The Relationship of Businesses Activity on Post-Graduate Migration in the Netherlands

A Quantitative Analysis of Post-Graduate Migration in University Cities in the Netherlands

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Lotte Manenschijn s4902327

Supervisor: Mark van Duijn

Faculty of Spatial Sciences

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ABSTRACT

This study examines the relationship between the number of established businesses in university municipalities and post-graduate migration patterns in the Netherlands. The research focuses on whether the presence of established businesses influences the likelihood of graduates remaining in their university cities or migrating elsewhere. Using data from CBS for the years 2020 to 2022, linear regression analyses were performed to assess this relationship. The results indicate a significant negative linear relationship, suggesting that higher numbers of established businesses are associated with lower post-graduate migration rates. This falls in line with literature research that post-graduates migrate to places with job opportunities.

1. INTRODUCTION

1.1. Motivation

Retaining post-graduates in the region is high on the regional political agenda, especially in municipalities with a research university. Post-graduates provide the necessary human capital to stimulate economic growth in knowledge-driven economies. The outmigration of post-graduates with substantial human capital is typically referred to as "brain drain". The outmigration of highly educated graduates can have negative consequences for the remaining population, especially in rural regions (Kooiman & Bontje, 2019).

There are two noticeable trends in spatial mobility for people getting a university degree, one around the age of 19, when students move away from their parental home to a university city, and another trend at around the age of 25 when university students are graduating and moving away due to labor market opportunities. The second trend shows especially an influx of movements towards the Randstad (Huis & Agtmaal-Wobma, 2009). This research has shown that in more peripheral university cities, such as Groningen or Maastricht, the outflux of 25-year-old graduates is higher than compared to university cities in the Randstad. The current movement patterns of students and postgraduate students in the Netherlands deviate from other movement patterns in the Netherlands. Higher educated people in the Netherlands are moving more than people without a university degree (Kooiman & Bontje, 2019), leading to regional differences in education level and regional economic development.

In these peripheral regions, it is more likely for graduates to not come back. These regions experience lower percentages of people with a university degree. A reason commonly seen for these migration patterns is the availability of a more specialized labor market, with more knowledge based opportunities (Kooiman & Bontje, 2019). An outflux of high educated people out of peripheral regions results in the loss of certain services, especially cultural services. The outflux also leads to a general population loss in some of the regions, which also results into these regions having fewer impact in politics and them feeling overlooked (Stornebrink & Berg, n.d.).

1.2 Academic relevance

Higher educated people seem to be more important than ever. The leaving of higher educated people from rural regions can have negative consequences for the remaining population (Beine, F, & Rapoport, 2001; Faggian et al.,2017). Which is a reason why brain drain can be seen as a societal problem. Brain drain is often referred to as 'human capital flight' (Beine, F, & Rapoport, 2001). Human capital is seen as creating and utilizing knowledge by highly educated people (Lucas, 1988). By creating and utilizing this knowledge, higher educated people are regarded as more productive. Human capital is an important factor for economic growth (Raspe, van Oort, & de Bruijn, 2004), attracting and binding the higher educated is essential in a knowledge-driven economy. Knowledge is regarded as a prerequisite to recognize and solve problems. This is why regional bodies are trying more to retain high-skilled graduates (Faggian, Rajbhandari, & Dotzel, 2017).

The Netherlands is one of the countries that is most affected by brain drain in Europe, especially for PhD holders (Docquier & Rapoport, 2012). Municipalities in the Netherlands are currently busy retaining graduates for their own

labor and housing markets (Venhorst, et al., 2011). In the Netherlands there has been research done regarding how some cities have an urban escalator effect: migrants use opportunities for their education and return to their place of origin after graduating (Klaver & Odé, 2015), this is a common phenomenon within the EU.

CBS has already done some research regarding post-graduate migration in university cities in the Netherlands, especially looking at a certain "student pattern" to define the movement patterns of students in the Netherlands (Huis & Agtmaal-Wobma, 2009). They show a lot of regional differences between student cities, especially between Randstad cities and more peripheral cities. This study noticed two peaks in migration patterns, one around the age of 19 and one around the age of 25. These peaks describe the movement of students to the university city and the movement away after graduating. This research, however, was only about three university cities, namely of Groningen, Leiden, and Eindhoven. This was done to compare the Dutch periphery, Randstad, and intermediate regions. However, this research regarded only patterns and did not look for an explanation for these patterns.

1.3 Research problem statement

Economic factors are mostly used to explain post-graduate migration (Plopeanu, et al., 2018). According to (McCann & Ortega-Argilés, 2015) there is a relationship between skills training and regional development, and how the local labor supply impacts post-graduate migration. Most of the research already done about brain drain is primarily focused on individual and regional characteristics. In this thesis, the goal is to analyze how the number of established businesses relates to post-graduate migration in university cities in the Netherlands, as the labor market is regarded as one of the most relevant push and pull factors regarding higher education movements. The research question that will be answered in this thesis is: How does the amount of established businesses in a municipality relate to post-graduate migration in the Netherlands? The focus will be on all university cities of Amsterdam, Groningen, Leiden, Maastricht, Nijmegen, Rotterdam, Tilburg, Utrecht and Wageningen. These are all of the non-technical and non-theological universities in the Netherlands. The research will be done on a municipal scale.
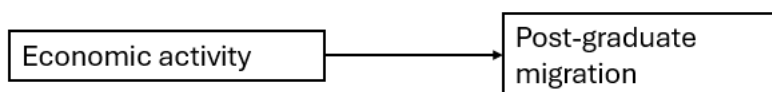
1.4 Conceptual model

Figure 1 Conceptual model

The conceptual model above illustrates the relationship that will be examined in this thesis. The economic activity will be represented by the amount of established businesses per municipality. The post-graduate migration will be represented by the percentage of outmigration for post-graduates per university municipality.

1.4 Outline

The remainder of this paper is organized as follows. Section 2 describes the literature review and hypotheses and Section 3 the data collection and methodology. Section 4 includes the results and a discussion of the results. While Section 5 concludes.

2. THEORY, LITERATURE REVIEW & HYPOTHESES

2. 1 Human capital model and rational choice theory

The definition of human capital is "productive wealth embodied in labor, skills, and knowledge" (OECD, 2001), which means any sort of knowledge that a person possesses, through education or other factors. Before the 1960s a common explanation for inequality was the difference in natural resources. However, the human capital theory reviews that non-tangible resources play a larger role, such as possessed knowledge that results from human investment. Becker (1962), was one of the first researchers regarding this topic who pioneered human capital theory, which revolves around activities that influence future real income through the embedding of resources in people. Improving the physical and mental abilities of people to raise real income prospects. Becker found results that investment in human capital raised observed earnings at older ages (Becker, 1962).

This means that in human capital theory, education is considered the source of economic development. As individuals acquire knowledge through education and training, productivity in the workplace increases, leading to higher individual wages. Thus, education and high wages have a positive correlation and should be promoted (Tan, 2014). Human capital theory derives from rational choice theory (Tan, 2014). Resulting in the idea that all actions are based on rational decision-making. It denies alternate types of actions, that do not derive from the most rational calculative (Scott, 1999). It is a normative theory that tells what to do to reach certain goals. Which is mainly interested in the means instead of the ends. A rational individual who behaves following these assumptions, is in economic theory called homo economicus, a human who pursues self-interest without regarding other people's welfare. Which is considered as a model for the human being in neoclassical economics (Yamagishi, et al., 2014).

Rational choice theory and the homo economicus have been disproven multiple times. As humans have limited cognitive skills, weak memory, incomplete preferences, and computational skills (Tan, 2014). Reasoning can be easily distorted through psychological biases and experimental manipulation (Yong, et al., 2021). Coping with decision-making, humans tend to satisfice instead of optimizing, considering something as sufficient enough instead of pursuing the most rational alternative (Hey, et al., 2017).

2.2 Human capital theory in relation to migration

In human capital theory, migration is considered a human investment, individuals or families only migrate if the expected returns exceed the costs of migrating (Kooiman, et al., 2018). From this point of view, human capital is the main reason for migration. The opportunities offered by this type of migration are in the labor market and in education, as they both contribute to human capital.

The factors that determine interregional migration flows are complicated and heavily debated. A common explanation is the disequilibrium model of migration, regarding migration as an economic phenomenon determined by the job search. People react to initial disequilibria in wages by moving to regions where the wages are higher, while unemployment is lower to restore the equilibrium (Biagi, et al., 2011). In Europe, most interregional migration is driven by disequilibrium models. It is more common to follow a life-cycle mobility pattern. Migration is mostly a

reaction to spatial differences in economic factors such as employment opportunities and wages. For high-skilled people employment opportunities is the dominant migration factor (Kooiman, et al., 2018). Research regarding migration patterns in Italy found that most long-distance mobility is for economic opportunities, while shorter-distance movements are mostly to improve quality of life (Biagi, et al., 2011). The disequilibrium model falls short on some aspects, the model predicts a convergence of lower wages regions and a reduction in disparities, however, these disparities persisted. Also, there were unexplained mobility patterns in low-wage regions.

The equilibrium approach offered an alternative view on interregional migration, explaining the relationship between migration and real wages. According to this approach, differences in wages are compensating for spatial variations in non-tradable, non-economic factors (Biagi, et al., 2011). These factors have been researched in both urban and rural settings, with climate being an important rural factor and public services being especially significant in an urban context. In the United States, it has been found that non-economic factors are key drivers in interregional migration, and amenities play an important role in this. Equilibrium deviations influence migration behavior in the United States, as a rise in income results in a rise in amenities. These amenities became important in migrants' decision-making, as they would draw a large number of people, mainly the elderly, to high-amenity states. However, the migration of labor market participants in these areas mainly derives from employment opportunities that result from the rise of amenities (Graves & Mueser, 1993).

"Job-related migration, especially for the skilled and highly skilled, is associated with upward occupational mobility with those with the highest levels of human capital being the most likely to move longer distances" (Ham, 2001). Occupational mobility is an aspect of an escalator region, which attracts upwardly mobile young adults, socially promotes them, and encourages their outmigration at middle age or retirement. This escalator region tends to have more cosmopolitan aspects, such as openness to ideas and practices from elsewhere compared to strong regional features (Gordon, et al., 2015). For escalator regions, it is a common tendency for outmigration as the human capital is accumulated. Universities act as providers to bring human capital into a region (Comunian, et al., 2017). Staying in a large metropolitan region, seen as an escalator, have positive effects on future careers. Moving to Edinburgh or Glasgow, the two escalator regions in Scotland could have the same size of effect as getting a higher degree (Ham, et al., 2012).

3.3 Post-graduation mobility patterns

Research on post-graduate mobility patterns found that migrants moving soon after graduating have overall higher incomes, followed by late migrants and university stayers (Comunian, et al., 2017). "The innovativeness of a region is one of the major factors that encourage university graduates to seek employment in that region" (Faggian & McCann, 2006), this innovativeness is followed by the crime rate, proportion of knowledge, and the geographical peripherality of the region. The innovativeness is linked to human capital inflow and the entering of graduates into the local labor market.

In the Netherlands, after graduating until their late twenties, university graduates are largely represented in large cities and university cities. Later on, the suburbanization of this generation starts, while a large part of human capital

remains in the large cities. Analysis of wage differences between 27 and 31-year-olds in the Netherlands shows that the major part of spatial variation in wages is derived from differences in hours worked and the composition of economic sectors (Kooiman, et al., 2018). Wages in the larger cities are thus higher than those of the same cohort in smaller cities, due to a higher number of hours worked and working in industries that tend to have higher salaries. However, findings show that there is more wage progression in urban regions compared to more peripheral regions. According to the previously described human capital theory, it would be a rational decision for those living in peripheral regions to move to larger cities to make higher wages. The decision to stay is argued to be based on multiple reasons such as a lower ability to analyze opportunities efficiently or a close connection to family and friends. Research on Welsh and Scottish post-graduate migration derived the decision to stay in the university region to exploit their local labor market and build networks (Faggian, et al., 2007). Previous migrations of an individual are highly correlated to later migration patterns and increase long-run wages (Faggian, et al., 2007). Interregional migration can offer more attractive employment opportunities such as higher wages and higher growth potential.

Post-graduate migration patterns reveal that university graduates initially cluster in large cities and university towns, driven by the higher incomes and career advancement opportunities these areas offer. Research indicates that graduates who migrate soon after finishing their studies typically achieve higher incomes compared to those who move later or remain in the university region (Comunian, et al., 2017). Large cities not only offer higher wages due to more hours worked and the presence of high-paying industries but also provide greater wage progression opportunities compared to peripheral regions (Kooiman, et al., 2018). However, as graduates reach their late twenties, a suburbanization trend begins, though a significant portion of human capital remains within urban areas due to continued economic benefits. Innovativeness of a region, alongside factors like crime rates and geographical location, plays a crucial role in attracting graduates to specific regions (Faggian & McCann, 2006). Additionally, previous migration experiences strongly influence future migration patterns, often leading to better long-term wage prospects (Faggian, et al., 2007).

3.4 Hypothesis

Based on the previous literature review the hypothesis for the research question How does the amount of established businesses in a municipality relate to post-graduate migration in the Netherlands? is stated below.
The amount of established businesses in university cities in the Netherlands positively impacts post-graduate migration, as a higher density of businesses enhances local labor market opportunities, attracting graduates to remain in or move to these areas. This relationship is expected to be stronger in larger cities with more dynamic and innovative business environments, which provide greater career advancement prospects and higher wage potential, thereby reducing the tendency for brain drain and increasing the retention of human capital.

3. DATA & METHODS
3.1 Data collection

The data used in this research is from CBS, this is secondary data that is publicly available. A few different datasets are used, the first one being "Migrated persons, within municipalities, between municipalities" This is regarding migration in the Netherlands, in which the influx and outflux of municipalities are shown, in this dataset the ages of migrants are also given, these ages will be used to filter post-graduate migration. In this thesis, an age range of 22 to 26 is used, this is due to the average graduating age in the Netherlands being 24, and by offering a higher range more cases will be included making it more accurate. This however also comes with a risk, due to not being able to filter on post-graduate migration it also includes other movement patterns of 22 to 26-year-olds. There was not a dataset available that only included graduates, meaning that this was the closest to the post-graduate population possible for this research. The analysis is on a municipal scale meaning that the municipalities of Amsterdam, Groningen, Leiden, Maastricht, Nijmegen, Rotterdam, Tilburg, Utrecht, and Wageningen will be included.

Students living in different municipalities will not be included in this research, meaning that this research is only focused on the university municipalities. 31% of students are not living in their university city (Bie & Ton, 2023), however, it is difficult to include this in the sample, which is why these students are excluded.

The other dataset that will be used is the amount of established businesses in the university municipality. The amount of established businesses is an indicator of business activity in the university municipalities. These established businesses are based on the International Standard Industrial Classification of All Economic Activities 2008, which are guidelines to classify businesses into categories. These are also on a municipal scale, based on the same municipalities mentioned above.

In both datasets, the data for the years 2020 to 2022 will be used. The analysis will be run of all these years combined and also analyses per year will be performed. The reasoning behind these years is due to the data of 2023 and 2024 not officially being published yet, and to keep it as recent as possible.

The data used in this thesis are publicly available, hence they do not contain sensitive information and follow ethical considerations, which means that it is not necessary to elaborately delve into ethics and data security.

The data collection was conducted via CBS. The raw data was imported into an Excel file, in which both surveys were combined and all the separate ages were added together, to create an age range of 22 to 26 years old. After that, the singular age groups were deleted. The percentage of people moving out of the municipalities was calculated via Excel by multiplying the outmigration numbers and dividing this number by the total amount of movements in the municipality. These movements were both in and out of the municipality. After this, the natural logarithm of the amount of established businesses was calculated in Excel. The reasoning behind this is that using natural logarithms makes the data more normally distributed and especially when performing regression analyses with percentages, the coefficients will be more accurate. All calculations described above were performed in Excel.

3.2 Descriptive statistics/analysis

The statistics will be described as a summary statistics table for the SPSS analysis, a GIS map showing locations of the university municipalities and the percentage of their outmigration, and a scatterplot showing the initial relationship between the percentage of outmigration and the businesses established.

Figure 2 Summary Statistics table

	N	Minimum	Maximum	Mean	Standard Deviation
Percentage Outmigration	27	34.91	62.84	50.7873	8.18929
Businesses Established	27	3715	181675	45416.85	51151.623
N (valid)	27				

The summary statistics table above shows the number of cases, and the minimum, maximum, mean, and standard deviation for both variables. The amount of cases in the analysis is 27, these cases are 3 separate years for the 9 universities researched. The numbers in this table are the raw numbers of established businesses instead of the logarithms, due to this giving a clearer overview as to what the real numbers entail. The minimum percentage of outmigration of 34.91% is in the municipality of Amsterdam, while the maximum percentage of 62.84% is in the municipality of Wageningen. The minimum amount of businesses established with 3715 amount of businesses is also in Wageningen while the maximum amount of businesses is in Amsterdam.
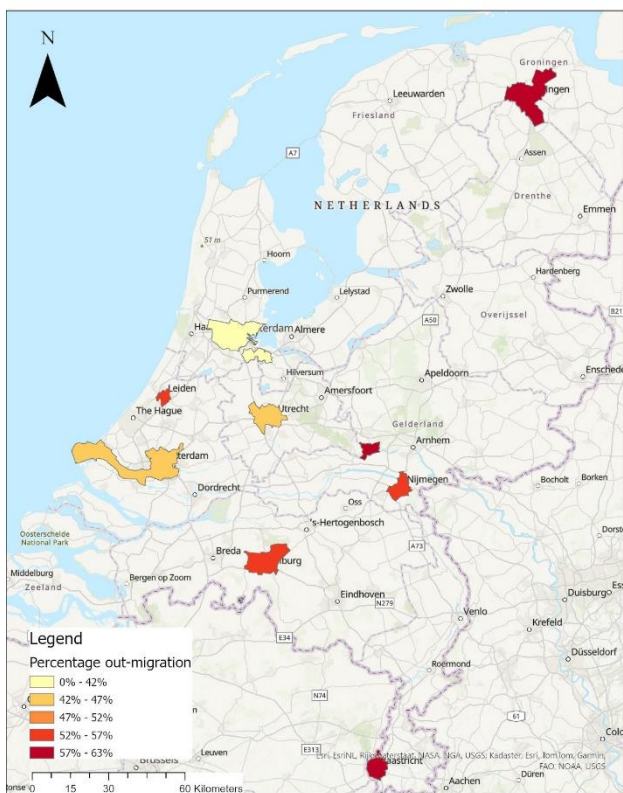

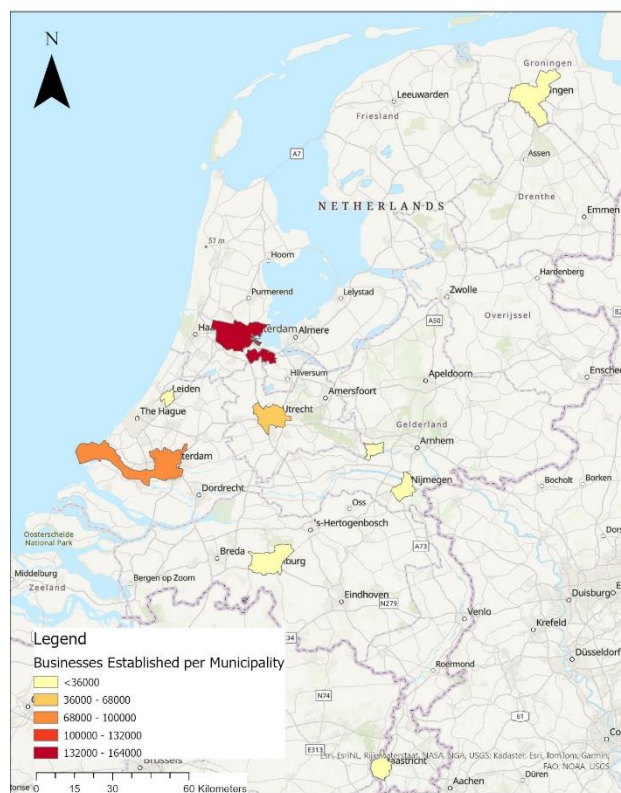*Figure 4 ArcGIS map percentage of outmigration per university municipality*

Figure 3 ArcGIS map businesses established per university municipality

In both ArcGIS map, the university municipalities are portrayed. The left map shows the percentage of outmigration per municipality and the right map shows the businesses established per municipality. Comparing both there seems to be a

trend that municipalities with a lower percentage of outmigration have a higher number of established businesses, such as Amsterdam, Rotterdam, and Utrecht. The opposite of this is also visible from the map, municipalities with a high percentage of outmigration tend to have less established businesses, see Groningen, Maastricht, and Wageningen.
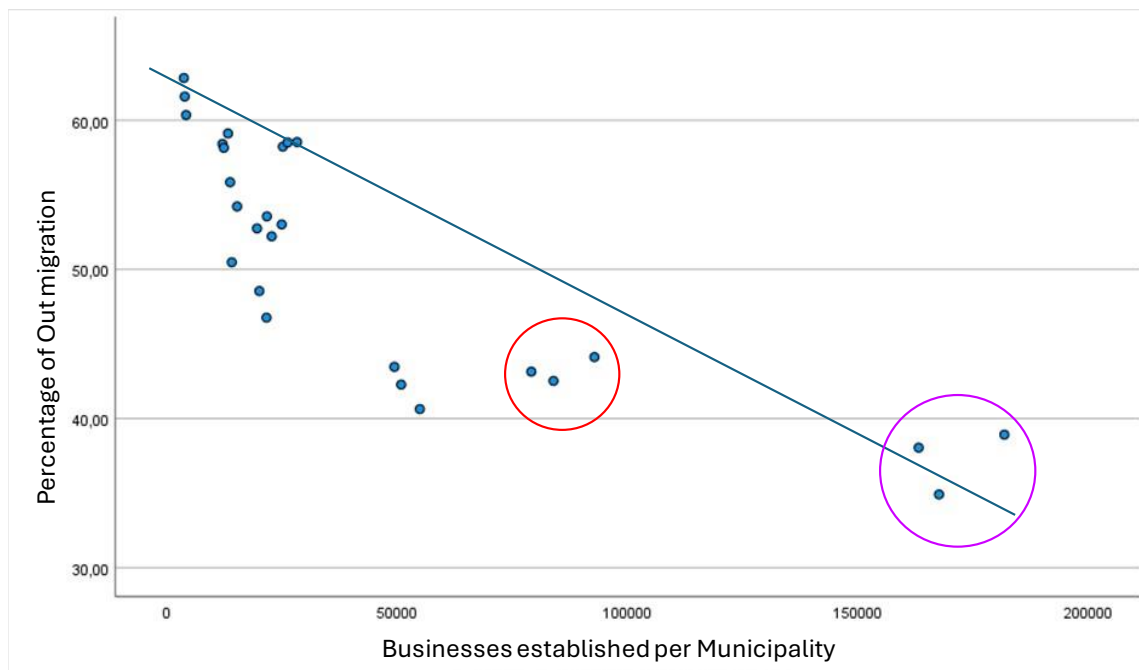

Figure 5 Scatterplot Businesses established and percentage of outmigration. Amsterdam cases are in the purple circle and Rotterdam cases are in the red circle

This scatterplot includes all years as separate cases. On the x-axis is the amount of businesses established in the university municipality and on the y-axis is the percentage of graduates who moved away from the university municipality. Looking at this scatterplot, it is noticeable that municipalities with fewer businesses established have higher percentages of graduates who moved away. Looking at the line that is supposed to portray a linear relationship the cases of Amsterdam and Rotterdam, in the purple and the red circles, are portrayed as farther away from the line than the other cases. However, these are not outliers, due to the data being population data. Since linear regressions are built on linear relationships, the data from Amsterdam and Rotterdam could give skewed results, which is why the linear regression will be run two times, one with Amsterdam and Rotterdam and one excluding both municipalities.

3.3 Methodology

First, the probability of a graduate remaining in the university municipality will be analyzed, this will be done based on a linear regression regarding the probability of staying in the region compared to the probability of migrating. In this context, this means that post-graduate migration is the dependent variable and the number of established businesses is the independent variable.

These analyses will be run in SPSS, using the Analyze, Regression, and Linear regression tool

4. RESULTS AND DISCUSSION

4.1 Linear regression 2020-2022 including Amsterdam and Rotterdam

First, the linear regression will be done for 2020, 2021, and 2022 combined, using cases from all municipalities. The null hypothesis in linear regressions is typically that there is no relationship between the independent and the dependent variable. In this case, it means that there is no relationship between businesses established in the municipality and the percentage of post-graduates moving away from the university municipality.

Table 1 Results linear regression 2020-2022

	Adjusted R Square	Significance	F-value	Standardized Coefficients Beta (Natural logarithm businesses established)	Unstandardized Coefficients B
2020-2022 including Amsterdam and Rotterdam	0.464	<0.001	21.656	-0.681	-4.293
2020-2022 excluding Amsterdam and Rotterdam	0.200	0.042	4.759	-0.448	-2.715

The adjusted R square of the analysis including Amsterdam and Rotterdam is 0.464, meaning that the model explains 46.4% of the relationship.

This table indicates that the regression model predicts the dependent variable significantly well. In the "Regression" in the "Sig." column it indicates the statistical significance of the regression model that was run. Here, $p < 0.001$, which is less than 0.05, indicates that, overall, the regression model statistically significantly predicts the outcome variable, meaning that it is a good fit for the data. And thus, the null hypothesis that there is no relationship between businesses established in the municipality and the percentage of post-graduates moving away from the university municipality, can be rejected.

The Coefficients table provides the necessary information to predict the percentage of people moving away from the municipalities regarding businesses established in said municipality, as well as determine whether businesses established contribute statistically significantly to the model. The Standardized Coefficients Beta is -0.681, this is a negative number, meaning that this analysis shows an inverse relationship between businesses established and outmigration, so an increase in post-graduate migration results in a decrease in businesses established. The unstandardized coefficients are -4.293, this means that there is a negative linear relationship. An increase in outmigration would lead to a decrease in businesses established.

The model summary excluding Amsterdam and Rotterdam had different results than the test including them. The adjusted R square is more than half lower than that of the previous dataset (0.464 compared to 0.200). However, it is still able to explain 20% of the relationship.

A notable difference between the first ANOVA table and the second ANOVA table is the F value (21.656 compared to 4.759). Which determines the ratio of the explained variable to the unexplained variable. This means that in the first analysis, there is a higher ratio of explained variables, which suits the Adjusted R Square in the previous table.

The Standardized Coefficients Beta has also changed compared to the previous test, it went from -0.681 to -0.448. Meaning that there still is an inverse relationship and that an increase in post-graduate migration leads to a decrease in businesses established. The unstandardized coefficient for businesses established is -2.715. This means that there is again a negative linear relationship.

This regression analysis suggests that Amsterdam and Rotterdam impact the strength of the model and the strength of the results. Including both of them gives a higher R square, F-value, and more pronounced coefficients.

4.3 Linear regression 2020-2022 in separate years

Now, there will be a comparison between all the different years, to check whether there are notable differences.

Table 2 Comparison linear regression 2020 to 2022

	Adjusted R Square	Significance	F-value	Standardized Coefficients Beta (Natural logarithm businesses established)	Unstandardized Coefficients B
2020	0.885	<0.001	54.064	-0.941	-7.082
2021	0.770	0.001	27.771	-0.894	-7.097
2022	0.684	0.004	18.316	-0.851	-6.268

The Adjusted R square of the year 2020 is 0.885, meaning that 88.5% of the relationship is explained by the variables. This Adjusted R square is higher than that of all three years combined and the highest of all three separate years. This table indicates that the test is significant as the p-value is <0.001. Thus, the null hypothesis of "there is no relationship between businesses established in the municipality and the percentage of post-graduates moving away from the university municipality" can be rejected. Meaning that the regression model significantly predicts the outcome variable. The F value of this test is 54.064 which determines the ratio of explained variables to unexplained variables. This value is the highest F value seen so far in the results.

The Standardized Coefficients Beta is -0,941, which still shows an inverse relationship between businesses established and outmigration. However, compared to the test of all three years, the Unstandardized Coefficients is -7.082, which indicates a negative linear relationship, meaning that an increase in percentage outmigration would lead to a decrease in businesses established.

The Model Summary of 2021 shows an Adjusted R Square of 0.770, meaning that 77.0% of the relationship can be explained. This is lower than the Adjusted R Square value of 2020 and the one for the years combined. First of all, the test is significant as the p-value is 0.001 which is lower than 0.05. This means that the null hypothesis can be rejected. The ANOVA table of 2021 shows an F value that is a lot lower than the F value of 2020, with a value of 27.771. This means that the ratio of explained to unexplained variables lower is than in 2020. This suggests that while the relationship is present, the strength and influence of this relationship may vary over time, possibly due to other influencing factors or changes in the underlying dynamics of post-graduate migration.

The Standardized Coefficients Beta is -0,894, meaning that it still shows an inverse relationship between businesses established and post-graduate migration. The Unstandardized Coefficients is -7.097, which suggests that there is again a negative linear relationship.

According to the Model Summary of the year 2022, the Adjusted R Square is 0.684, which is the lowest of all of the other years. Meaning that 68.4% of the relationship can be explained.

The P-value of this test is 0.004 which is lower than 0.05 meaning that this test is significant and the null hypothesis of "there is no relationship between businesses established in the municipality and the percentage of post-graduates moving away from the university municipality" can be rejected. However, the F-value is the lowest of all years analyzed, this means that it has the lowest ratio of explained to unexplained variables. This suggests that while the relationship is significant, the model does not capture as much of the variability in post-graduate migration as in other years. This highlights the importance of considering additional factors and potentially refining the model to better understand the dynamics of post-graduate migration in different years.

The Unstandardized Coefficients is -6.268 which is lower than in the other years. The Standardized Coefficients Beta is -0.851, resulting in again, an inverse relationship.

Over the period from 2020 to 2022, the relationship between post-graduate outmigration and the businesses established in university municipalities in the Netherlands has evolved, reflecting changes in the underlying dynamics influencing these variables. In 2020, the model shows the strongest explanatory power with an Adjusted R Square of 0.885, indicating that 88.5% of the variance in post-graduate migration could be explained by the number of businesses established. This year also showed the highest F-value (54.064) and the most substantial negative relationship, with a Standardized Coefficients Beta of -0.941 and Unstandardized Coefficients of -7.082. However, by 2021, the relationship weakened slightly, with the Adjusted R Square dropping to 0.770 and the F-value to 27.771. The inverse relationship persisted with a Standardized Coefficients Beta of -0.894 and Unstandardized Coefficients of -7.097, suggesting that the factors influencing outmigration and business establishment were still strongly connected but less so than in the previous year. In 2022, this trend continued with the Adjusted R Square further decreasing to 0.684, the lowest among the three years, and the F-value declining to 18.316. The inverse relationship remained, as indicated by a Standardized Coefficients Beta of -0.851 and Unstandardized Coefficients of -6.268, but the strength of the relationship weakened. These changes suggest that while the connection between outmigration and business establishment remains significant, other variables and external factors increasingly influenced the dynamics over these years, leading to a progressively weaker explanatory power of the model.

4.4 Discussion

The initial analysis of the data showed a clear trend in the migration patterns of post-graduates from the university municipalities. The dataset revealed that cities like Amsterdam, Utrecht, and Rotterdam, have a higher retention rate of post-graduates compared to more peripheral cities such as Groningen and Maastricht. The number of established businesses in each municipality varied considerably, with Amsterdam having the highest number of businesses, followed by Rotterdam and Utrecht.

The literature on post-graduate migration highlights several factors influencing the decision of graduates to stay or leave their university cities. Key themes include economic opportunities, quality of life, and social ties. The availability of job opportunities is often seen as a primary factor, with many studies highlighting the role of local businesses and economic activities in attracting and retaining talent (Faggian et al., 2007; McCann & Ortega-Argilés, 2015). Quality of life, housing affordability, cultural amenities, and recreational activities, also significantly impacts migration decisions (Kooiman et al., 2018). Furthermore, social ties, including family and friends, play a crucial role in the retention of graduates, as strong social networks provide emotional support and a sense of belonging (Faggian et al., 2017).

5. CONCLUSION

The research question analyzed in this thesis is: "How does the number of established businesses in a municipality relate to post-graduate migration in the Netherlands?" Based on the results of the analysis, the number of established businesses in a municipality has a substantial impact on post-graduate migration. A negative linear relationship has been found between the outmigration of graduates and the amount of established businesses, meaning that a lower amount of businesses leads to a higher outmigration. Municipalities with a higher number of established businesses exhibit lower percentages of post-graduate outmigration. This indicates that graduates are more likely to stay in areas where there are job opportunities, supporting the hypothesis and literature that regarded job availability as the main reason for migrating. The regression analysis demonstrated that the number of businesses is a predictor of post-graduate retention, highlighting the role of local economic conditions in influencing migration decisions.

Limitations of this thesis are the limited database and the inclusion of non-post-graduates in the analysis. Also, by collecting the data post-graduates moving from non-university municipalities were excluded. For future research adding different variables to the analysis could help give a more thorough explanation of post-graduate migration. In the literature review, amenities and family ties were discussed as other reasons for migrating, these could be included. Also, a qualitative research study could help give a more inclusive view of post-graduate migration and give a more personalized and detailed approach to the post-graduate migration process. Interviews with post-graduates could uncover deep insights into the motivations and experiences of these migrants, which helps the overall understanding of migration dynamics.

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