be derived from regional income disparities. Crescenzi, Holman and Orru (2016) examine driving forces of return migration to Sardinia, which is a comparatively less developed region in Italy. The authors conclude that income is only partly an explanation of graduate migration behavior and that family, social networks and quality of life appear to have a strong influence on the choice of location.

3.2 Swedish studies of graduate mobility
Studies that examine graduate migration from a national perspective have been conducted by the Swedish Higher Education Authority (UKÄ) and the official statistical government agency Statistics Sweden, among others. UKÄ (2020) researched the distribution prior and after studying of students from 35 higher education institutions located in different parts of Sweden. The report examined from which region the students are recruited, and whether this affects the locational choice after graduation. The conclusion is that more individuals live in urban areas after graduation than before, that younger graduates are more mobile than older and that regionally recruited students are more likely to stay in the university municipality (UKÄ, 2020).

Statistics Sweden (2017) performed a national study which examined to what extent local labor markets managed to retain students who graduated in 2016 from either of the ninth

biggest universities in Sweden with a degree within business and economics, engineering or teaching. Stockholm is prominent at retaining moved-in university students and particularly those with a degree in engineering or business and economics; according to the study, 79 % of business students that moved to Stockholm for university studies are hired locally after graduation, compared to 43 % in Gothenburg and 42 % in Malmö. Moreover, Gothenburg is comparatively better at attracting and retaining engineering graduates and points out that a possible explanation is that the manufacturing industry is prominent within the local labor market. The study also reveals that approximately 90 % of the students born in either Stockholm, Malmö or Gothenburg that studied at a local university chose to stay after graduation. Teachers are most likely to return to their home region (38 %) while engineers are the least likely (22 %). Statistics Sweden (2017) notes that the numbers may be somewhat biased since women appeared to be more likely to return than men and that more women graduate with a teaching degree. Lastly, Uppsala appears to be better at retaining graduates compared to Lund which Statistics Sweden (2017) argues may relate to the fact that Uppsala is included in the Stockholm-Solna local labor market.

University specific studies of graduate mobility in Sweden have mainly been conducted on northern universities and southern universities (Statistics Sweden, 2020). Eklund, Eriksson and Lundberg (2019) investigated the migration patterns of graduates from Umeå University students, located in Norrland, to analyze who stays and who leaves in regards to the individual factors such as gender and field of studies. In Umeå a large share of the graduates from the university chose to leave after finishing their studies which indicates a "brain drain" effect from the region. Statistics Sweden, (2020) examine graduates from Linköping University and find that whether students chose to stay or leave to a great extent depended on their field of studies; 87 % of students with a teaching degree stayed after graduation, compared to 62 % of the engineering graduates (Statistics Sweden, 2020). One out of four students were found to return to their home municipality (Statistics Sweden, 2020; Statistics Sweden, 2017). Moreover, health care students were the most common among the returning migrants (31 %), compared to 11 % of the teaching graduates and 19 % of the engineering graduates. Eklund, Eriksson and Lundberg (2019) and Statistics Sweden (2020) find that Stockholm received the greatest in-flow of graduates from both Umeå University and Linköping University.

Regarding location preferences, Berck, Tano and Westerlund (2011) note that young people are more likely to move to areas with higher per capita tax bases and that students are less likely to move to areas with a higher share of older people. The authors further reason that younger people prefer university cities or areas with lower amounts of older residents because the areas better match their consumption preferences and lifestyles, as younger people tend to enjoy areas with a greater amount of restaurants, bars and cultural activities (Berck, Tano & Westerlund, 2011). However, both Berck, Tano and Westerlund (2011) and Bjerke and Mellander (2016) find family and networks to be one of the most influential factors in the choice of location for graduates. Bjerke and Mellander (2016) further state that labor market opportunities and regional amenities were less important for returning migrants.

4. Theory of labor migration

4.1 The Roy Model

The Roy model is a widely used model that illustrates the self-selection of workers in the long run. Roy (1951) describes the society as containing professions with different skill requirements and workers with different skill levels. The returns of engaging in a profession will therefore depend on who and how many engage in what. Roy (1951) concludes that workers will naturally sort themselves to pursue the careers that they are most fit for, i.e., that the most skilled workers will choose the work requiring the most skill.

The Roy model can be further extended as how the choice of geographical location affects the salary of the worker. Individuals can choose to live where they grew up or move to a different area, and whether they choose to stay or move depends on what maximizes their future lifetime earnings (Robinson & Tomes, 1982). Through empirical studies in Canada, Robinson and Tomes (1982) conclude that the choice between staying or moving is a self-selection process that places individuals in the most efficient location.

Borjas (2020) expands further on this theory by bringing about positive and negative selection on migration. Positive selection is when a highly skilled individual moves because the return to skill is higher in the destination region than in the home region (Borjas, 2020). Similarly, negative selection is when those with a lower skill level move because the return to skill is lower in the new area and therefore low-skilled earn more compared to what they would in an area where the relationship between wage and skill is steeper (Borjas, 2020). Borjas concludes that the type of immigrants (high or low skill level) an area attracts depends on the returns to skills.

4.2 Human capital as an investment

Human capital is knowledge, talent, experience and other characteristics an individual can acquire to increase their productivity, and obtaining these characteristics usually requires some form of investment (Langelett, 2002). This investment is usually done through education or different types of training, indicating that the cost of the investment is the opportunity cost of not having a salary during the education or training period (Langelett, 2002). The individual will choose to invest if the expected return minus the cost is higher

than if no investment is made, based on the assumption that people act rationally and want to maximize their profits.

Borjas (2020) suggests that migration also can be seen as a form of human capital investment. It is based on the idea that individuals can move between labor markets to increase their earnings. He describes this as a decision each individual makes by calculating the present value of working in different labor markets. The difference between migration and other forms of human capital investments is that the cost of the investment is the migration cost (Borjas, 2020). Several types of costs are included in the migration cost, e.g., the actual cost of moving such as moving trucks but also the more indirect cost of moving away from loved ones and the familiarity of the home town. The individual will choose to move to another labor market if the estimated lifetime earnings minus the migration costs are higher than the expected present value of staying in the current labor market.

4.3 Push and pull factors

Lee (1966) defines the decision to migrate as a selective choice made by individuals and states that the decision to move either depends on positive "+" conditions in the destination or negative "−" conditions in the origin. These conditions are commonly called push and pull factors in economic research (Borjas, 2020; Urbánski, 2022; Zanabazar, Kho & Jigjiddorj, 2021). Potential push-effects could be high levels of unemployment, lack of opportunity or natural disasters. Pull-effects can likewise be induced by both economic, social, political and environmental factors that the individual perceives as desirable at the destination (Urbánski, 2022). Further Lee (1966) explains that whether it is the "+" or the "−" conditions that influence the individual's choice of location will affect whether the destination location experiences a positive or negative selection of the moved-in individuals. Positive selection occurs when individuals move to a location because they expect positive conditions from moving there, while negative selection arises when individuals migrate because of "-" conditions at the origin (Lee, 1966).

5. Method

5.1 Data

The two primary sources of data used in this thesis are the databases "Bak- och framgrund" and "Statistikdatabasen" (Labok, 2022; Statistics Sweden, 2022c). From the database "Bak- och framgrund", developed by Ladokkonsortiet and Statistics Sweden, we get aggregated data of graduates. The data contains information about the demography of the student population, e.g., gender, birth years, recruitment municipalities and fields of studies. Post graduation variables are also included, such as municipalities of residence and employment both one, three and five years after graduation. The values of the data describe the number of individuals for a given population, where the lowest values were anonymized (Labok, 2022) and needed to be approximated to be able to analyze the data. For a further explanation of the approximation, see Appendix B. The dependent variable in the regression analysis is also based on data from "Bak- och framgrund".

We also use the database "Statistikdatabasen", developed by Statistics Sweden, to collect data from 2015 on a municipal basis for the variables *Average yearly income, Share of older people, Tax rate, Share of higher educated* and *Nature* used in the regression analysis. Finally, we also collected data from other sources. These include authorities such as Arbetsförmedlingen and organizations like Svenskt Näringsliv and Fastighetsägarna. These were used for the more specific variables where more specialized actors (compared to the broader Statistics Sweden) had done research and could provide valuable data to be used in the regression analysis. A more detailed description of each variable and where the data was collected from is presented in section 5.2.

Excel is used to process and analyze the demographic data from "Bak-och framgrund", and to create tables and figures. The analysis of the regional factors is done through four multivariate regressions, which were performed with the help of the econometric tool Gretl. Before performing the OLS regressions, all variables that are not dummy variables were transformed into natural logarithms using Gretl, to adjust for the fact that the data was found not to be linear in parameters.

5.2 Variables

5.2.1 Dependent variable

In-migration of Lund University graduates

The purpose of the regression analyses is to examine what regional factors impact the in-migration of graduates from Lund University to different municipalities. For the regression analysis to accord with the empirical research, the dependent variable in the regression model discloses the number of graduates residing in each municipality one year after graduating from Lund University in 2015 with a bachelor's or master's degree. The data is retrieved from the database "Bak- och framgrund". Since the main focus of the thesis is pull factors of migration, the in-migration becomes more relevant to examine than the out-migration or the municipal net migration of graduates.

5.2.2 Independent variables

Unemployment rate

Labor market opportunities are an important driving force for labor mobility, which is highly related to the possibility of getting hired (Borjas, 2020). High vacancy rates can be considered a pull factor while a high rate of unemployment can be considered a push factor of migration (Urbánski, 2022). Although the regressions primarily concerns municipal pull factors, data over vacancy rates was only available at a regional basis while unemployment rates could be retrieved at municipal basis, and hence the variable *UNEMP* is included in the regression to test whether higher unemployment rates discourage in-migration of graduates. The variable measures the percent of the municipal population between 16-64 years that were unemployed during the year 2015. Data is retrieved from the Swedish public unemployment service, Arbetsförmedlingen, and concerns open unemployment which is a condition where an individual is both qualified and willing to work but still unable to find a job (Borjas, 2020). In the regression, the coefficient for the variable is expected to be negative since a high level of unemployment would indicate a less attractive municipality for the graduates when making their migration decision.

Business climate

Bjarnason and Edvardsson (2017) state that graduates are more prone to move to metropolitan areas where the concentration of firms sparks innovation and productivity within the labor market. The variable *BUSCLI* (*Business climate)* is used in the regression as a proxy for the labor market structure, as it indicates whether the municipalities are open and supportive for entrepreneurial ideas. The Confederation of Swedish Enterprise (Svenskt näringsliv, 2021), releases a yearly report regarding the business climate in all Swedish municipalities. The results are summarized into a ranking of the 290 municipalities from the best business climate to the worst, thus the lower the value, the better. Accordingly, the coefficients for the variable are expected to be negative.

Average yearly income

According to human capital theory, the decision to migrate is an economic decision where the individual expects to get a return on their investment (Borjas, 2020). The return in this case would imply getting an increase in salary from moving. Therefore the variable *INC* is included in the regression to test if and in that case how the average yearly income in each municipality affects the in-migration of Lund University graduates. According to theory, the coefficient for the variable *INC* should be positive, indicating that municipalities with higher average income are more preferable for graduates when choosing where to reside. The data for the variable is collected from "Statistikdatabasen", the database of Statistics Sweden.

Share of older people

Previous research within the field of young adult migration indicates that young people prefer young areas with more people of the same age, and hence are less likely to move to areas with a large share of older people (Berck, Tano & Westerlund, 2011). Accordingly, the independent variable *OLD* is included to test whether the share of the municipal population above the age of 65 influences the graduate in-migration. The data is retrieved from "Statistikdatabasen" as a measure of the number of people above 65. To adjust the data into a per capita measure, the numbers are divided by the total municipal population. The trend of youth out-migration from rural areas has increased the relative share of older people in many rural municipalities (Hjort & Malmberg, 2008) and urban areas generally are characterized by

a lower average age (Statistics Sweden, 2020). Thus it is likely that the coefficient for the share of older people will have a negative effect on the overall in-migration from Lund. However, it is possible that the preference will differ when separately analyzing the graduate in-flows to urban, rural and suburban municipalities.

Fun

Berck, Tano and Westerlund (2011) found that young people prefer to move to areas that reflect their consumption preferences in terms of restaurants, bars and cultural activities. To examine whether newly graduated students are more inclined to move to more fun municipalities, the variable *FUN* is included in the regressions. The variable data is based on the report "Sveriges roligaste kommun", where Fastighetsägarna (2016) ranked all 290 municipalities according to the combined number of restaurants, liquor licenses and entertainment companies per thousand inhabitants in the municipality, to determine which was the most fun. Stockholm was ranked in third place while the other four out of the top five were smaller municipalities that attract a large amount of tourists (Fastighetsägarna, 2016). A high intensity of restaurants, nightlife and entertainment business is likely to attract more graduates to the municipality and thus the variable *FUN* is expected to have a positive coefficient.

Broadband

Both Bjerke and Mellander (2016) and the Swedish board of agriculture (2013) note that developed physical and digital infrastructure make regions more attractive for in-migration, which for instance can be estimated by the broadband and fiber coverage. Accordingly, the variable *BRBA* (*Broadband*) is included as a measure of the infrastructure's effect on the graduate in-migration to the municipalities. Data over broadband coverage in Sweden is retrieved from a Swedish organization within the field of broadband networks, Svenska Stadsnätsföreningen (2022), that has mapped out the broadband and fiber coverage in the municipalities year by year, from 2017 to 2021. The broadband data used in the regression is from the year 2017, since it is the most relevant as data from 2015 was not available. Important to note is that many municipalities struggled with mobile reception in 2017 and that the broadband coverage has increased substantially since, especially in more rural areas. In 2017, the coverage ranged between 40-90 %, in comparison to the year 2021 where most

of the municipalities display broadband coverage above 90 %. Thus, the expected outcome is that more extensive broadband coverage positively affects the in-migration of graduates from Lund.

Tax rate

According to human capital theory, the migration decision is based on the expected returns to the investment. In municipalities with higher tax rates, individuals get to keep less of their earned salary, which would disencourage in-migration. However, Berck, Tano and Westerlund (2011) found that young people are more likely to move to areas with higher per capita tax base. The variable *TAX* is included in the regression to see whether higher tax rates do in fact increase or decrease the in-migration of Lund University graduates and the data is retrieved from "Statistikdatabasen".

Share of higher educated

Cörverst and Venhorst (2018) found that labor markets with a larger share of high-educated individuals are more attractive to newly graduated students. Furthermore, municipalities with a higher concentration of high-educated individuals more likely reflects a like-minded environment influenced by knowledge spillovers. The variable *EDU* examines the effect on municipal in-migration of graduates from having a larger share of higher educated individuals. Data from "Statistikdatabasen" regarding the number of residents in each municipality with at least three years of higher education was divided with the population above 20 years old to get the share of the population with a higher education. The coefficient for the variable is expected to be positive.

Nature

The study by the Swedish board of agriculture (2013) emphasizes that environmental attractiveness supports municipal population growth. Moreover, Bjerke and Mellander (2016) note that open landscapes, coastlines and lakes in particular can be considered rural amenities. As a proxy for the environmental attractiveness, the variable *NATR (Nature)* is described by the percentage of the land area in each municipality that is covered by protected

nature. The coefficient is expected to be positive, especially for rural municipalities, and the data for the variable is also retrieved from "Statistikdatabasen".

Degree of urbanization (dummy variable)

As concluded by Statistics Sweden (2022a), Bjarnason and Edvardsson (2017) and Hjort and Malmberg (2008), among others, young people tend to prefer moving to urban municipalities over more rural ones. To examine whether this holds true for graduates from Lund University, two dummy variables for the degree of urbanity (*URBAN_d1* and *URBAN_d2*) are added in the regression analysis that examines the in-migration to all municipalities. According to the urban classification of Eurostat (2019) that is used throughout the thesis, the municipalities are divided into either urban, suburban or rural municipalities (for more details regarding the classification, see Appendix A). Urban municipalities are used as the reference dummy and thus numbered 0 for both urban dummy variables. Suburban municipalities are numbered as 1 for *URBAN_d1* and rural municipalities are numbered 1 for *URBAN_d2*. Because urban municipalities are the reference dummy, it is probable that both of the urban dummy variables will have a negative effect on the municipal in-migration of graduates.

NUTS2-region (dummy variable)

The regression analysis solely examines the municipal in-migration of graduates from Lund University. Thus the distance between the municipality of residence and Lund is likely to impact the graduate in-migration rate, as people tend to prefer to not move too far away (Statistics Sweden, 2022b). To estimate the relative distance from Lund, the NUTS 2 classification of regions is used. The NUTS classification (Nomenclature of territorial units for statistics) is a three level classification of regions developed by the European Union to divide territories in the EU and the UK (Eurostat, n.d.). The NUTS 2 level divides Sweden into eight regions: Stockholm, Östra Mellansverige, Småland med öarna, Sydsverige, Västsverige, Norra Mellansverige, Mellersta Norrland and Övre Norrland (Statistics Sweden, 2008). For further details regarding Swedish regions within each NUTS 2 region, see Appendix C. Stockholm is used as the reference dummy in the regression and thus always numbered 0. Seven dummy variables, *NUTS2_d1* through *NUTS2_d7,* are added to the regressions that shows the additional effect on the municipal graduate in-migration of belonging to each of the NUTS 2 regions, in relation to belonging to the region of Stockholm.

Given the distance from Lund, which is located in the NUTS 2 region Sydsverige, it is likely that the Sydsverige dummy variable together with Småland med öarna and Västsverige will have positive coefficients, in relation to the reference dummy Stockholm. Following the same line of argument, the coefficients for the remaining four NUTS 2 dummy variables are likely to be negative, as they are located in level with or north of Stockholm.

University city (dummy variable)

Prior studies indicate that the presence of a university supports both regional development and municipal in-migration (Bjerke & Mellander, 2016; Faggian & McCann, 2009; Bjarnason & Edvardsson, 2017). Accordingly, the dummy variable *UNICITY_d* is included to analyze whether university municipalities have a favorable in-migration of university graduates from Lund. All municipalities with an academic institution for higher education are included (UKÄ, 2022). For universities with multiple locations of campuses, all municipalities are included as well. For instance, both Helsingborg and Gotland are classified as university municipalities as they host campuses for Lund and Uppsala University. Municipalities with a university are numbered as 1, while the others are numbered 0. The expected outcome is that *UNICITY_d* will have a positive effect on the in-migration.

Table 1. Descriptives of the regression variables.

Variables	Mean	Median	S.D.	Min	Max
In-migration of LU graduates	23.31	2.0	134.8	1.0	1637
Unemployment rate	0.077	0.074	0.028	0.023	0.152
Business climate	145.5	145.5	83.86	1.0	290.0
Average yearly income	277.0	267.6	35.55	235.2	531.4
Tax rate	0.327	0.330	0.011	0.292	0.347
Share of higher educated	0.137	0.121	0.056	0.069	0.401
Fun	2.351	2.055	1.429	0.420	12.56
Nature	6.1	3.0	9.012	0.1	62.80
Share of older people	0.232	0.238	0.041	0.129	0.334
Broadband	0.754	0.779	0.133	0.294	0.995

Descriptives of all variables in the regression model (except the dummy variables) can be found in *Table 1*.

5.3 Regression framework

Table 2. Explanation of the variable abbreviations.

lnINMIG	The natural logarithm of the number of 2015 graduates from Lund University moving to a given municipality (Dependent variable).
lnUNEMP	The natural logarithm of the percent unemployed in each municipality.
lnBUSCLI	The natural logarithm of the ranking of the number of each municipality in terms of the business climate.
lnINC	The natural logarithm of the average yearly income in each municipality.
lnOLD	The natural logarithm of the percent of the municipal population over the age of 65.
lnFUN	The natural logarithm of the score of how "fun" a given municipality is.
lnBRBA	The natural logarithm of the percentage of each municipality covered in broadband.
lnTAX	The natural logarithm of the tax rate for each municipality.
lnEDU	The natural logarithm of the share of the population above 20 years old with higher education.
lnNATR	The natural logarithm of the percentage of land area in each municipality covered by protected nature.
UNICITY	A dummy variable to adjust if a university campus is located in the municipality.
NUTS2_d	7 dummy variables to adjust for whether the municipality is located in the region Stockholm, Östra Mellansverige, Småland med öarna, Sydsverige, Västsverige, Norra Mellansverige, Mellersta Norrland or Övre Norrland.
URBAN_d	2 dummy variables to adjust for whether the municipality belongs to the urban, suburban or rural category.

To determine the effects of regional factors of Swedish municipalities variables on graduate in-migration, four different OLS regressions were performed. The first one includes all municipalities (290 observations). The model includes nine independent variables and three dummy variables, and was set up as follows:

$$lnINMIG_i = \beta_1 + \beta_2 \, lnUNEMP_i + \beta_3 \, lnBUSCLI_i + \beta_4 \, lnINC_i + \beta_5 \, lnOLD_i + \beta_6 \, lnFUN_i$$

$$+ \beta_7 \, lnBRBA_i + \beta_8 \, lnTAX_i + \beta_9 \, lnEDU_i + \beta_{10} \, lnNATR_i + \beta_{11}(UNICITY \; Dummy)_i \qquad \text{(Equation 1)}$$

$$+ (\beta_{12}NUTS \, 2\_1 \, Dummy + \; ... \; + \beta_{18} \, NUTS2\_7 \, Dummy)_i + \beta_{19}URBAN\_d1_i$$

$$+ \beta_{20}URBAN\_d_i + \varepsilon_i$$

Next, we divide municipalities according to the three levels of urbanity. For urban, suburban and rural municipalities, one regression each was run with the purpose of testing whether the regional factors affect the migration decision differently depending on if the graduates choose to move to urban, suburban or rural municipalities. For the suburban and rural municipalities, the regressions included 121 and 146 observations respectively. The variables are identical to what we include in the regression for all municipalities except for the dummy variables *URBAN_d* which were excluded since all municipalities in each of the regression already have the same level of urbanization:

$$lnINMIG_i = \beta_1 + \beta_2\ lnUNEMP_i + \beta_3\ lnBUSCLI_i + \beta_4\ lnINC_i + \beta_5\ lnOLD_i + \beta_6\ lnFUN_i$$
$$+ \beta_7\ lnBRBA_i + \beta_8\ lnTAX_i + \beta_9\ lnEDU_i + \beta_{10}\ lnNATR_i + \beta_{11}(UNICITY\ Dummy)_i \qquad \text{(Equation 2)}$$
$$+ (\beta_{12}NUTS\ 2\_1\ Dummy + \ ... \ + \ \beta_{18}\ NUTS2\_7\ Dummy)_i + \varepsilon_i$$

In Sweden, only 23 municipalities classify as urban and therefore only 23 observations are used in the last regression. Ramanathan (2002) explains that the inclusion of many variables will increase the goodness of fit measured by the R^2, but when including more variables, the degrees of freedom will sink. Since the amount of observations for urban municipalities is low, the dummy variables adjusting for the different regions in Sweden were excluded from the regression to not lower the degrees of freedom even further:

$$lnINMIG_i = \beta_1 + \beta_2\ lnUNEMP_i + \beta_3\ lnBUSCLI_i + \beta_4\ lnINC_i + \beta_5\ lnOLD_i + \beta_6\ lnFUN_i \qquad \text{(Equation 3)}$$
$$+ \beta_7\ lnBRBA_i + \beta_8\ lnTAX_i + \beta_9\ lnEDU_i + \beta_{10}\ lnNATR_i + \beta_{11}(UNICITY\ Dummy)_i + \varepsilon_i$$

The data for both the dependent and independent variables were found not to be linear, which was adjusted for by using a log-log model where all variables were logged before performing the regression. A log-log model measures elasticity and is interpreted as a one percent change in an independent variable leading to a percent change in the dependent variable, expressed by the coefficient of the independent variable (Ramanathan, 2002). The data also shows signs of heteroscedasticity when performing White's test. Therefore robust standard errors are used in the regressions throughout.

6. Results

6.1 Descriptive statistics

Approximately 6600 students graduated with a bachelor's or a master's degree from Lund University in 2015. One year after graduation, 19 % were still residing in Lund and 65 % still residing in the regions of Skåne and Blekinge (Sydsverige). Malmö attracted the largest share of the graduates (25 %). Of the majority of the graduates that had moved further away by 2016, approximately 17 % were residing in the region of Stockholm and 5 % in the municipality of Gothenburg. After classifying the municipalities according to their degree of urbanity (see Appendix A), the distribution of the graduates from Lund University between urban, suburban and rural Swedish municipalities can be derived (see *Table 3*).

Table 3. Distribution of graduates in urban, suburban and rural municipalities in recruitment and residence 1 and 5 years after graduation (Ladok, 2022).

Municipalities	Recruited from	Residence year 1	Residence year 5
Urban	46 %	73 %	69 %
Suburban	40 %	21 %	24 %
Rural	14 %	6 %	7 %

Table 3 (adapted from Ladok, 2022) shows that urban municipalities were the most common locations of residence for the research population of graduates, both before and after entering university. The share of urban residents among the graduates increases however after the enrollment at Lund University, while the share of the graduates residing in suburban and rural municipalities decreases.

6.1.1 Recruitment municipality

Table 4. Municipality of residence 1 and (5) years after graduating for students from different municipalities of origin (Ladok, 2022).

Municipality of origin	Municipality of residence, Year 1 (Year 5)		
	Urban	*Suburban*	*Rural*
Urban	85 % (79 %)	12 % (17 %)	3 % (4 %)
Suburban	56 % (52 %)	40 % (41 %)	5 % (7 %)
Rural	52 % (49 %)	22 % (28 %)	25% (23 %)

Table 4 (adapted from Ladok, 2022) shows the share of graduates moving to either an urban, suburban or rural municipality after finishing their studies. We show this separately for graduates recruited to Lund University from an urban, suburban or rural municipality. Urban municipalities were the most common location of residence after graduation for students from all municipalities of origin, but in particular for students originating from urban municipalities. 85 % of graduates recruited to Lund University from an urban municipality chose to live in an urban area again a year after graduation, while just above half of the graduates from suburban and rural municipalities moved to an urban municipality.

Table 4 (adapted from Ladok, 2022) shows that a majority of the graduates choose to move to a municipality similar in degree of urbanity to the municipality of origin. For the graduates originating from a suburban municipality, the share moving to a suburban area after their studies is significantly higher than those from urban and rural municipalities. The same holds true for those who originally resided in rural areas; a quarter of them live in a rural area after graduating whereas only three and five percent respectively of graduates originating from urban and suburban municipalities chose to live in a rural area.

Table 4 (adapted from Ladok, 2022) also shows that the distribution of urban, suburban and rural residents five years after graduation is fairly similar to the distribution one year after graduation. The shares of urban residents were lower five years after graduation than one year after graduation for all graduates. This implies a slight increase in the shares of graduates residing in suburban and rural municipalities from the first to the fifth year after graduation for all types of origin. The exception is students who grew up in rural municipalities, where the share living in a rural municipality decreased from 25 to 23 percent between one and five years after graduation.
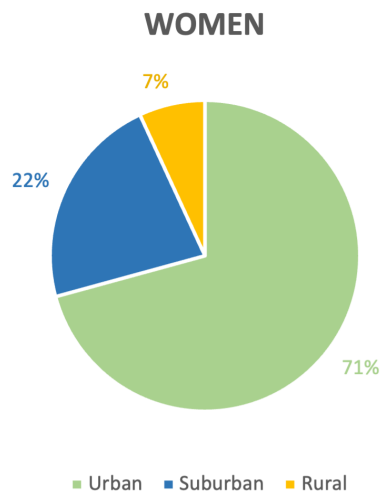
6.1.2 Gender

Figure 1. Shares of women moving to urban, suburban and rural municipalities.
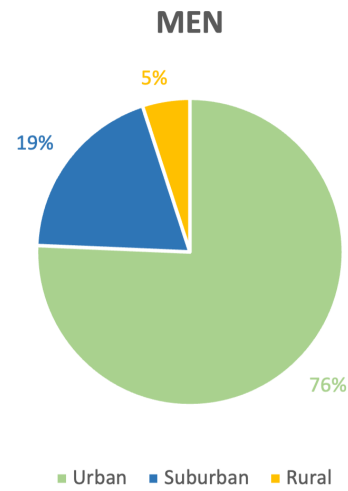
Figure 2. Shares of men moving to urban suburban and rural municipalities.

Source (*Figure 1-2*): Author compilation of data from Ladok (2022).

Of the graduates from Lund university in 2015, 56 % were women and 44 % were men (Ladok, 2022). *Figure 1* and *2* display the distribution of men and women that move to urban, suburban and rural municipalities, revealing that the distribution is not equal. Men were more likely to move to urban municipalities (76 % compared to 71 %) while women to a higher degree chose to move to suburban or rural municipalities (22 % and 7 % compared to 19 % and 5 %).
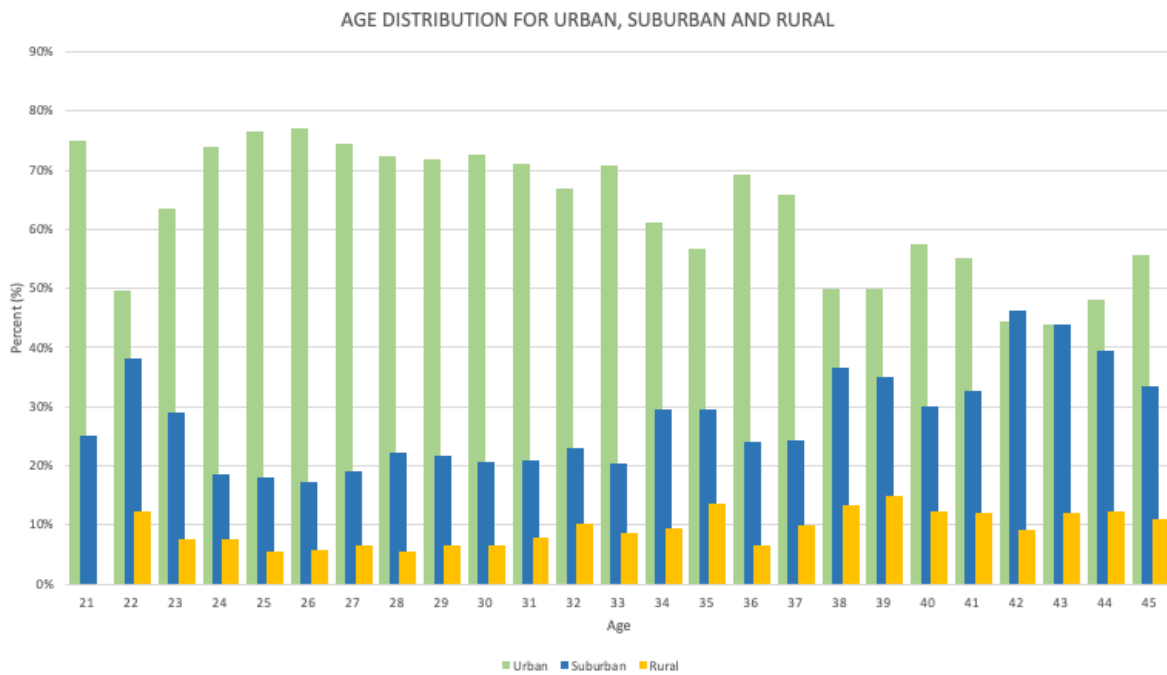
6.1.3 Age

Figure 3. The distribution of each age group moving to urban, suburban and rural municipalities. Source: Author compilation of data from Ladok (2022).

Figure 3 shows the percentage of each age group moving to either an urban, suburban or rural municipality. In other words, the combined percentage of e.g., all 25-year-olds in the figure will sum to 100. The figure above shows the overall preference for urban municipalities compared to more rural ones. When comparing the bars, the observed trend points to younger graduates having a preference for urban municipalities compared to those graduating at a higher age. The exceptions are those graduating at age 22, 23 or 24, where the suburban municipalities are a lot more popular than for those graduating when they are just a few years older. *Figure 3* moreover reveals that rural municipalities appear to be more attractive for older graduates.
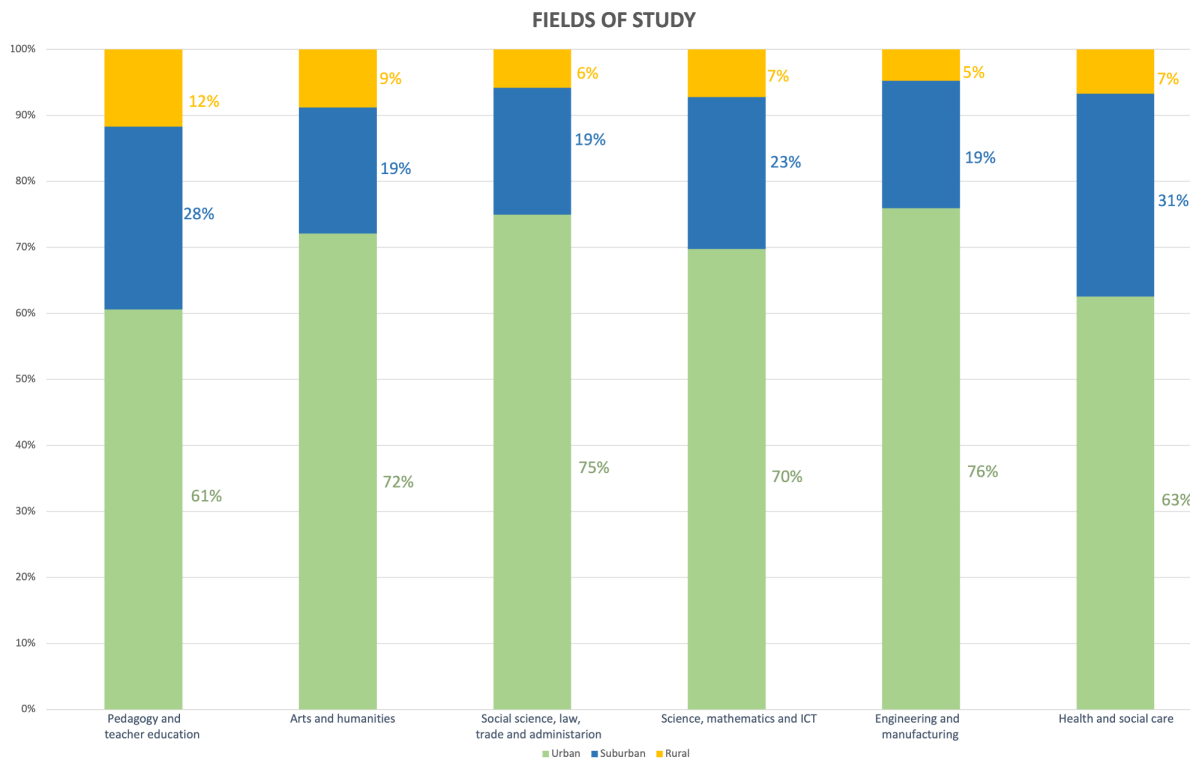
6.1.4 Fields of study

Figure 4. Shares of graduates from different fields of studies moving to urban, suburban and rural municipalities.

Source: Author compilation of data from Ladok (2022).

Figure 4 depicts the distribution of students from different fields of studies at Lund University that moved to urban, suburban and rural municipalities. By comparing the bars, it is possible to observe that the distribution differs between graduates with different degrees. Engineering graduates are the most likely to move to urban municipalities (76 %) and the least likely to move to rural municipalities (5 %). The fields of studies that display the largest share of graduates moving to rural municipalities are pedagogy and teaching (12 %) and arts and humanities (9 %). Lastly, it is possible to observe that suburban municipalities were able to attract the largest shares of graduates from the fields of pedagogy and teaching (28 %) and health and social care (31 %).
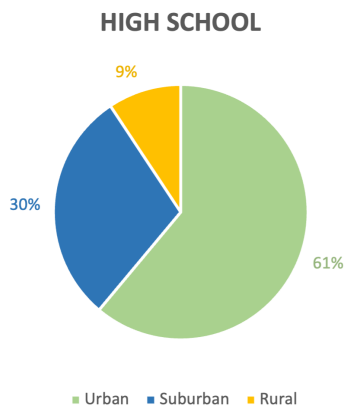
6.1.5 Parental education

HIGH SCHOOL

■ Urban ■ Suburban ■ Rural

Figure 5. Graduate distribution, parents with a high school diploma or less.

HIGHER EDUCATION < 3 YEARS

■ Urban ■ Suburban ■ Rural
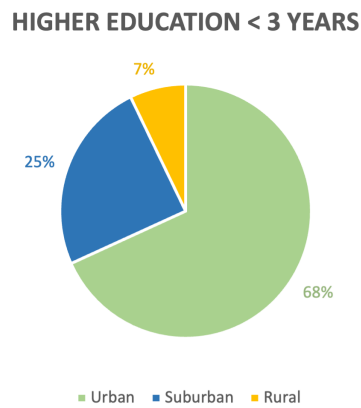
Figure 6. Graduate distribution, parents with higher education of less than three years.

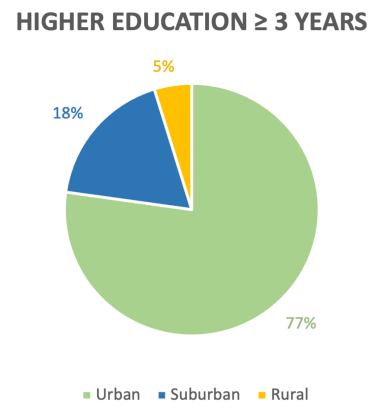**HIGHER EDUCATION ≥ 3 YEARS**

■ Urban ■ Suburban ■ Rural

Figure 7. Graduate distribution, parents with higher education of three or more years (including postgraduate studies).

Source (*Figure 5-7*): Author compilation of data from Ladok (2022).

A majority (67 %) of the 2015 graduates from Lund University have parents with a higher education (Ladok, 2022). *Figure 5, 6* and *7* moreover display that the parental education of the graduates moving to urban, suburban and rural municipalities somewhat differs. The figures reveal that graduates with highly educated parents move to urban municipalities to a greater extent than students whose parents have not pursued studies beyond high school (77 % compared to 61 %). The share of graduates moving to rural municipalities was the largest (9 %) among graduates whose parents had the lowest level of education. Further can be noted that for 10 % of the Lund University graduates from 2015, no data was available regarding the education level of their parents.
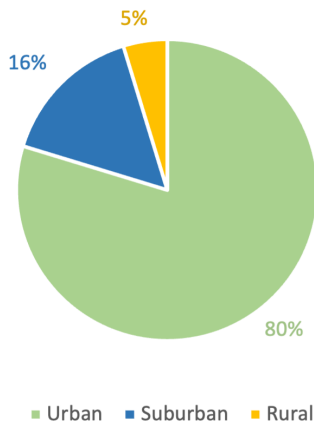
6.1.6 Background

FOREIGN - FOREIGN

Figure 8. Shares of foreign born students moving to urban, suburban and rural municipalities.

NATIVE - FOREIGN

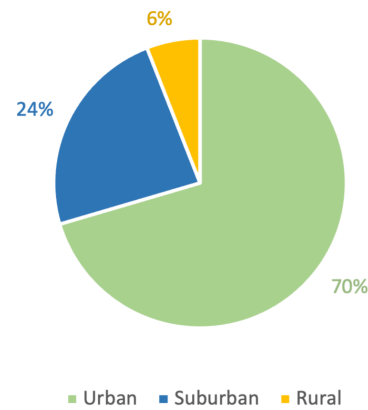*Figure 9. Shares of native born students with foreign born parents moving to urban, suburban and rural municipalities.*

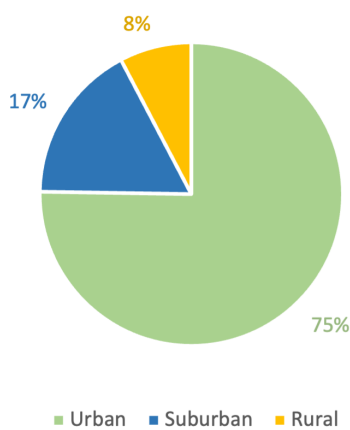**NATIVE - FOREIGN/NATIVE**

Figure 10. Shares of native born students with one native and on foreign born parent moving to urban, suburban and rural municipalities.
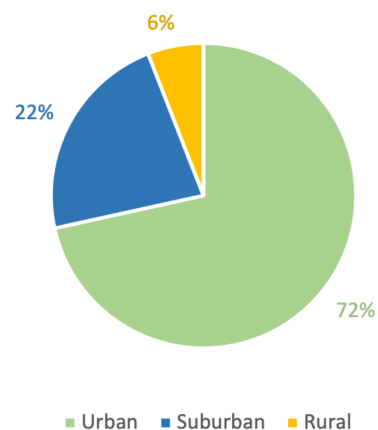
NATIVE - NATIVE

Figure 11. Shares of native born students with two native born parents moving to urban, suburban and rural municipalities.

Source (*Figure 8-11*): Author compilation of data from Ladok (2022).

A clear majority (73 %) of the graduates from Lund University in 2015 are native born with two native parents (Ladok, 2022). *Figure 8, 9, 10* and *11* displays how the distribution of graduates moving to urban, suburban or rural municipalities differs between graduates with native or foreign backgrounds. When comparing the figures, it is possible to observe that the distribution is fairly equal between graduates with different backgrounds. Noticeable differences include that graduates that are born outside of Sweden are more likely to move to

urban municipalities. Moreover, *Figure 9* and *11* show that suburban municipalities attract the largest shares of graduates among those who are native born with either two native born or two foreign born parents (24 % and 22 %).

6.1.7 Summary

From the presented statistics above we can observe some patterns about the demography of graduates moving to urban, suburban and rural municipalities. Firstly, the level of urbanity of the municipality of origin seemed to highly influence whether the graduate chose to move to an urban, suburban or rural municipality after their studies. Moving to a more rural area was more common among women than men. Younger graduates were more likely to move to urban areas while those graduating at an older age to a higher extent chose to live in suburban and rural areas. The distribution of graduates from different fields of studies also seems to differ between urban, suburban and rural municipalities. Urban municipalities attract a larger share of engineers than suburban and rural ones and the share of health and social care workers is the largest in suburban municipalities. Parental education also differed between those moving to urban, suburban and rural municipalities, where those moving to urban areas in general had parents with a higher education level. The distribution of graduates with native and foreign backgrounds were similar for all levels of urbanity.

6.2 Regression results

The results of the multivariate regression analysis performed on all municipalities is presented in *Table 5* below.

Table 5. *Marginal effects of regional factors on in-migration to all municipalities*

	All municipalities
const	−7.899
	(5.714)
Unemployment rate	0.610 ***
	(0.159)
Business climate	0.034
	(0.049)
Average yearly income	0.664
	(0.806)
Tax rate	−8.137 ***
	(2.588)

Table 5 continued	All municipalities
Share of higher educated	1.420 ***
	(0.297)
Fun	0.203 *
	(0.111)
Nature	0.022
	(0.031)
Share of older people	−0.347
	(0.410)
Broadband	−0.254
	(0.232)
Östra mellansverige (d)	0.071
	(0.196)
Småland m. öarna (d)	0.690 ***
	(0.217)
Sydsverige (d)	1.857 ***
	(0.236)
Västsverige (d)	0.526 **
	(0.227)
Norra mellansverige (d)	0.243
	(0.223)
Mellersta Norrland (d)	0.048
	(0.257)
Övre Norrland (d)	−0.037
	(0.226)
University city (d')	0.900 ***
	(0.190)
Suburban (d'')	−0.641 ***
	(0.233)
Rural (d'')	−0.731 ***
	(0.259)

Number of observations: 290 municipalities (6663 graduates)

$R^2 = 0.819$

*** p < 0.01; ** p < 0.05; * p < 0.1

Reference group for dummy variables (d, d', d''): Stockholm, Non-university city and Urban

Table 5 shows that several regional factors explain if students move away from Lund. The coefficients for the suburban and rural dummy variables are significantly negative, meaning that suburban and rural municipalities have an additional negative marginal effect on the in-migration of graduates in relation to urban municipalities, which support the hypothesis

that urban municipalities are the most attractive for newly graduated students. Moreover, the significant positive marginal effect of the share of high-educated and the additional significant positive effect of the presence of a university suggest that the general educational level within the municipality is important for graduates of Lund University, as expected. The results in *Table 4* also support the hypothesis that proximity to Lund has a positive effect on graduate in-migration, as the three NUTS 2 regions Småland m. öarna, Sydsverige and Västsverige display a significant positive additional marginal effect in relation to Stockholm. That the coefficients for the NUTS 2 regions Östra mellansverige, Norra mellansverige and Mellersta Norrland also appear to be positive somewhat contradicts the hypothesis, but the effects cannot be ensured since the values are not significant.

Other regional factors that are significant in *Table 5* are the unemployment rate, the tax rate and the intensity of restaurants, nightlife and entertainment businesses. The positive marginal effect of the independent variable *FUN* indicates that newly graduated students from Lund University prefer to move to more buoyant municipalities. The fact that the tax rate has a strong negative marginal effect suggests that graduates are more prone to move to municipalities with a lower tax rate. Unemployment has a significant positive marginal effect, which disagrees with previous research as it implies that the graduate in-migration would increase given an increase in the unemployment rate.

Next we perform regression analyses separately on urban, suburban and rural municipalities.

Table 6. *Marginal effects of regional factors on in-migration to urban, suburban and rural municipalities*

	Urban	Suburban	Rural
const	3.056	−15.883 *	−13.502
	(13.831)	(8.832)	(8.718)
Unemployment rate	3.466 **	0.899 ***	0.303
	(1.509)	(0.288)	(0.188)
Business climate	0.078	0.114	−0.021
	(0.249)	(0.083)	(0.066)
Average yearly income	0.299	0.545	2.353 *
	(3.482)	(1.367)	(1.386)
Tax rate	−12.083	−16.402 ***	−3.344
	(10.368)	(3.496)	(2.963)

Table 6 continued	Urban	Suburban	Rural
Share of higher educated	7.569 ***	1.684 ***	0.699 **
	(2.004)	(0.559)	(0.332)
Fun	1.161	0.194	0.053
	(0.770)	(0.221)	(0.093)
Nature	0.060	0.033	0.015
	(0.334)	(0.051)	(0.036)
Share of older people	−0.971	−0.039	0.129
	(1.900)	(0.699)	(0.499)
Broadband	−14.717 **	−0.268	−0.429 *
	(5.160)	(0.551)	(0.245)
Östra mellansverige (d)		0.231	−0.564
		(0.239)	(0.392)
Småland m. öarna (d)		1.128 ***	−0.052
		(0.302)	(0.402)
Sydsverige (d)		1.572 ***	1.444 ***
		(0.311)	(0.406)
Västsverige (d)		0.744 ***	−0.269
		(0.273)	(0.416)
Norra mellansverige (d)		0.651 **	−0.601
		(0.282)	(0.402)
Mellersta Norrland (d)		0.245	−0.547
		(0.308)	(0.431)
Övre Norrland (d)		−0.035	−0.632
		(0.312)	(0.417)
University city (d')	0.700	0.636 ***	0.517
	(0.578)	(0.190)	(0.701)
Number of municipalities:	23	121	146
(Number of graduates):	(4858)	(1400)	(405)
$R^2=$	0.835	0.798	0.715

*** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$

Reference group for dummy variables (d, d'): Stockholm and Non-university city

Table 6 shows that the marginal effects of the regional factors on graduate in-migration differ somewhat between urban, suburban and rural municipalities. This suggests that the regional factors are of different importance for graduates moving to municipalities of different degrees of urbanity, although a larger share of higher-educated appears to significantly increase the graduate in-migration to all three kinds of municipalities. A positive marginal effect on in-migration from the presence of a university could moreover only be significantly detected regarding suburban municipalities. In a similar matter, the tax rate appears to have a strong

negative impact on the in-migration to all municipalities, but it could only be significantly supported for suburban ones. That the unemployment rate seems to have a significant positive marginal effect on in-migration to both urban and suburban municipalities once again contradicts with previous research. Similarly, the significant negative marginal effect of broadband coverage on in-migration to urban and rural municipalities conflicts with the hypothesis that more developed infrastructure increases the municipal in-migration.

The NUTS 2 dummy variables appear to have different additional marginal effects for suburban and rural municipalities. For rural municipalities there is only a strong positive additional effect on the in-migration from belonging to Sydsverige compared to Stockholm. The negative coefficients of the other NUTS 2 dummy variables imply that besides Sydsverige, rural municipalities located in the Stockholm region are comparatively more attractive for graduates choosing to move to a rural area, although the values of the coefficients cannot be significantly supported. In comparison, suburban municipalities in the NUTS 2 regions Småland m. öarna, Sydsverige, Västsverige and Norra Mellansverige all seem to benefit from an additional significant positive marginal effect on the graduate in-migration in relation to Stockholm.

7. Discussion

The purpose of this thesis is to examine the demographic characteristics of the graduates from Lund University moving to urban, suburban or rural municipalities after graduation and what regional factors affect the choice of location.

From the results presented above there appears to be several factors, both individual and regional, that affect the choice of location for newly graduated students from Lund University. According to the Roy model, graduates will self-select themselves into areas where their level of skills gives them higher returns. For Lund University graduates who all have a higher education, it is rather a matter of where their different specific skills can provide them with the highest compensations. This trend can be observed in the results, as graduates from certain fields of studies appear to move to areas with compatible labor market opportunities. Engineers were found to be far more likely to move to urban municipalities than to suburban or rural ones which accords with the findings of the study by Statistics Sweden (2017), who argued that the reason why Gothenburg is comparatively better at attracting engineering graduates is because the local labor market is prominent within the manufacturing industry. Suburban municipalities were able to attract a larger share of health and social care workers while rural municipalities received a comparatively greater in-flow of graduates within arts and humanities and teaching. As Statistics Sweden (2017) pointed out, the strong correlation between gender and field of study may explain why women were found to be more likely to move to both suburban and rural areas. The share of men who studied engineering was more than twice as large as the share of women and likewise, 20 % of women graduated within health and social care compared to 8 % of men. It is possible that the connection could go in either direction, i.e., that both gender and field of studies could affect the choice of location. In a similar matter, it is interesting to reflect whether the choice of location reflects the field of study or whether the choice of studies reflect a preference for a less or more urban lifestyle.

The marginal effects of the variables *Average Yearly Income* and *Tax rate* together align with predicted migration patterns by the Roy model and human capital theory, which argue that individuals will choose to move to locations where there are probable returns to the investment of moving. The average yearly income was found to have a positive impact on the in-migration to both urban, suburban and rural municipalities. However, it could only be

proven significant for rural municipalities which demonstrates that high-income areas are comparatively more attractive for graduates moving to rural areas. Furthermore, the tax rate was found to have negative marginal effects on the graduate in-flow, significantly for suburban municipalities. All together, the marginal effects present support for the idea that the choice of location is an economic decision, although it disagrees with the observation that young people tend to move to areas with higher tax rates (Berck, Tano & Westerlund, 2011).

There may be several contributing explanations to why the results reveal a gravitational pull of graduate in-flows to the more southern parts of Sweden and in particular to Sydsverige. The data revealed that Malmö was able to attract the largest share of graduates and the regression analysis moreover showed that rural municipalities located in Sydsverige have a comparatively large in-flow of graduates from Lund University. One possible explanation may be that many of the graduates are return- or non-migrants, as a majority of the students at the university are locally recruited (Lund University, 2022) and as people in general prefer not to move too far away (Statistics Sweden, 2022b). The graduates that move to rural municipalities outside of Skåne appear to have a preference for the Stockholm region (although not significantly proved), similar to previous studies that have found that Stockholm attracts a large share of graduates from both Umeå and Linköping University. For Lund University, the extensive in-flows to Stockholm may partly be explained by return migration as well, since many students were recruited from Stockholm. The return migration hypothesis is further supported by the fact that both urban, suburban and rural municipalities were found to attract large shares of graduates originating from municipalities of the same degree of urbanity and that family and social networks are important for the choice of location (Bjerke & Mellander, 2016; Crescenzi, Holman & Orru, 2016). In regards to human capital theory, returning migrants are likely faced by lower migration costs, which as well would favor the migratory decision. However, it is likely that the graduate in-flow to more rural municipalities in both Stockholm and Sydsverige benefits from the regions being located in very densely populated parts of the country, since the development in commuting opportunities makes it possible to live outside of the bigger cities while still being able to benefit from the urban labor markets and services (IVA, 2017; Swedish board of agriculture, 2013; Statistics Sweden, 2005). In a similar matter, greater geographical distances between urban and rural areas in less densely populated northern parts of Sweden would explain why graduates from Umeå move comparatively further away than graduates from Lund.

The substantial graduate in-flow to municipalities in Skåne could moreover be a possible explanation to the counterintuitive coefficients for *Unemployment* and *Broadband* in the regressions. For instance, the unemployment rate was found to have a significant positive marginal effect which could be explained by the fact that the majority of the graduates moved to Malmö, which had the fourth highest unemployment rate out of all 290 municipalities. The broadband coverage was moreover found to have a significant negative effect on the in-migration to both urban and rural municipalities, which contradicts with the hypothesis that municipalities with more developed infrastructure would be more attractive. However, the broadband coverage in Skåne was comparatively poor in 2017, which could be a possible explanation to why the variable turned out to have negative coefficients.

The results showed diverging preferences in terms of regional amenities. For graduates, the liveliness of the municipalities had a clear impact on the migration decision. Given the significant positive coefficients for the variables *Higher education* and *University city*, newly graduated tend to be more attracted to areas with more like-minded people, that likely reflect dynamic environments that provide opportunities for interpersonal exchanges of knowledge and ideas. The negative coefficients for *Share of older people* and the positive coefficients for *Fun* (although not significant) further support the idea that younger people tend to move to areas that better correspond to the desired lifestyle. Similar to what Berck, Tano and Westerlund (2011) stated, younger areas generally offer more restaurants, bars and activities. The marginal effects for *Higher education, Fun* and *Share of older people* were stronger for urban municipalities than suburban or rural, which further indicates that an event-filled lifestyle is even more important for the graduates moving to urban municipalities. On the other hand, the amount of protected nature did not seem to be an important pull factor for graduates when deciding where to reside after their studies, no matter if they ended up living in an urban, suburban or rural municipality. The results align with the national study by Bjerke and Mellander (2016), which included several variables connected to natural amenities without any major findings.

The results confirmed that migration patterns of graduates from Lund University align with previous studies in that a clear majority of newly graduated students move to urban areas; approximately 70 % of the students in the analysis resided in an urban municipality both one and five years after graduation. As revealed by *Table 3*, the students were inclined to either move to municipalities of the same degree of urbanity as the municipality of origin or

somewhere more urban, but very few chose to move to a municipality that was less urban than where they grew up. That far more of the students resided in urban areas after entering university than before and the fact that the distribution within urban, suburban and rural municipalities remains somewhat the same both one and five years after graduation implies a reallocation of human capital from more rural to urban areas. The discrepancies in the migration flows of graduates have serious implications since substantial in-migration of graduates, or the lack thereof, is likely to spark either positive or negative spiral effects in the regional development. The substantial in-migration to urban municipalities has the potential to stimulate the economy and encourage investments in both public sector services, private firms and cultural activities, while the relatively low in-flow of graduates to rural municipalities poses a threat to regional development if the migration trends remain persistent. Discrepancies between urban and more rural municipalities risk being further amplified by the fact that the students who moved to urban areas to a larger extent had parents with a higher education than did the graduates who moved to rural areas (almost 70 % compared to 56 %). Since the majority of the students recruited to Lund University had parents with an academic background, it could be argued that the migration trends risk leading to a depopulation of residents in suburban and rural areas who will invest in higher education in the future.

8. Conclusion

We find three factors to be especially important for the choice of location for graduates from Lund University: labor market opportunities, proximity to Lund, and like-mindedness of the population in the municipality. In relation to human capital theory and the Roy model, the choice of moving to an urban, suburban or rural municipality partly depends on whether there is a potential return to the migration decision. In other words, it is important that the labor market opportunities are compatible with the graduate's acquired degree. The fact that municipalities within Sydsverige were able to retain and attract a large share of graduates from Lund University despite less beneficial regional factors such as low broadband coverage and fairly high rates of unemployment indicates that there are other more important factors that make Sydsverige an attractive region for Lund University graduates. The results suggest that these factors are proximity to Lund, return migration of locally recruited students and a high regional population density that enables rural municipalities to benefit from urban labor markets and services. Lastly, the like-mindedness of the population in the region was identified as an important pull factor, since municipalities with a higher share of younger and high-educated people were found to be more vibrant and to receive a greater in-flow of Lund University graduates. In future research it would be interesting to further address the regional effects of discrepancies in graduate in-flows to urban, suburban and rural municipalities in Sweden and analyze whether graduate migration patterns over time are affected by local policies, current events or economic fluctuations.

References

Berck, P., Tano, S., & Westerlund, O. (2011). Regional Sorting of Human Capital: The Choice of Location among Young Adults in Sweden, *Regional Studies,* vol. 50, no. 5, pp. 757-770. Available online: https://doi.org/10.1080/00343404.2014.931935 [Accessed 10 April 2022].

Bjarnason, T., & Edvardsson, I. (2017). University pathways of urban and rural migration in Iceland, *ScienceDirect*, vol. 54, pp. 244-254. Available online: https://doi.org/10.1016/j.jrurstud.2017.07.001 [Accessed 10 April 2022].

Bjerke, L., & Mellander, C. (2016). Moving home again? Never! The locational choices of graduates in Sweden, *Annals of Regional Science,* vol. 59, no. 3, pp. 707-729. doi: 10.1007/s00168-016-0777-2.

Borjas, G. (2020). ISE Labor Economics. New York: McGraw-Hill Education.

Crescenzi R., Holman N., & Orru E. (2016). Why do they return? Beyond the economic drivers of graduate return migration. *Annals of Regional Science*, vol. 59, no. 3, pp. 603-627, doi:10.1007/s00168-016-0762-9.

Cörverst, F., & Venhorst, V. (2018). Entry into working life: Internal migration and the job match quality of higher‑educated graduates, Regional Science, vol. 58, no. 1, pp. 116-140. doi: 10.1111/jors.12347.

De Cintio, M., & Grassi, E. (2013). Internal migration and wages of Italian university graduates, *Regional Science,* vol. 92, no. 1, pp. 119-140. doi: 10.1111/j.1435-5957.2011.00397.x.

Eklund, J., Eriksson, R., & Lundberg, J. (2019). Ska jag stanna eller flytta? En analys av nyexaminerade studenters flyttmönster. Umeå universitet: *CERUM rapport.*

Eurostat. (n.d.). History of NUTS. Available online: https://ec.europa.eu /eurostat/web/nuts/history [Accessed 8 April 2022].

Eurostat. (2019). Territorial typologies manual - degree of urbanisation. Available online: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Territorial_typologies_manual_-_degree_of_urbanisation#Classes_for_the_typology_and_their_conditions [Accessed 21 April 2022].

Faggian, A., & McCann, P. (2009). Universities, Agglomerations and Graduate Human Capital Mobility, *Journal of Economic & Social Geography,* vol. 100, no. 2, pp. 210-223. Available through: LUSEM Library website: https://www.lusem.lu.se/library [Accessed 8 April 2022].

Faggian, A., Rajbhandari, I., & Dotzel, K. (2017). The interregional migration of human capital and its regional consequences: a review, *Regional Studies*, vol. 51, no. 1, pp. 128-143, Available through: LUSEM Library website: https://www.lusem.lu.se/library [Accessed 8 April 2022].

Fastighetsägarna. (2016). Sveriges roligaste kommun [pdf]. Available online: https://www.fastighetsagarna.se/globalassets/rapporter/gfrs-rapporter/kul-index_100316.pdf [Accessed 10 April 2022].

Glesbygdsverket (2007). Kartläggning av strategier för att öka befolkningen i kommuner och regioner [pdf]. *Regeringsuppdrag augusti 2007*. Available online: https://www.tillvaxtanalys.se/download/18.62dd45451715a00666f276a7/1586367607388/Kartlaeggning_av_strategier_foer_att_oeka_befolkningen.pdf [Accessed 20 April 2022].

Hjort, S., & Malmberg, G. (2006). The attraction of the rural: Characteristics of rural migrants in Sweden, *Scottish Geographical Journal*, vol. 122, no. 1, pp. 55-75, doi:10.1080/00369220600830870.

IVA. (2017). Den urbana utvecklingens drivkrafter och konsekvenser – IVA-projektet Framtidens goda stad [pdf]. Available online: https://www.iva.se/globalassets/info-trycksaker/framtidens-goda-stad/framtidensgodastad-urbanisering.pdf [Accessed 8 April 2022].

Jones, I. & Vollrath, D. (2013). Introduction to Economic Growth, 3rd edn. New York: W.W. Norton & Company.

Kazakis, P. & Faggian, A. (2016). Mobility, education and labor market outcomes for U.S. graduates: Is selectivity important? *Regional Science,* vol. 59, no. 3, pp. 731-758. doi:10.1007/s00168-016-0773-6.

Ladok. (2022). Bak- och framgrund. Available from: Ladokkonsortiet [Accessed 19 April 2022].

Langelett, G. (2002). Human Capital: A Summary of the 20th Century Research, *Journal of Education Finance,* vol. 28, no. 1, pp. 1-23. Available online: https://www.jstor.org/stable/40704155 [Accessed 10 April 2022].

Lee, E. (1966). A Theory of Migration, *Demography,* vol. 3, no. 1, 1966, pp. 47–57, Available online: https://www.jstor.org/stable/2060063?seq=1 [Accessed 22 April 2022].

Lovén, I., Hammarlund, C., & Nordin, M. (2020). Staying or leaving? The effects of university availability on educational choices and rural depopulation. *Papers in Regional Science*, vol. 99, no. 5, pp. 1339-1365. Available online: https://doi.org/10.1111/pirs.12530 [Accessed 10 April 2022].

Lund University. (2022). The history of Lund University. Available online: https://www.lunduniversity.lu.se/index.php/about-university/university-glance/history-lund-university [Accessed 26 April 2022].

Lund University. (2022). University world rankings. Available online: https://www.lunduniversity.lu.se/about-university/university-glance/university-world-rankings [Accessed 26 April 2022].

Lunds kommun. (2022). Samverkan med Lunds universitet. Available online: https://lund.se/kommun-och-politik/projekt-och-samarbeten/samverkan-med-lunds-universitet [Accessed 26 April 2022].

Ramanathan, R (2002) Introductory Econometrics with Applications, Mason: South-Western.

Robinson, C., & Tomes, N. (1982). Self-Selection and Interprovincial Migration in Canada, *The Canadian Journal of Economics,* vol. 15, no. 3, pp. 474-502. Available online: https://www.jstor.org/stable/134762?seq=1 [Accessed 8 April 2022].

Roy, A. D. (1951). Some Thoughts on the Distribution of Earnings, *Oxford Economic Papers,* vol. 3, no. 2, pp. 135-146. Available online: https://www.jstor.org/stable/2662082?seq=1 [Accessed 8 April 2022].

Statistics Sweden. (2005). Geografin i statistiken – regionala indelningar i Sverige [pdf]. Available online: https://www.scb.se/contentassets/5f7f821206e24fc88501f4b6f5d1c559 /mis-2005-2.pdf [Accessed 8 April 2022].

Statistics Sweden. (2008). Karta över NUTS-indelningen i Sverige från och med 2008-01-01[pdf]. Available online: https://www.scb.se/contentassets /1e02934987424259b730c5e9a82f7e74/nuts_1_2_3_20080101.pdf [Accessed 12 April 2022].

Statistics Sweden. (2015). Urbanisering – från land till stad. Available online: https://www.scb.se/hitta-statistik/artiklar/2015/Urbanisering--fran-land-till-stad/ [Accessed 21 April 2022].

Statistics Sweden. (2017). Stockholm bäst på att behålla studenter. Available online: https://www.scb.se/hitta-statistik/artiklar/2017/Stockholm-bast-pa-att-behalla-studenter/ [Accessed 10 April 2022].

Statistics Sweden. (2020). Studenternas rörlighet före och efter avslutade studier - Linköpings kommun [pdf]. Available online: https://www.scb.se/contentassets/B1ae4493ffd1404987a4d32c bf213ae5/studenternas-rorlighet-fore-och-efter-avslutade-studier.pdf [Accessed 7 April 2022].

Statistics Sweden. (2022a). Befolkningstäthet i Sverige. Available online: https://www.scb.se /hitta-statistik/sverige-i-siffror/manniskorna-i-sverige/befolkningstathet-i-sverige/ [Accessed 7 April 2022].

Statistics Sweden. (2022b). Flyttar inom Sverige. Available online: https://www.scb.se/ hitta-statistik/sverige-i-siffror/manniskorna-i-sverige/flyttar-inom-sverige/ [Accessed 27 April 2022].

Statistics Sweden. (2022c). Statistikdatabasen. Available online: https://www.statistikdatabasen.scb.se/pxweb/sv/ssd/ [Accessed 21 April 2022].

Svenskt näringsliv. (2021). Ranking 2021. Available online: https://www.foretagsklimat.se/ranking [Accessed 20 April 2022].

Svenska Stadsnätsföreningen. (2022). PTS mobiltäcknings- och bredbandskartläggning 2021 [pdf]. Available online:https://www.ssnf.org/globalassets/sveriges-stadsnat/fakta-och-statistik /bredbandsranking/pts-mobiltacknings--och-bredbandskartlaggning-2021_tillganglig.pdf [Accessed 10 May 2022].

Swedish board of agriculture. (2013). Allt om landet – en sammanfattning [pdf]. Available online: https://www2.jordbruksverket.se/webdav/files/SJV/trycksaker/Pdf_ovrigt/aol11_1.pdf [Accessed 21 April 2022].

UKÄ. (2020). Studenternas rörlighet inom Sverige – en fördjupning [pdf]. Available online: https://www.uka.se/download/18.719f1329170c017dab83c/1583928437597/Studenternas%2 0r%C3%B6rlighet%20inom%20Sverige%20en%20f%C3%B6rdjupning.pdf [Accessed 7 April 2022].

UKÄ. (2022). Lista över universitet, högskolor och enskilda utbildningsanordnare. Available online: https://www.uka.se/fakta-om-hogskolan/universitet-och-hogskolor/lista-over-universitet-hogs kolor-och-enskilda-utbildningsanordnare.html [Accessed 2 May 2022].

Urbański, M. (2022). Comparing Push and Pull Factors Affecting Migration, *Economies* 10:

21. Available online: https://doi.org/10.3390/economies10010021 [Accessed 21 april 2022].

Zanabazar, A., Kho, N., & Jigjiddorj, S. (2021). The Push and Pull Factors Affecting the Migration of Mongolians to the Republic of South Korea, *SHS Web of Conferences,* 90, p. 01023, doi: 10.1051/shsconf/20219001023.

List of tables and figures

Appendixes

Appendix A

Urbanity classification of municipalities

The urbanity of each municipality is determined based on the framework from the statistical office of the European Union, Eurostat, which adopts three different categories to define regional urbanity. Based on regional population density, Eurostat (2019) classifies local administrative units (LAUs) into either *cities*, *towns and suburbs* or *rural areas*. For Sweden, the LAUs correspond to the 21 regions. In the first step of the classification process, Eurostat identifies the population density of 1 km² grid cells and group neighboring cell groups into either urban centers (at least 1 500 inhabitants per km² and a minimum of 50 000 inhabitants), urban clusters (at least 300 inhabitants per km² and a minimum of 5 000 inhabitants) or rural grid cells (all cells outside of urban centers and clusters). Secondly, Eurostat classifies the regions according to the degree of urbanization as follows:

- If more than half of the population lives in urban centers, the area is densely populated and classified as a *city*.
- If less than half of the population lives in an urban center but more than half of the population lives in an urban cluster, it is an intermediate dense area and hence classified as a *town or suburb*.
- If more than half of the population lives outside of urban centers or clusters, the area is thinly populated and classified as a *rural area*.

Statistics Sweden (2015) have used Eurostat's classification process to further specify the urbanity of the 290 Swedish municipalities. According to Statistics Sweden (2015), 23 municipalities meet the criterias to be classified as densely populated cities. Because Nordic regions are comparatively large but with a low population density, the urbanity of some municipalities risk being somewhat underestimated when using European measurements (Statistics Sweden, 2015).

Appendix B

Approximation of "..C" in the data

The Excel reports downloaded from the database "Bak- och framgrund" were incomplete in the sense that the numbers one through four were anonymized by being replaced with "..C" in the data. It would have been impossible to create useful and understandable tables and figures with "..C" included in the data set, in other words, all "..C" needed to be approximated and replaced with a numerical value, logically a number between one and four. To choose an adequate replacement number, a test was performed where all the "..C" were replaced with 1, 2, 3 and 4 respectively and the approximated total of the number of students was then compared with the original total downloaded from "Bak- och framgrund". Using the value 1 gave an underestimation of the totals while using the values 2, 3 and 4 gave an overestimation. As presented in the table below, using the value 2 gave totals closer to the originals than using 1 as a replacement value. The approximation however entails a slight overestimation of the in-migration to municipalities where few graduates choose to migrate.

Factor	Original total, i.e., number of students	Total when approximating "..C" with 1 (Difference from original total)	Total when approximating "..C" with 2 (Difference from original total)
Parental education	6645	6259 (386)	6750 (105)
Gender	6645	6466 (179)	6663 (18)
Age	6238	5622 (616)	6761 (523)
Field of study	6645	6374 (271)	6841 (196)

Source: Author compilation of data from Ladok (2022).

Appendix C

NUTS levels in Sweden

NUTS 1	NUTS 2	NUTS 3 (län)
SE1 Östra Sverige	SE11 Stockholm	SE110 Stockholms
	SE12 Östra Mellansverige	SE121 Uppsala
		SE122 Södermanlands
		SE123 Östergötlands
		SE124 Örebro
		SE125 Västmanlands
SE2 Södra Sverige	SE21 Småland med öarna	SE 211 Jönköpings
		SE212 Kronobergs
		SE213 Kalmar
		SE214 Gotlands
	SE22 Sydsverige	SE221 Blekinge
		SE224 Skåne
	SE23 Västsverige	SE231 Hallands
		SE232 Västra Götalands
SE3 Norra Sverige	SE31 Norra mellansverige	SE311 Värmlands
		SE312 Dalarnas
		SE313 Gävleborgs
	SE32 Mellersta norrland	SE321 Västernorrlands
		SE322 Jämtlands
	SE33 Övre norrland	SE331 Västerbottens
		SE332 Norrbottens

Source: Statistics Sweden (2008).