university of groningen

Education-job mismatch among international graduates of higher vocational education in the Netherlands

Gavin Neuvenheim
S3753395
Faculty of Spatial Science
MSc Economic Geography
Master's thesis
Supervisor: dr. V.A. (Viktor) Venhorst
Second reader: prof. dr. J. (Jouke) van Dijk
March 2020

Abstract

This research investigates education-job mismatch among international graduates of higher vocational education in the Netherlands. The number of international students graduating from Dutch higher education is increasing every year. However, the share of international graduates who are staying and working after graduation is relatively low. That is why this research examines whether this group is experiencing education-job mismatches, revealing whether international graduates have difficulty in finding matching jobs. If so, this might be a crucial factor in the decision to leave. For this research, data from the HBO monitor was used. A yearly survey conducted among graduates of Dutch higher vocational education. Research on international graduates in higher vocational education in relation to the education-job mismatch is lacking. For this reason, this thesis will investigate the education-job mismatch among international graduates in Dutch higher vocational education. A variety of graduate-backgrounds will be compared, including natives, first- and second-generation migrants. This allows for a comparison of outcomes with regard to mismatching among different graduate groups. Besides, several other characteristics are being controlled for like personal, educational and job factors. In the empirical analysis, five statistical models are presented. The first three are logistic regressions aimed at finding the determinants of a mismatch. The remaining models consist of a logistic regression and OLS regression. Both aimed at determining the effects on graduate job satisfaction and wage. Furthermore, this research looks how the graduate-background affects mismatch probability. Findings demonstrate that educational and job characteristics are the strongest mismatch determinants. Graduate job satisfaction levels and wage are negatively affected by mismatches and influenced by the graduate's background. Furthermore, for international graduates no evidence was found that they are more or less likely to experience a mismatch. Based on this, it no conclusion can be made regarding the labor market position of international graduates who remained to work in the Netherlands. Additionally, results show that an ethnic penalty might exist among graduates who are second-generation migrants. They are found to be more prone to certain types of mismatch and have lower wages. However, among first-generation migrants there is no evidence for this ethnic penalty.

Keywords:

Education-job mismatch, international graduates, Dutch higher vocational education, labor markets.

Table of Contents

Abstract....2
Table of Contents....3
List of tables and figures....5
1. Introduction....6
1.1 Research aim & questions 6
1.2 Structure of thesis 7
2. Conceptual Framework
2.1. International graduates in Dutch higher education 8
2.2. Education-job mismatch 10
2.3. Measurement of mismatch 11
2.3.1. Measurement of vertical mismatch 11
2.3.2. Measurement of horizontal mismatch 13
2.4. Empirical Evidence 14
2.4.1. Determinants of mismatch 14
2.4.2. Consequences of mismatch 15
2.4.3. Higher vocational education 16
2.4.4. Migrants 16
2.4.5. International graduates 17
2.5 Conceptual model 18
Research Design
3.1. Data set 19
3.2. Dependent variables 20
3.3. Independent variables 21
3.3.1. Graduate-Background 21
3.3.2. Independent variables 23
3.4. Model specification 26
3.4.1. Binary logistic regression 26
3.4.2 OLS Regression 27
4. Empirical Results
4.1. Analysis of results 30
4.1.1. Key variable: Graduate-background 30
4.2. Control variables 31
4.2.1. Personal 31

4.2.2. Education 32
4.2.3. Job 33
4.2.4. Location 34
4.2.5. Mismatch 35
5. Conclusion
5.1. Contribution, limitations and research recommendations 41
6. Bibliography 42
Appendix I 44
Appendix II 45
Appendix III 46
Appendix IV 54

List of tables and figures

List of tables

Table 3.1: Specification of the graduate-background variable

Table 3.2: Descriptive statistics

Table 4.1: summarized regression results of last stage for each model

Table 6.1: The graduate unemployment rate according to province and year

Table 6.2: Logistic regression results for vertical mismatch

Table 6.2: Logistic regression results for horizontal mismatch

Table 6.3: Logistic regression results for double mismatch

Table 6.4: Logistic regression results for job dissatisfaction

Table 6.5: Robust OLS regression results for log hourly wage

Table 6.7: Cross tabulation of gender x field of study

List of Figures

Figure 2.1: Distribution of international students in Dutch higher education

Figure 2.1: Stayrate five years after graduation

Figure 2.3: Visualization of the types of mismatch

Figure 2.4: Conceptual model

Figure 3.1: Distribution of Graduate-Background

Figure 4.1: Distribution of mismatch over the years in %

Figure 4.2: Distribution of mismatch according to graduate-background

Figure 6.1: Stayrate of international graduates in the combined study cohorts for the period between 2006-07 till 2012-13, after 1 till 5 years

Figure 6.2: Distribution of the original hourly wage

Figure 6.3: Distribution of the residuals

1. Introduction

In 2015, there were 143,000 job vacancies in the Netherlands, about 1.4% of all jobs available. Near the end of that year around 591,000 (6.6%) individuals were still unemployed. Despite the high number of job openings there are still persons who are unable find a matching job and remain unemployed (Cabus & Somers, 2018). This economic situation is often explained by the inability to match the supply of workers to the demand of employers. Specifically, educational profiles and skills of individuals do not match with requirements set by employers. This problem is referred to as the education-job mismatch.

A mismatch between education and jobs has always been prevalent, but due to changes in the rapidly developing world, they are even more likely to become frequent and persistent. Nevertheless, a mismatch has negative effects for individuals and also for society as a whole. On a personal level, consequences can be noticed in higher unemployment risks, lower wages and job dissatisfaction. Subsequently, on a societal level this affects the economy, which suffers when workers are mismatched in the labor market. Thus, from an economic perspective, an education-job mismatch is a negative and costly outcome for both society and the individual.

Concurrently, there is a noticeable recent trend in higher education. An increasing number of international students obtain a degree in the Netherlands, but many of these international students leave after graduation. In fact, there is an opposite trend: the number of international graduates who are staying is decreasing more than it did before. If more international graduates would decide to stay and work in the Netherlands, this would lead to considerable economic and societal gain. Besides, these higher educated international graduates might also be the missing piece in filling the remaining vacancies. Therefore, maintaining international graduates could be an opportunity.

For these reasons, it is important to investigate the labor market position of the international graduates who did indeed decided to work in the Netherlands. Specifically, whether their education matches with their jobs. If this is not the case, then this could prove to be a factor in the decision to leave and find better matching jobs abroad. Studies focusing on international graduates are mostly centered on those who followed an education at research universities. However, there is also a significant share of international graduates who completed a higher vocational education and remain uninvestigated. This research will fill this gap, investigating education-job mismatch among international graduates in higher vocational education.

1.1 Research aim & questions

The purpose of this thesis is to investigate to what extent international graduates of Dutch higher vocational education are experiencing an education-job mismatch. Besides, it aims to discover the labor market outcome of this particular group by examining whether their education matches their jobs. Moreover, this study tries to find the determinants and consequences of such a mismatch. Thereby, are the personal, educational, job and locational characteristics of the graduates examined. Furthermore, the research design of this thesis allows for the group of international graduates to be compared to other graduate groups with varying backgrounds. This will be referred to as the graduate-background and consists among others of internationals, natives, first- and second-generation migrants. The possibility to compare different graduate groups is an unique aspect in this research. Altogether, these features in this thesis provide valuable insights in the labor market position of graduates in higher vocational education, with a focus on the education-job mismatch. Therefore, this information could be of use and helpful for educational and governmental

institutions, and policymakers. At last, a tentative attempt is made to link the education-job mismatch among international graduates to the trend they leave after graduating.

In order to fulfill the goals outlined above, the main research question for this thesis will be the following:

"To what extent are there education-job mismatches among international graduates of Dutch higher vocational education and what are the determinants and consequences of such a mismatch?"

In order to answer this main question, a number of sub questions have been formulated. These are:

> *To what extent are there mismatches among graduates of higher vocational education?*
>
> *What are the key factors that determine a mismatch for graduates?*
>
> *To what extent and in what ways do educational-job mismatches influence job satisfaction and wage?*
>
> *How does being an international graduate influences the labor market position?*

By means of several statistical analyses, this thesis tries to answer the questions above. The first sub question is answered by examining the incidence of mismatch. Followed by a discussion of what the determinants of mismatch are. Thereafter, the impacts of mismatch on job satisfaction and wages of graduates are evaluated. Also, the focus of the analysis is on the background of graduates and whether this is related to experiencing a mismatch. All in all, this would provide an answer to the main research question.

1.2 Structure of thesis

Insofar, the introduction and the relevance of this thesis along with the research questions have been presented. In the following second section, the conceptual framework will be provided. The state of the current literature and the relevant studies concerning education-job mismatch will be discussed. Thereafter, section three provides the research design that is used. In section four, the results from the empirical analysis will be presented and elaborated upon. At last, section five includes a discussion answering the research questions. Additionally, the limitations of this thesis are outlined, together with recommendations for future research.

2. Conceptual Framework

In the previous section, the subject of this thesis was introduced along with its research aim and questions. The central topic in this research is the education-job mismatch with a focus on the group of international graduates. Therefore, in this conceptual framework the existing literature in relation to this subject will be presented. The related concepts are explained and the best practices in the literature are identified. Also, the relevant findings in previous research are given in the empirical evidence part. Before the above-mentioned objectives are conducted, the importance of investigating the group of international graduates is highlighted.

2.1. International graduates in Dutch higher education

Higher education in the Netherlands is popular among students from countries abroad. Every year the number of international students applying, studying and graduating here is increasing. This trend is noticeable in all types of education levels belonging to the Dutch higher education system. The Dutch higher education system consists of two levels: scientific universities (WO) and higher vocational education (HBO). Moreover, both levels are split in a Bachelor and Master education program. Since 2008, the number of international students who are following a full degree in higher education has more than doubled. This group of international students consisted of more than 85.955 persons in the academic year of 2018-19 and makes up for 11.5% of all students in Dutch higher education. *Figure 2.1* illustrates the distribution of international students over different levels in the higher education system. Over the years, the largest number of international students were following a Bachelor at a University of Applied Science, also known as higher vocational education. Yet, in comparison to the total number of students, international students represent only a small share of 6.1%. Moreover, if one looks at international students enrolled at Research Universities without distinguishing between Bachelor or Master level, then it is safe to say that most of them are following a program at such an institution. For both types of Master level, the percentage of international students is considerably larger, namely 20%. A possible explanation for this could be the shorter duration of the program and the greater offer of English taught programs (Nuffic, 2019).

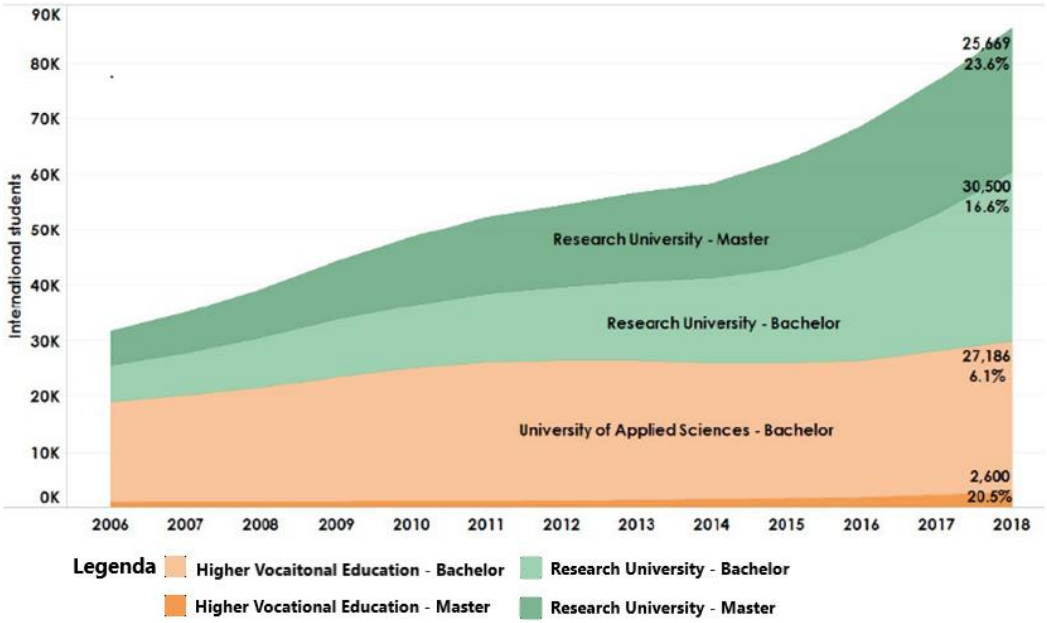

Figure 2.1: distribution of international students in Dutch higher education (source: Nuffic, 2018)

Although, the number of international students following a higher education in the Netherlands is increasing every year, the share of them remaining after graduation is relatively low. In fact, a decreasing trend is visible for the proportion of international students that five years after graduation are still here. This is also known as the 'stayrate' and refers to the percentage of international graduates of higher education that after a number of years are still living in the Netherlands (Nuffic, 2018). *Figure 2.2* portrays the stayrate five years after graduation for the period of 2006-2013. These years represent the graduation year for each study cohort. This means that for the study cohort of 2006, 29.3% of international graduates still lived in the Netherlands in 2013, five years after their graduation. Furthermore, one can observe that for every year thereafter the stayrate decreases. From the international students who graduated in 2012, five years later only 22,7% still lives in the Netherlands.

In this period, a larger share of the international graduates in higher education went abroad again, than before. This is a missed opportunity because there are a lot of economic and societal benefits to gain from international graduates who remain. The Nuffic estimated with the most recent numbers of international students that came to the Netherlands in the academic year of 2017-18, and with the calculated chance for them to stay based on numbers of the CBS, that this group would contribute a net value between 1,64-2,08 billion euro per year (Nuffic, 2018). As a result, an increase in the number of international graduates staying would lead to significant economic and societal gains. Therefore, this research focusses on the group of international graduates that decided to stay, live and work in the Netherlands.

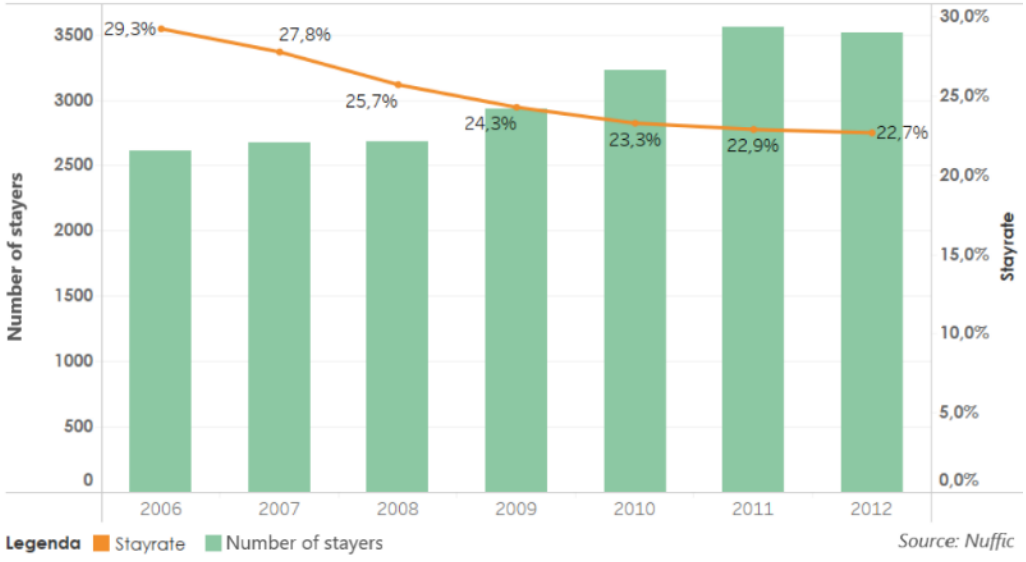

Figure 2.2: Stayrate five years after graduation *(source: Nuffic, 2018)*

2.2. Education-job mismatch

An education-job mismatch refers to the difference in education attained by an employee and education required by the employer for a job. In this research, it is more relevant to phrase it as the difference of a graduate's educational attainment and required schooling for their occupation. Naguib, Baruffini and Maggi define the concept of mismatch as "a situation in which the knowledge and skills needed to perform adequately in the present occupation are either higher, or lower, or just different from those possessed by the worker" (2019, p. 201). A mismatch can occur in two ways, vertical and horizontal. A vertical mismatch exists when the level of education does not match with the level or academic titles required for the job. This type of mismatch can also be split into two categories: overeducation and undereducation. The former means that the level of education is higher than required and the latter implies that a lower level is demanded for the profession. Besides, a mismatch also occurs when the field of study does not correspond with field required for the job. This is called a horizontal mismatch. When both the education level and field of study do not match simultaneously, it is categorized as a double mismatch (Falcke, Meng, & Nollen, 2016).

The mismatch literature is rooted in two different fields, modern labor economics and economics of education (Leuven & Oosterbeek, 2011). Most research in the mismatch literature is focused on the vertical mismatch, particularly overeducation. On the other hand, there is a relatively small part of the literature that discusses horizontal mismatch. Specifically, Witte and Kalleberg (1995) are pioneers in the horizontal mismatch literature and more recently the research by Robst (2007) has been influential in this niche. In order to understand the horizontal mismatch, it is important to further explain its definition. Sellami, Verhaest and Van Trier define a horizontal match as "the field delivering the optimal preparation for the job" (2013), since they do not believe that all knowledge and skills required for the job can be obtained in formal education. This implicitly suggests that a perfect match does not exists between field of study and that required field for a job. Thus, a horizontal mismatch is determined by the required field of the job, which corresponds best to the field of study.

Furthermore, the bulk of mismatch literature focuses on overeducation. Defined as the vertical mismatch where the educational level is higher than what is required for a job. Hence, an educational mismatch is often assumed to be about overeducation (McGuinness, 2006; Mavromaras, Sloane & Wei, 2012). The term overeducation was firstly introduced in 1976, by Richard Freeman, in his research on the American graduate labor market (in McGuinness, 2006). One of the founding fathers in the mismatch literature, specifically regarding the vertical mismatch is Sicherman (1991). His research was one of the first to conceptualize the overeducation mismatch and its impact on wage. The effects of a mismatch will be discussed later when the focus is on the consequences of a mismatch.

Moreover, recently the number of studies that simultaneously investigate vertical and horizontal mismatches are becoming more frequent. For example, the research by Verhaest, Sellami and van der Velden (2017) examines the vertical and horizontal mismatch concurrently and additionally identifies the double mismatch. Verhaest et al. (2017) name this a 'full mismatch' which exists when an individual is experiencing a vertical and horizontal mismatch at the same time. This type of mismatch is, according to them, the most problematic and hence needs to be tackled first. Concluding from their results, the authors suggest investing in quality of study programs. Also, to provide guidance and more information for the choice of study, particularly on fields most demanded in the labor market. The former reduces the vertical mismatch, while the latter diminishes horizontal mismatch. Accordingly, these two approaches will resolve the double mismatch (Verhaest et al., 2017).

Besides, within the mismatch literature there is a debate about whether education or skills are mostly responsible in a mismatch. The literature on mismatch and skills is extensive, which could even be considered as another niche. Also, this thesis focusses on recent graduates who are lacking significant work experience where skills for a job could be obtained. For persons who are in further stages their career, skills attained in earlier jobs are indeed important. However, among graduates skills are predominantly acquired through education. For this reason, the mismatch literature focusing on skills is beyond the scope of this thesis

Hitherto, all types of education-job mismatch have been explained and the relevant influential works in the mismatch literature were presented. *Figure 2.3* represents a visualized overview of the three kinds of mismatch, which will be the key concepts in this thesis. In the following sub-section, the measurements of these types of mismatch are discussed.

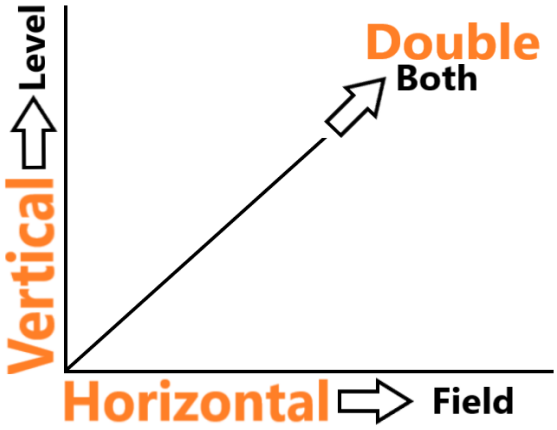

Figure 2.3: Visualization of the types of mismatch

2.3. Measurement of mismatch

The measurement of mismatch will be separately discussed, according to type of mismatch. First, the vertical mismatch and thereafter the horizontal mismatch. Moreover, measurements are distinguished by subjective and objective measures.

2.3.1. Measurement of vertical mismatch

There are three general measures for vertical mismatch identified in the literature (Hartog, 2000; Naguib et al., 2019; Piracha & Vadean, 2013). First, there is a subjective measure for the vertical mismatch, called the 'worker self-assessment'. In this measurement, the worker states whether their current job requires a higher or lower education level than he or she attained (Hartog, 2000). It is considered to be more trustworthy than objective measures because it is based on experiences of the employee. The worker knows best what competencies and qualifications are needed to fulfill the job (Allen and Van der Velden 2001). This information is more accurate than standard requirements asked in job vacancies, since new skills are often learned at the start of a new occupation to properly conduct the job. The 'worker self-assessment' measure has the advantage in that it relies on the most recent knowledge available in a job, as a current employee provides information for requirements of the job (Piracha & Vadean, 2013). However, with this subjective measure it is possible that there is a 'common mood effect', which could influence results and possibly lead to the issue of endogeneity in the measurement (Naguib et al., 2019). Moreover, Hartog (2000) states that questioned employees tend to overstate specifications required for their jobs. The reason for this is that workers magnify requirements for their occupation to feel more satisfied about their job.

Furthermore, the worker self-assessment method is based on replies of workers to questions about the education level required for their job. Yet, when this method is applied the questions asked are phrased differently among multiple studies (Galasi, 2008; Hartog & Oosterbeek, 1988; Sicherman, 1991). Hartog and Oosterbeek use the following question: "which education, according to you, is the best preparation for the work you are doing?" (1988, p.188). Sicherman poses the question: "how much formal education is required to get a job like yours?" (1991, p.103). While, Galasi asks: "if someone was applying nowadays for the job you do now, would they need any education or vocational schooling beyond compulsory education? And if so, about how many years of education or vocational schooling beyond compulsory education would they need?" (2008, p.5). The last two questions inform about recruitment norms, while the first specifies requirements to conduct the job. Moreover, the first and second question vary in type of schooling that is referred to: formal and informal. Thus, varying phrasing of questions leads to different answers for the same measurement. However, it is not known if and to what extent these variations result in different outcomes regarding required education (Leuven & Oosterbeek, 2011).

Secondly, the 'job analysis' method is a systematic assessment by professional job analysts who assign the required level of schooling for every occupational category (Hartog, 2000). A well-known example of results of such an evaluation is the Dictionary of Occupational Titles (DOT) from the United States. Every occupation is classified on a scale from one to seven, which is translated into years of schooling required for a job, running from 0 to 18 years. This measurement is regarded as an objective method to measure a mismatch (Piracha & Vadean, 2013). Besides, the job analysis approach takes into account the difference between years that an individual followed education and years of schooling normally required for the job (Naguib et al., 2019). Yet, since this research focusses on international graduates who completed a bachelor in higher vocational education, the number of years of schooling acquired by them and required for the jobs that they will apply to are likely to be the same among this homogenous group.

Thirdly, is a measure named 'realized matches'. This method relies on the general attained education of all workers, which are currently in a specific job. It is comparable to the mean or the mode of the distribution of education among employees (Hartog, 2000). One approach by Verdugo and Verdugo (1989, in Piracha & Vadean, 2013) is based on the average education level of workers in the same job. Employees are considered to be overeducated if the level of schooling is not less than one standard deviation over the average, while workers are regarded as undereducated when education level is one standard deviation below the mean level of schooling. Another approach by Kiker et al. (1997, Piracha & Vadean, 2013) adopts the mode of attained education level, instead of the mean. Employees with a higher or lower level than the given mode are classified accordingly as over- or undereducated. However, this measure does not apply the two standard deviations interval around the centrality measure. In comparison to the previous two measurements discussed above, the realized matches method is less suitable and only applied when data does not allow for the other two to be utilized. The main reason for why this method is inferior to the other two is because it is an outcome of demand and supply forces. Therefore, it is not able to solely reflect requirements of a job (Leuven & Oosterbeek, 2011).

To conclude, Van der Velden and van Smoorenburg (1997) have demonstrated in their research that for the Netherlands the workers self-assessment is a more reliable measurement than the job analysis method. One of the data sets they have used, is the HBO-Monitor, an older version of the data set used for this thesis. In their study two different methods are applied to their data sets about graduates who enter the Dutch labor market and find varying results. The differences are noticeable in the extent to which there is overeducation and undereducation. The level of overeducation is

regularly overestimated in the *job* analysis method, while there are no signs that there are over- or underestimates in the worker self-assessment method. Therefore, van der Velden and van Smoorenburg conclude that "the self-report method yields considerably more accurate estimates of the level of education required than the job-analyst method" (1997, p.12). The only caveat is that their study is somewhat outdated. Yet, based on this evidence and the previous analysis of three standard measurements for mismatches, the *worker-self assessment* proves to be the most suitable method to examine the vertical mismatch among international graduates in higher vocational education in the Netherlands.

2.3.2. Measurement of horizontal mismatch

In the mismatch literature, one can also find a discrepancy in the manner of how a horizontal mismatch is measured. It is even more complicated to find consistency in the measure for this type of mismatch, as compared to the vertical mismatch. Likewise, for the measurement of horizontal mismatch, one can distinguish between objective and subjective measures. The difficulty in measurement of this mismatch lies in the specification of the definition, specifically for what can be considered as required field of study for a job. There are educational fields that clearly match specific occupations but there also fields more broadly defined that do not have a one on one match with a job. For example, graduates who followed an education in the field of teaching are obviously a perfect match with the teaching profession, while for the field of economics there is a wider range of professions that could fit this field but are not a considered to be the perfect matching field. Now that the pitfalls of horizontal mismatch are addressed, the measurements are presented below.

First, the approach for the objective measurement of a horizontal mismatch is given. This approach is applied in the research of Wolbers (2003) and based upon the International Standard Classification of Occupations (ISCO) allocating occupational codes to study fields. Through this way professions can be linked to specific fields of study. If one wants to know whether a field of study matches an occupation, he or she can look up the code corresponding to the occupation and check what educational field is linked. For example, the field of Healthcare consists of medics (code 222) and nurses (223), while the field of education comprises all teachers (230-235). The main criterion for allocation of occupational codes to a field of study is that there is a match between skills learned during education and skills required for a job. A horizontal mismatch is identified when there is a difference between attained skills in the field of study and those required for the job (Wolbers, 2003).

Secondly, there is the subjective method relying upon the workers' self-report of educational requirements necessary for their job. This method is comparable to the worker self-assessment approach of the vertical mismatch. Similarly, the employee specifies whether occupation requirements are related to the attained field of study. However, it is the decision of the researcher to decide boundaries for what can be considered as a horizontal mismatch. For example, a worker whose job requires no specific field at all can be regarded as horizontally mismatched but simultaneously also as matched. Besides, it can be decided that a match only exists when the field of study perfectly matches the required field for the job, whereas a closely related field is already considered to be a horizontal mismatch (Kucel & Vilalta-Bufi, 2013). Yet, other researchers draw a different boundary and regard this not as a mismatch but a match. Furthermore, another approach in subjective measure is to question the degree to which employees regard their field of study to fit the required field of their occupation. The respondents answer in degrees of no relation, moderate relation, or close relation. (Somers et al., 2019). However, then again the same issue arises of where a line is drawn in what is considered to be a horizontal mismatch. This is a limitation that is embedded in the mismatch literature making the measurement of horizontal mismatch difficult.

Lastly, if one is to decide between an objective or subjective measure, pros and cons should be taken into account. The subjective method has the benefit of not being limited to a number of different codes for jobs that only match certain fields of study as in the objective approach. Therefore, the subjective approach assesses a horizontal mismatch more specifically and individually. The field of study of an employee is directly compared to the required field for their job. One drawback of the subjective approach is that the workers' judgement of a match or mismatch is by its own nature subject to self-report bias. Contrary, the objective measure for this matter proves to be a less biased approach. Therefore, in the literature that focusses on horizontal mismatches there seems to be no uniform measure. Consequently, these differing measurements will remain to yield diverse outcomes in research regarding horizontal mismatches. Somers et al. (2019) conclude that it would be beneficial for future research to have a general measure for horizontal mismatch. However, this might seem to be an ideal solution but there might be cases where a specific approach is necessary, and the uniform measure would not capture the right result. Thus, since the literature does not offer a best practice for measuring a horizontal mismatch, it can be assumed that the approach taken in this thesis can be considered as valid.

2.4. Empirical Evidence

There are plenty of studies conducted in the literature of education-job mismatch. Each of them has their own specific goal to investigate certain aspects within this topic. These can vary in type of mismatch like vertical- or horizontal mismatch, a specific country or several countries, but also for a particular group of individuals or a multiple groups. Since this thesis has a specific aim of what will be researched and what not, empirical evidence presented in this sub-section is selected accordingly. Studies that identified determinants of a mismatch will be discussed. Furthermore, findings in research about consequences of a mismatch on job satisfaction and income are examined. Then, the focal point will be on research concentrating on Dutch higher vocational education. Lastly, studies that focus on mismatches among specific groups such as migrants, and of course international graduates are included.

2.4.1. Determinants of mismatch

In mismatch literature there have been a lot of studies conducted and all of them include varying determinants of mismatch in their research. Here determinants of a mismatch are outlined found in the literature relevant to this thesis. Leuven and Oosterbeek (2011) identify a number of determinants consistently found in relation to mismatch. The first determinant is gender, women are more prone to experience a mismatch. The traditional explanation for this is that females are tied movers, meaning that their male partners are the main income earners, which restrict women to the location of where the partners' labor market prospects are the best (Leuven & Oosterbeek, 2011).

Furthermore, as the name of education-job mismatch already reveals, educational characteristics are important determinants. School performance proves to be an important factor in determining the outcome to be mismatched. According to Chevalier (2003) higher grades decrease the probability to experience a mismatch. Likewise, resume building and experiences during study are of significance among graduates, because these can serve as an indicator of their ability for employers and are therefore important in relation to education-job mismatch (Allen & Weert, 2007; Falcke et al.,2016; Venhorst & Cövers, 2018). Besides, field of study is another significant determinant for a mismatch. It is frequently found that mismatches and unemployment highly depend on the chosen field of study (Hensen, De Vries & Cörvers, 2009).

Additionally, job characteristics are the significant other in the education-job mismatch. Béduwé and Giret (2011) identify a number of job variables that are incorporated in their empirical analysis like

working hours, type of contract, and firm size. These are also found to be utilized in the following studies: García-Aracil and van der Velden (2008) include a variable for working hours split between full-time and part-time. The type of contract is found to be influential by Wolbers (2003) as individuals with temporary contracts have a higher chance to experience a mismatch in comparison to permanent workers. Also, in terms of firm size there are differing findings. According to Wolbers (2003), workers in large firms have a higher possibility of finding a matching job, while the results of Witte and Kalleberg (1995) demonstrated that employees in large firms are more likely to be horizontally mismatched. Furthermore, Venhorst and Cövers (2018) use a control variable for time spent in unemployment after graduation. They hypothesize that when more time is spent in unemployment the reservation wage of the graduate will lower. This could also be applicable in the choice of taking a job that does not match the educational profile of the graduate as a temporary solution for being unemployed (Sicherman, 1991). In accordance with the examples for determinants of a mismatch that were utilized in the studies presented above, these will return as variables in the empirical analysis of this research. In section three, these variables will be presented.

2.4.2. Consequences of mismatch

An education-job mismatch is associated with negative consequences for an individual. In the literature this is predominantly researched by investigating the effects of a mismatch on wage and job satisfaction. It is found that a mismatch leads to a lower income and job dissatisfaction (Allen & Van Der Velden, 2001; Allen & De Weert, 2007; Hartog, 2000; Leuven & Oosterbeek, 2011). In general, evidence shows that overeducated employees have lower earnings than workers with same qualifications but who are well-matched. Also, undereducated employees earn less in comparison to individuals in the same job, while being correctly matched. Furthermore, job satisfaction of overeducated employees is found to be lower in comparison to their well-matched colleagues in the same job with similar qualifications (Quintini, 2011).

Another relevant work is that of Robst (2007), who explicitly investigates the impact of a horizontal mismatch on wage. The results demonstrate that having a different field than the job requires, leads to a significant wage penalty in comparison to someone who is well-matched and has an equal year of schooling. Additionally, it is found that graduates with fields of study which are rather broad and general in skills are more prone to be mismatched, but do not have a high wage penalty. Yet, graduates that have a background in a highly specialized field experience a significantly high income penalty but are less frequently mismatched. Thus, the horizontal mismatch affects wages, but the severity depends on how specialized the field of study is (Robst, 2007).

Furthermore, Allen and van der Velden (2001) examine the relation between educational mismatches and skill mismatches, and its effects on job satisfaction and wage. Their findings show that the educational mismatch has a significant effect on wage, while skill mismatch only slightly affects wage. Lower wages are associated with overeducation, so the vertical mismatch.
Besides, it is surprisingly found that a mismatch does not influence job satisfaction.
However, in a later study by Allen and Weert (2007), results demonstrate the opposite, mismatches do affect job satisfaction. Individuals who are experiencing a mismatch tend to be more dissatisfied with their jobs, which is the overall conclusion in the literature. The differences found between these two studies can be addressed to different data sets and variables used in the statistical analyses. In the earlier study, data on Dutch graduates in the nineties was used, while in the other study a data set was used on graduates from five different countries at the end of that decade. In the latter research, extra variables like field of study, age and organization type were included. This resulted in a more inclusive research and yielded the expected outcome in line with the literature.

2.4.3. Higher vocational education

A very relevant study, having several common aspects with this thesis, was conducted by Falcke et al. (2016). First, their research focusses on graduates of higher vocational education in the Netherlands. Specifically, second-generation migrants are studied in comparison to natives. Even though, the group of focus in this thesis is slightly different, the research design, variables and findings are still very significant. Secondly, the data set used in their research is the same that will be applied in this thesis. Also, the approach taken to define second-generation migrants can be similarly used to define international graduates and other types of groups. This will be elaborated upon in section three. Besides, it is found that "an ethnic penalty in educational mismatch and unemployment exists, being more severe for non-western than western immigrants" (Falcke et al., 2016, p.11). This is an interesting outcome and might also exist for international graduates.

Another pertinent research, also concentrating on graduates of Dutch higher vocational education was conducted by Hensen et al. (2009). They investigated the relationship between geographic mobility and education-job mismatch. Similarly, this study makes also use of the same data set. It is found that graduates with greater spatial mobility have a higher likelihood of finding vertical matching jobs than those who are less mobile. However, with respect to the horizontal mismatch mobile graduates are found to have a higher probability to suffer from this type of mismatch. Additionally, the results demonstrate that there is strong evidence that mobile graduates are more likely to secure full-time and permanent jobs. Thus, mobility turns out to be positively related with finding a vertical matching job and to increase the chance to obtain a full-time or permanent job. The study of Hensen et al. (2009) proves to be a valuable example of how locational characteristics and geographical mobility are related to education-job mismatch and why this dimension should be incorporated in this thesis as well.

2.4.4. Migrants

A common subject group in the mismatch literature besides graduates is migrants. In relation to international graduates, migrants share several characteristics like non-native, foreign language and different former education. Therefore, it is relevant to review the mismatch literature on migrants. In general, findings in this niche show that migrants are more prone to education-job mismatches in comparison to natives. For example, the study of Battu and Sloane (2004) found that people with an Indian background in the UK have a greater chance of being overeducated compared to white natives. Also, Boudarbat and Chernoff (2012) discovered that there is a significant disadvantage among immigrants in education-job match even if they attained their schooling in the same Canadian education system as natives. Furthermore, Aleksynska and Tritah (2013) conducted an extensive research on mismatches among migrant workers across Europe. The findings reveal that overall, immigrants across European countries tend to frequently experience mismatches and are both over- and undereducated in comparison to natives. Personal and educational factors like language ability, former education- and work experience are important determinants for mismatches among this group. The latter are especially important, but it is difficult to translate former experiences to the destination labor markets. Moreover, the extent of overeducation among immigrants depends mostly on the economic state of host countries and the active policies in relation to immigrants. On the other side, undereducation is also caused by the quality of human capital in the immigrants' origin countries, which influences the selection process of those that will migrate (Aleksynska & Tritah, 2013). Besides, studies that focus on effects of a mismatch on earnings of migrants find that these are stronger than for natives. For example, immigrants who are overeducated are found that the return to overeducation is lower for immigrants than for natives, implying that even though they are in an identical situation, the earnings of an immigrant are lower (Joona et al., 2014).

A research by Kõu, Mulder and Bailey (2017) studied how parents, partners and extended families of highly skilled Indian migrants influence decisions to migrate to the Netherlands and UK. Their findings show that the role of significant others play an important role in many decisions over the life course. These decisions consist of following an education abroad or permanently migrating or returning again. Specifically, Indian culture with its strong norms and values around family and caregiving make this a complex process. In relation to the group of international graduates, it can be concluded that it is important to consider the influence of family and partners in the migration decision to stay or to return.

2.4.5. International graduates

To the knowledge of the author of this thesis, there has not yet been any research particularly focusing on international graduates in Dutch higher vocational education. Moreover, even studies concentrating on mismatch among international graduates are rarely found. Only one research conducted by Naguib et al. (2019), seemingly investigates international graduates. Yet, the authors do not specifically aim to investigate international graduates. Their research sample consists of Master graduates from a Swiss university, claimed to be internationalized. However, from their summary statistics it is notable that a dummy is included for Swiss citizenship, having a value of 0.30 implying that seventy percent has another nationality, who therefore can be regarded as international students. Furthermore, their analysis shows that a mismatch does not have a negative effect on both wages and job satisfaction. Naguib et al. conclude that “the effects of job-education mismatch in this sample of graduates appear as less serious than could have been thought, since the negative impact of educational mismatch on wages is not statistically significant and the influence of educational mismatch on job satisfaction is not robust to alternative definitions of the mismatch variable (objective vs subjective)” (2019, p.214). These results are unexpected and in contrast to other findings presented above, which demonstrated that educational mismatches have negative effects on income and job satisfaction. This illustrates that outcomes in this thesis could also deviate from expectations derived from the literature and serves as a caution.

2.5 Conceptual model

In *figure 2.4,* the conceptual model is visualized and serves as an overview of this section. All concepts derived from the literature that were discussed above are included and linked into a scheme. The key concept in this research is education-job mismatch, existing in three ways: vertical, horizontal and double. The vertical and horizontal mismatch are both measured by the subjective approach, while the double mismatch is formed by a combination of the first two mismatches. Subsequently, determinants and consequences of a mismatch are identified. The determinants are factors derived from the literature and categorized into four groups: graduate-background, personal, educational and job. The graduate-background includes the focus group of international graduates and several other groups. Each type of these backgrounds will have its own influence on experiencing a mismatch. For the other three groups of determinants, the factors are self-explanatory and were discussed in detail before. Moreover, the consequences of a mismatch are noticeable in two aspects: job satisfaction and wage.

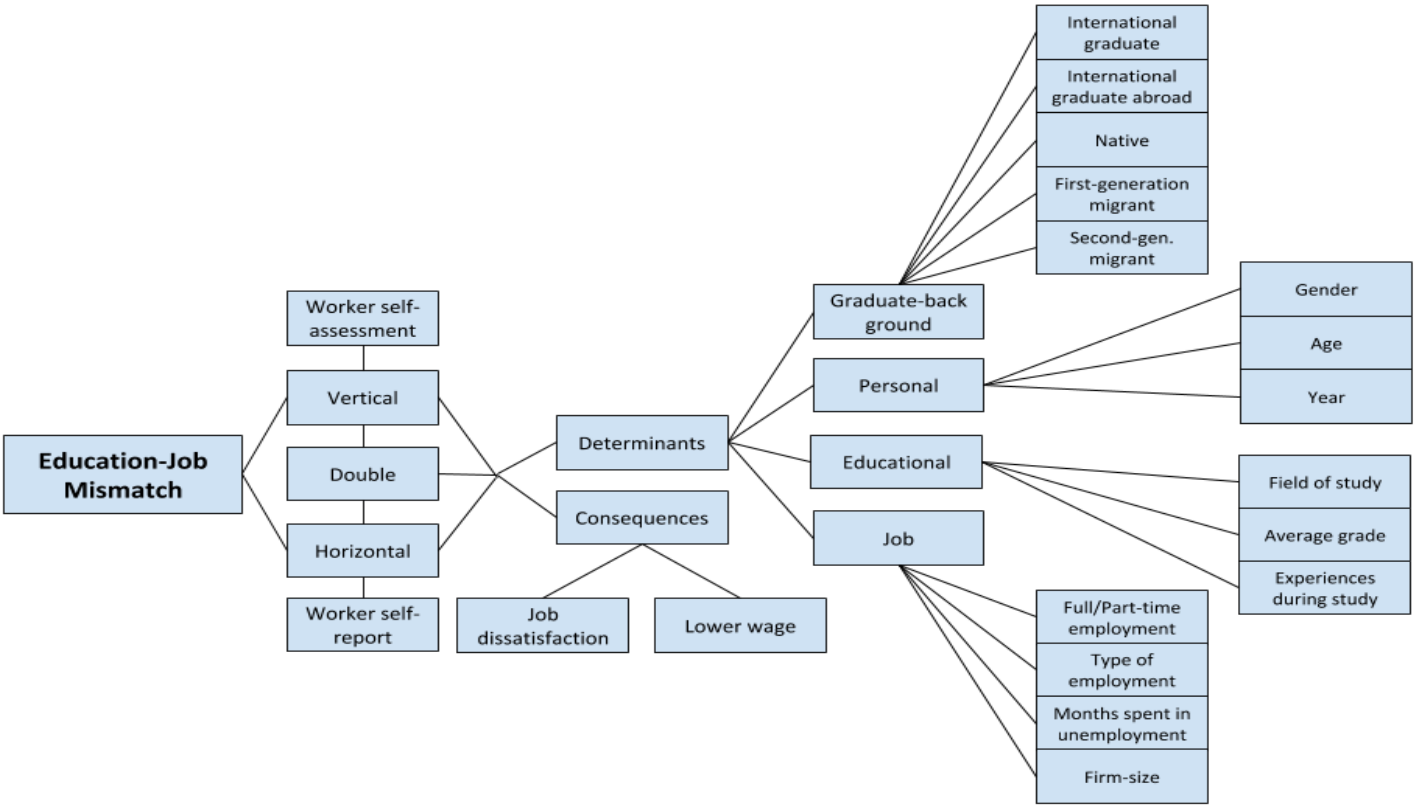

Figure 2.4: Conceptual model

In this second section, it has become clear that the academic literature on education-job mismatch is plentiful. It has covered many different directions within the topic. Varying types of mismatch have been investigated separately, but also simultaneously. Many studies have sought to find the determinants of a mismatch. Also, impacts of a mismatch on job satisfaction and wage of individuals have been examined. These researches are predominantly focused on Western countries. Besides, there have been many different groups of individuals that were the research subject. Even though, it seems like all perspectives and angles have been investigated, there is still a group missing. The international graduates in Dutch higher vocational education who decided to stay and work are still uninvestigated. Therefore, building upon the rich literature on mismatch, this thesis will research the international graduates in Dutch higher vocational education.

3. Research Design

Hitherto, the introduction has presented the relevance of the topic and the research questions for this study. Thereafter, the conceptual background was discussed. Now, this chapter provides the research design of this thesis. Firstly, the data set that is utilized will be introduced. Additionally, an overview of selection criteria and limitations of the data is given. Secondly, dependent variables that will be at the core of the statistical models are elaborated upon. Thirdly, an analysis of independent variables is included. Thereafter, the descriptive statistics are provided. At last, different types of statistical methods for the models are presented together with its model specifications.

3.1. Data set

The data set that has been used in this study is called the *higher vocational education monitor (HBO Monitor).* This monitor is a yearly survey conducted by the Research Center for Education and Labor Market (ROA), located in Maastricht, the Netherlands. It is a survey among recent graduates of Dutch higher vocational education. Nearly every higher vocational education institution across the country participates in the survey, only certain private institutions are not included. Around 85% of the public institutions for higher vocational education participates. Moreover, 95% of all students in the Netherlands are following an education at the institutions participating in the monitor. Thus, the results from the survey can be regarded as representative for a national scale. The monitor is conducted every year, roughly 18 months after graduation of a study cohort. The survey includes questions yielding information about the labor market position of the graduate. This information covers personal characteristics, educational background, current employment status and locational characteristics. This extensive information makes it possible to do a thorough analysis on the education-job mismatch among graduates.

There are several selection criteria applied to the data set in order to determine what is included in the sample. These criteria are in line with the works of Venhorst and Cörvers (2018), and Falcke et al. (2016) who also examined higher vocational graduates with the use of the *HBO monitor*. Accordingly, only graduates who followed a Bachelor program are included. The number of graduates that follow an HBO Master program is too small. Even though, the share of international students in this type of education is quite large as we have seen in *figure 2.1*. Therefore, it might still be interesting for follow-up research to focus specifically on international graduates in the Master level. Furthermore, only graduates that followed a full-time program are selected. Inasmuch as students who follow a part-time program have different characteristics. For example, part-time students might already participate in the labor market by working in a job for four days and the other day following an education. Therefore, these students have different characteristics and if they would be included the homogeneity of the sample would be affected. Besides, the original data set covers a time period from 1998-2016. Yet, this thesis will use the timeframe of 2005-2016. This choice comes naturally because variables have been selected that do not hold information for the period before 2005. This is due to the fact that these variables represent information obtained from questions that were included later in the survey and did not exist before. Besides, this time frame covers an unprecedented period of eleven years, including crucial periods like the global financial- and European crisis, along with a couple of pre- and post-crisis years.

Unfortunately, like nearly every other the data set it is not perfect and there are several limitations. First, the survey takes place about one and a half year after graduation of the participants. However,

in a report by the Nuffic (2018), the chance that an international graduate would stay was calculated. In the first year, the chance that an international graduate would leave is still about 50% and for the second year this decreases to 40%. For every year following, the chance of leaving gradually decreases (*see Appendix I, figure 6.1)*. Yet, when the survey is taken the likelihood that an international graduate would leave is still relatively high. Meaning that they could have left shortly after participating in the survey. Thus, it would be ideal if there was a follow-up survey conducted five years after graduation. This provides more reliable information on international graduates who are most likely to stay for the rest of their lives. Secondly, although students are categorized according to the graduation year, it happens that students graduate earlier than their colleagues in the same academic year. Consequently, students who graduate earlier might have an advantage to be able to search for a job under different circumstances. For example, job availability is larger and the number of individuals looking for a job is lower. Accordingly, these graduates could have an advantage over others. However, this is something difficult to control for and thereby regarded as a limitation within this research.

3.2. Dependent variables

For the empirical analysis in section four, there are five statistical models conducted, each with its own separate dependent variable. These dependent variables will be presented and explained here. The statistical methods that will be performed in the empirical analysis are predominantly logistic regressions. This requires a binary dependent variable. Therefore, the first four dependent variables presented below are binary variables. In the fifth model, the dependent variable is a continuous one. Hence, a different statistical method is applied called the Ordinary Least Squares (OLS) regression, which will further be elaborated upon in the last subsection.

In the first model, the vertical mismatch will be examined. The dependent variable used for this is a binary variable indicating whether the attained education level matches the required education level for the job. This dependent variable is based on a variable that exists within the data set. It was produced based on the answer of the graduate, who responds with either yes or no to the question whether their job requires at least their own education level. When answered yes, it is a match (0), if the response is no, it is regarded as a vertical mismatch (1). For the measurement of the vertical mismatch variable, the subjective approach was used, namely worker self-assessment. As discussed in section two, this method proved to be valid measurement for the vertical mismatch. However, there is one limitation, being that for the outcome it is not possible to differentiate between over- or undereducated. This is a constraint within the data set withholding valuable information.

In the second model, the dependent variable is the horizontal mismatch. Again, this dependent variable is also binary. An existing variable within the data set is used for horizontal mismatch. Similarly, for measurement of this variable the subjective approach was utilized, being the workers' self-report. Accordingly, the variable was constructed upon the response of the graduate to the statement: 'current job requires the field of study asked by the employee'. The answer to this is either: 'own/related field' or 'no/different field'. The former is regarded as 'match' (0) and the latter as 'horizontal mismatch' (1). However, a related field does not sound very convincing for an answer, which is considered to be a match. This is a shortcoming in the data set that will be taken for granted because it is something that cannot be changed.

For the third model, the dependent variable represents the double mismatch. In this model the dependent variable is self-constructed by using a combination of the previous two dependent variables. Thus, if a graduate simultaneously experiences a vertical and a horizontal mismatch, then it

is categorized as a double mismatch. This is a binary variable consisting of the outcomes: 'double mismatch' (1) or 'otherwise' (0).

Thereafter, in the fourth model the dependent variable portrays job satisfaction. In the data set there is an ordinal variable available representing the job satisfaction. Graduates were asked to indicate their job satisfaction on a scale from 'very unsatisfied' (1) to 'very satisfied' (5). In order to stay consistent and be able to perform the same statistical methods in the empirical analysis which allows for a comparison effect, this ordinal variable is transformed into a binary variable like the other dependent variables. Accordingly, the method of Allen and Van der Velden (2001) will be followed. If the ordinal variable for job satisfaction has the value 'satisfied' (4) or 'very satisfied' (5), it is recoded into satisfied (0). For the responses of 'very unsatisfied' (1), 'unsatisfied' (2) and 'neutral' (3), it is recoded into unsatisfied (1). Thereby, a binary job satisfaction variable is created with the values of either satisfied or unsatisfied. However, in the same manner as the horizontal mismatch variable, this approach poses a deficiency because the response 'neutral' does not belong to either the side of 'unsatisfied' or 'satisfied'.

In the fifth model the effect on wages of graduates is examined. In the data set there is information available about the hourly wage. This is a very strong indicator for the labor market position of the graduate. The hourly wage variable is continuous and requires a different statistical approach than the other dependent variables, namely an OLS regression. Besides, if the example in the literature is followed, the natural logarithm of hourly wage should be used (Allen & Van der Velden, 2001; Hartog, 2000). In *Appendix II figure 6.2* a plot of the original distribution of hourly wage is depicted, which shows that there is a positive skew. In addition to the examples in the literature this is another argument to apply the natural logarithm for wage. However, it is important to mention that differences in wages of recent graduates might be small. Since this group of graduates is very homogenous in the attained education level and are at the start of their careers. Also, in the Netherlands there is a central wage bargaining system resulting in similar wage levels among these graduates.

3.3. Independent variables

In addition to the dependent variables, there are a variety of independent variables used for the empirical analysis. First, there is the main independent variable comprising international graduates. This will now be presented and thereafter follow the remaining independent variables.

3.3.1. Graduate-Background

The main group of interest in this research is international graduates. In order to incorporate this group in the analysis, a self-made variable had to be created. This variable is the main independent variable in this research and named 'graduate-background'. As the name already suggest it represents the origin of a graduate. Unfortunately, there was not a readily available variable in the data set explicitly indicating whether the individual is an international graduate. Therefore, several existing variables within the data set haven been combined to produce the graduate-background, inspired by Falcke et al. (2016). These are the following variables: country of birth, country of birth of parents, living address at the age of 16 and current living address. Each of these variables have their own values or categories. Hence, there are many variations possible when all of these are taken into account. Eventually, this has led to eight categories for the graduate-background variable. These are: 'native', 'international graduate', 'international graduate abroad', 'international graduate living address age 16 in NL', 'native abroad', 'native born abroad', 'first generation migrant' and 'second generation migrant'. *Table 3.1* shows the specifications for each category of the graduate-background variable.

Graduate-Background	Birth Country Respondent	Birth Country Father	Birth Country Mother	Living address age 16	Current living address
Native	Netherlands	Netherlands	Netherlands	Netherlands	Netherlands
International graduate	Abroad	Abroad	Abroad	Abroad	Netherlands
International graduate abroad	Abroad	Abroad	Abroad	Abroad	Abroad
International graduate living address age 16 in NL	Abroad	Abroad	Abroad	Netherlands	Netherlands
Native abroad	Netherlands	Netherlands	Netherlands	Netherlands	Abroad
Native born abroad	Abroad	Netherlands	Netherlands	Netherlands	Netherlands
First generation migrant	Netherlands	Abroad	Abroad	Netherlands	Netherlands
Second generation migrant	Netherlands	Netherlands /Abroad	Netherlands /Abroad	Netherlands	Netherlands

Table 3.1: Specification of the graduate-background variable
**For second generation migrant, one of the parents should be born in the Netherlands and the other*

However, there are limitations in what the combinations of these variables are able to capture and what not. For the category 'international graduate living address age 16 in NL' it might be the case that it also includes another type of background like a refugee or immigrant. For example, someone who has left their country for the Netherlands before they were 16, thereafter followed a higher vocational education and currently still lives here, passes the criteria to be allocated in this category. Yet, this individual is not the international graduate aiming for. Besides, this issue might also be prevalent in other categories but are assumed to be exceptions, which do not influence the results. Additionally, to illustrate the distribution of the graduate-background variable, *figure 3.1* was created. One can notice that the largest group is unsurprisingly natives by 84%, while the group of interest international graduates are among the smallest groups with 1%. Other significant groups are first- and second-generation migrants, respectively 3% and 5%.

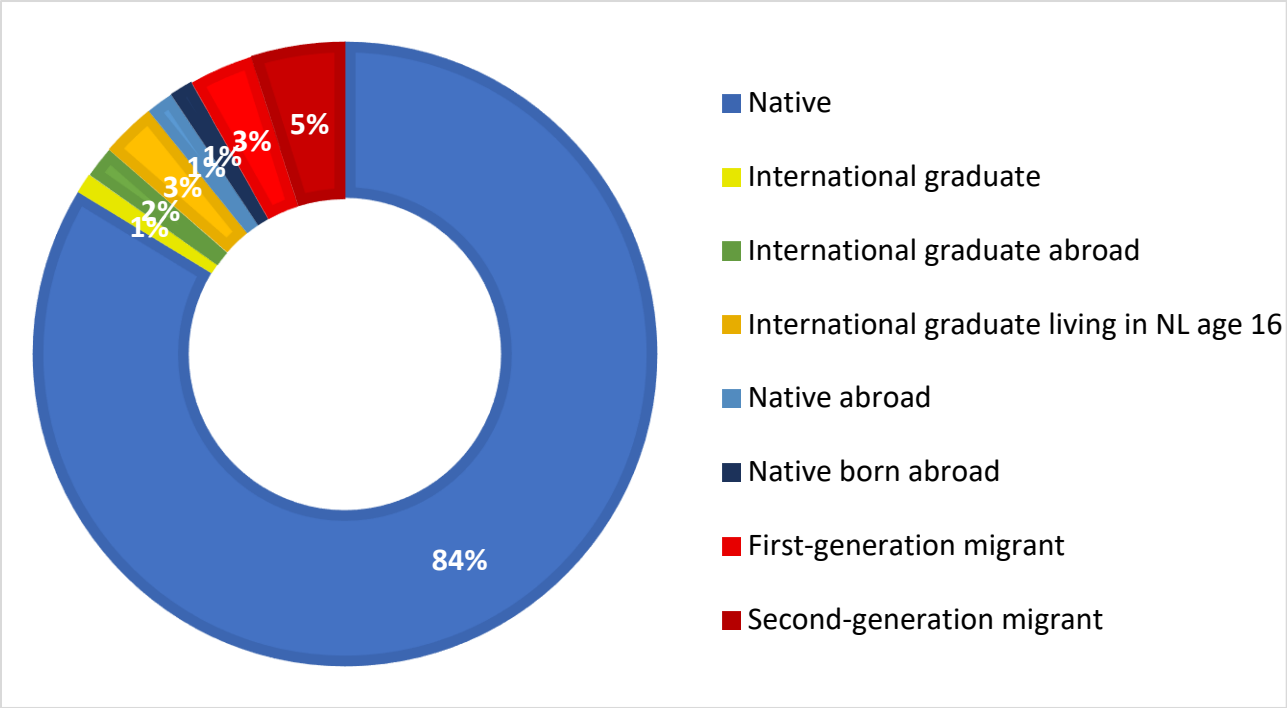

Figure 3.1: Distribution of Graduate-Background

3.3.2. Independent variables

Besides the fivefold dependent variables and the main independent variable, there are a number of additional independent variables that consistently return in the models. Most of these variables were identified in the literature, as described in section two. Furthermore, the variables are categorized into the following groups: personal, study, job, locational, and economic. In the next subsection, these groups are also used in the model specifications. Now, for each group the corresponding variables are discussed.

The personal characteristics consist of three variables: age, gender and graduation year. First, age represents the age of the graduate at the moment of taking the survey and ranges from 20-34. Thus, to know the age at the moment of graduation one and a half year should be deducted, since the survey is conducted approximately after that period of time. Secondly, the variable of gender is self-explanatory. Thirdly, the graduation year portrays the end of the academic year, in which the student finished their study and covers the period from 2005 until 2016.

Furthermore, under the educational characteristics reside the following variables: field of study, average grade, internship, relevant work experience, and board experience during study. The field of study variable consists of seven different fields. Moreover, the average grade ranges from 6 to 10 with an interval of 0,5. The grading in the Dutch higher education system ranges from 1 to 10, the higher the grade the better the performance. In order to graduate a minimum grade of six is required, explaining why the grade variable starts there. Then, the last three study variables are binary taking the form of either yes or no. These variables represent whether the graduate gained relevant experiences for their future career like an internship, board- and work experience.

Thereafter, the job characteristics follow consisting of five variables. First, a variable that indicates whether the graduate has a full-time (>32 hours) or part-time job. Secondly, a variable representing type of employment: permanent contract, temporary worker, assisting family member, self-employed, or otherwise. Thirdly, a variable for firm size ordered in classes, ranging from: 1-9, 10-99,

and >=100 persons. Fourth, a variable for the number of months unemployed until the first job, ranging from: 0, 1-3, 4-6, 7-12, >=13. The definition applied in the data set for unemployed is someone who does not have paid employment but is looking for it. At last, there is a binary variable indicating whether the graduate is looking for other paid employment, while currently having a job.

Additionally, there are a threefold of locational variables. Starting with the location of followed education, measured on a provincial level and categorized accordingly. The other two locational variables reveal information about mobility of graduates. One indicating mobility between the location of graduate's current job and where they followed their education. The other represents mobility based on the location of followed education and origin beforehand. The values of the mobility variables are categorized as: same province, bordering province, other provinces, or abroad.

Lastly, there is a variable controlling for business-cycle variation, as graduates from different years encounter other labor market conditions. This variable captures the regional graduate unemployment rate and is a self-constructed variable, based upon the work of Venhorst and Cövers (2018). Information and numbers are used from the primary data set (HBO monitor) but also secondary data from the CBS. The regional graduate unemployment rate is calculated as the percentage of graduates within the labor force but looking for paid employment and taken relative to the national unemployment rate. Also, it is classified by the province where the current living address of the graduate is located. In *Appendix I, table 6.1* contains the corresponding values for this variable.

Hitherto, the dependent and independent variables were presented. Below in *table 3.2*, a summary of the descriptive statistics is included. The variables are distinguished between continuous and categorical.

Continuous variables					
	Obs	Mean	Std. Dev.	Minimum	Maximum
ln(hourly wage)	96,033	2,635019	0,327887	-1,188186	5,31638
Age	96,033	24,61189	2,106636	20	34
Year	96,033	2010,675	3,4881	2005	2016
Average grade	96,033	7,145638	1,182108	1	9
GraduateUR	96,033	1,035371	0,2934297	0,22	3,7

Categorical variables							
	Freqenuecy	Percentage	Cumulative		Freqenuecy	Percentage	Cumulative
Vertical mismatch				***Field of education***			
no	84589	88.08	77.03	Agro&Food	3,269	3.40	3.40
yes	11444	11.92	100.00	Education	10,716	11.16	14.56
Horizontal mismatch				Beta	17,617	18.34	32.91
no	84118	87.59	76.54	Economics	37,292	38.83	71.74
yes	11915	12.41	100.00	Healthcare	13,149	13.69	85.43
Double mismatch				Social studies	13,617	14.18	99.61
no	85,421	88.95	88.95	Art	373	0.39	100.00
yes	10,612	11.05	100.00	***Internship***			
Jobsatisfaction				yes	94,872	98.79	98.79
satisfied	62,654	65.24	65.24	no	1,161	1.21	100.00
unsatisfied	33,379	34.76	100.00	***Work experience***			
Gender				no	48,662	50.67	50.67
male	39,726	41.37	41.37	yes	47,371	49.33	100.00
female	56,307	58.63	100.00	***Board experience***			
				no	79,226	82.50	82.50
				yes	16,807	17.50	100.00
Full-/Part-time				***Followed education (province)***			
full-time	59,315	61.77	61.77	Groningen	5,473	5.70	5.70
part-time	36,718	38.23	100.00	Friesland	5,155	5.37	11.07
Type of employment				Drenthe	685	0.71	11.78
paid employment	80,849	84.19	84.19	Overijssel	10,066	10.48	22.26
temporary worker	9,503	9.90	94.08	Gelderland	10,627	11.07	33.33
assisting family mer	331	0.34	94.43	Utrecht	9,901	10.31	43.64
self-employed	2,863	2.98	97.41	Noord-Holland	11,063	11.52	55.16
otherwise	2,487	2.59	100.00	Zuid-Holland	18,827	19.60	74.76
Firmsize				Zeeland	1,545	1.61	76.37
1~9	11,04	11.50	11.50	Noord-Brabant	17,206	17.92	94.29
10~99	28,339	29.51	41.01	Limburg	4,846	5.05	99.33
>=100	56,654	58.99	100.00	Flevoland	639	0.67	100.00
Months unemployed				***Job mobility***			
0 months	69,622	72.50	72.50	same province	56,501	58.83	58.83
1-3 months	14,588	15.19	87.69	bordering province	26,782	27.89	86.72
4-6 months	6,474	6.74	94.43	other province	9,546	9.94	96.66
7-12 months	3,621	3.77	98.20	abroad	3,204	3.34	100.00
>= 13 months	1,728	1.80	100.00	***Education mobility***			
Currently looking for another job				same province	56,932	59.28	59.28
yes	19,751	20.57	20.57	bordering province	28,138	29.30	88.58
no	76,282	79.43	100.00	other province	8,031	8.36	96.95
				abroad	2,932	3.05	100.00

Table 3.2: Descriptive statistics

3.4. Model specification

For the empirical analysis in the next section several statistical methods will be used. These are presented here in the following paragraphs. First, the model specifications for the four binary logistic regression are given. Thereafter, the specification for the OLS regression model is provided. Moreover, the model specifications are composed in such a way that they are able to yield an answer to the sub questions provided in the first section.

3.4.1. Binary logistic regression

The first type of statistical method applied is a binary logistic regression. This method is used to predict and explain the relationship between a binary dependent variable and the independent variables. As the name already suggests it requires a binary variable, meaning that it consists of only two possible outcomes coded as: 0 or 1.

In this study, four different binary dependent variables will be used separately, each in one statistical model. The first three models aim to predict the relationship between a type of mismatch and independent variables. Therefore, the dependent variables being used represent the vertical-, horizontal- and double mismatch. When the outcome is a mismatch it has the value of 1, if not then it is 'otherwise' with a value of 0. The dependent variables for the three mismatch models are outlined below:

$$y = \begin{cases} 0 & 'otherwise' \\ 1 & 'verticalmismatch' \end{cases} \quad y = \begin{cases} 0 & 'otherwise' \\ 1 & 'horizontalmismatch' \end{cases} \quad y = \begin{cases} 0 & 'otherwise' \\ 1 & 'doublemismatch' \end{cases}$$

Furthermore, the statistical models are built gradually in six stages. In every stage an additional characteristic group with the corresponding independent variables are added. Starting with the graduate-background, followed by the personal and study characteristic variables, and so on, as presented in the previous subsection. The model specifications take the general form noted as follows:

$$y = \beta_1 GraduateBackground + \beta_2 Personal + \beta_3 Study + \beta_4 Job + \beta_5 Location + \beta_6 Economic + e$$

where the dependent variable *y* is a binary variable indicating whether the graduate was experiencing a mismatch or otherwise, $\beta_1 GraduateBackground$ represents the graduate-background, $\beta_2 Personal$ stands for the personal characteristics, $\beta_3 Study$ consists of the study variables, $\beta_4 Job$ represents the job characteristics, $\beta_5 Location$ constitutes of the locational variables, $\beta_6 Economic$ controls for the business-cycle, and *e* denotes the error term.

In the fourth model, the dependent variable is also a binary variable representing job satisfaction of the graduate. Here the consequential relationship between job satisfaction and independent variables are explored. The binary dependent variable takes the following form:

$$y = \begin{cases} 0 & 'satisfied' \\ 1 & 'unsatisfied' \end{cases}$$

For this model, the specification is almost identical to that of the three mismatches. Yet, two additional components are included. First, the three different dependent variables for mismatch are now incorporated as independent variables and reside under the group 'mismatch'. Secondly, the natural logarithm of hourly wage is added to the group of economic variables. Finally, these additions result in the following model specification:

$$y = \beta_1 Mismatch + \beta_2 GraduateBackground + \beta_3 Personal + \beta_4 Study + \beta_5 Job + \beta_6 Location + \beta_7 Economic + e$$

where the dependent variable *y* is a binary variable indicating job satisfaction of the graduate, $\beta_1 Mismatch$ consists of the variables for vertical-, horizontal- and double mismatch. All other $\beta etas$ remain identical as in the previous specification. Only $\beta_7 Economic$ now also includes the natural logarithm of hourly wage. In the last model, the logarithmic hourly wage is taken as the dependent variable. Additionally, this variable is already included in this model specification following the example in the literature (Allen & Van der Velden, 2001), because the wage is expected to influence the job satisfaction.

3.4.2 OLS Regression

In order to provide an estimation of the consequential relationship between the hourly wage of a graduate and the independent variables, an Ordinary Least Squares (OLS) regression is applied. Again, the model specification follows the same general form as those discussed previously and consists of the same independent variables. Below the specification for the hourly wage model can be observed:

$$Ln\,(y) = a + \beta_1 Mismatch + \beta_2 GraduateBackground + \beta_3 Personal + \beta_4 Study + \beta_5 Job + \beta_6 Location + \beta_7 Economic + e$$

where *y* represents the logarithmic hourly wage of the graduate, *a* denotes the constant, $\beta_{1-}\beta_6$ have the same description has previously noted, $\beta_7 Economic$ still consists of the graduate unemployment, while hourly wage and job satisfaction have swapped places.

Since, the dependent variable is a natural logarithm its interpretation of coefficients is on a log-level scale. This means that the coefficients must be exponentiated, followed by subtracting one from this number and then multiplied by 100%. This can be written in the following formula:

$$\Delta y = (e^x - 1)^* 100\%$$

where Δy is the percentual change in the graduates' hourly wage, *e i*s the exponent and *x* the coefficient. Consequently, the results can be interpreted as percentages of increase or decrease in the hourly wage of the graduate. Furthermore, the OLS regression has several assumptions. First, the error-term should be normally distributed. In *Appendix II, figure 6.3* portrays the plot of the residuals and proves to meet this assumption. Secondly, the assumption of heteroskedasticity should not be violated. In order to remedy this potential issue, a robust regression is executed by means of a weighting factor.

To conclude, this third section has provided the research design. Therein, dependent and independent variables were introduced. Thereafter, the model specifications were presented. The first model specification consists of the three types of mismatch and aims to answer the sub question of what determinants of a mismatch are. Moreover, the other two model specifications are aimed to answer the sub question concerning the consequences of a mismatch. The next section contains the empirical analysis, which examines the results of the statistical models.

4. Empirical results

In this section, results of statistical models are presented and examined. Starting by discussing the distribution of mismatch among graduates in higher vocational education using *figure 4.1 & 4.2*. Thereafter, regression results of the five models will be discussed using *table 4.1.* The order of the models in the table are as follows: vertical mismatch, horizontal mismatch, double mismatch, job satisfaction and hourly wage. For the complete tables including all stages *Appendix III* can be consulted.

In order to know to what extent education-job mismatch exist among graduates of Dutch higher vocational education *figure 4.1* was created. In the figure there are four different lines, the upper blue line represents the total percentage of mismatch among graduates and the three at the bottom each illustrate a type of mismatch. At the beginning of the period, the percentage of horizontal mismatch is highest but taken over the whole period it remains relatively constant. Regarding the vertical and double mismatch there is a decreasing trend at the start, but from 2008 there is an increasing trend where it surpasses the horizontal mismatch. This same year also marks the start of the global financial crisis, reaching its worst year in 2012, in Europe. The peak visible in the combined mismatch line illustrates this well. Thereafter, a decreasing trend for the double and vertical mismatch among graduates starts. Surprisingly, the horizontal mismatch remained rather constant during the crisis, while thereafter it even slightly increases. All in all, from *figure 4.1* it can be concluded that graduates before and after the crisis were experiencing mismatch to the same extent.

Furthermore, *figure 4.2* portrays the distribution of mismatch according to graduate-background. Judging from the combined percentage of mismatch, international graduates have relatively low levels of mismatch. Besides, for the group of international graduates abroad the incidence of mismatch is even the lowest, specifically for double mismatch. In contrast, first- and second-generation migrants score the highest rates of mismatch. The results in the statistical models will further shed a light on how graduate-background influences the education-job mismatch.

Before the analysis of results will be conducted, there are some properties of a logistic regression requiring explanation. Starting with coefficients in the models. Since the statistical method is a logistic regression, coefficients would initially be presented in log-coefficients. Yet, for practicality of the interpretation of coefficients they are given as odds ratios. This implies that coefficients with a value between 0 and 1 should be interpreted as 'being less likely' to experience the outcome represented by the dependent variable. Whereas, values larger than one should be read as 'more likely' to experience the result of the binary dependent variable. In this case, the interpretation should be read as the odds ratio to experience a mismatch. Moreover, the stars indicate the significance levels. The significant levels being applied are * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$. Also, the numbers in parentheses represent the z-value. This can be seen as an indication for the importance of coefficients in relation to the dependent variable. A large positive or negative value suggests a higher relevance. Also, results in the wage model are somewhat different because an OLS regression is performed. Therefore, as explained in the previous section, coefficients should be interpreted as percentage increase or decrease when it is a positive or negative value.

Besides, the Pseudo R^2 and Adjusted R^2 indicate whether the models fit the data and how well variables explain or predict the dependent variable. This feature can be used to compare between models but also between different stages within. In the bottom rows of *table 4.1* the Pseudo R^2 and Adjusted R^2 are provided. Considering the three mismatch models, the Pseudo R^2 for double

mismatch is highest and shows that 16.8% can be explained by variables in the model. For the vertical and horizontal mismatch model values are somewhat lower, respectively 9.6% and 7.6%. The job satisfaction model shows the highest value by 20.2%. In the wage model the Adjusted R^2 is provided because it is an OLS regression. The value denotes 0.172 meaning that it is able to predict 17.2% of the variability in wages.

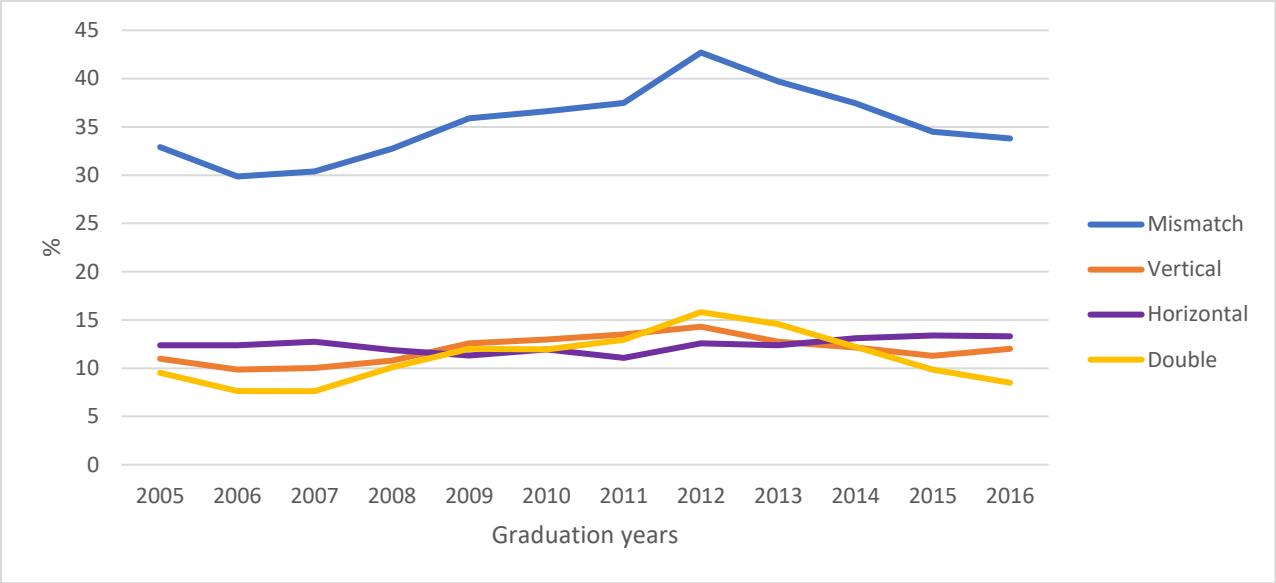

Figure 4.1: Distribution of mismatch over the years in %

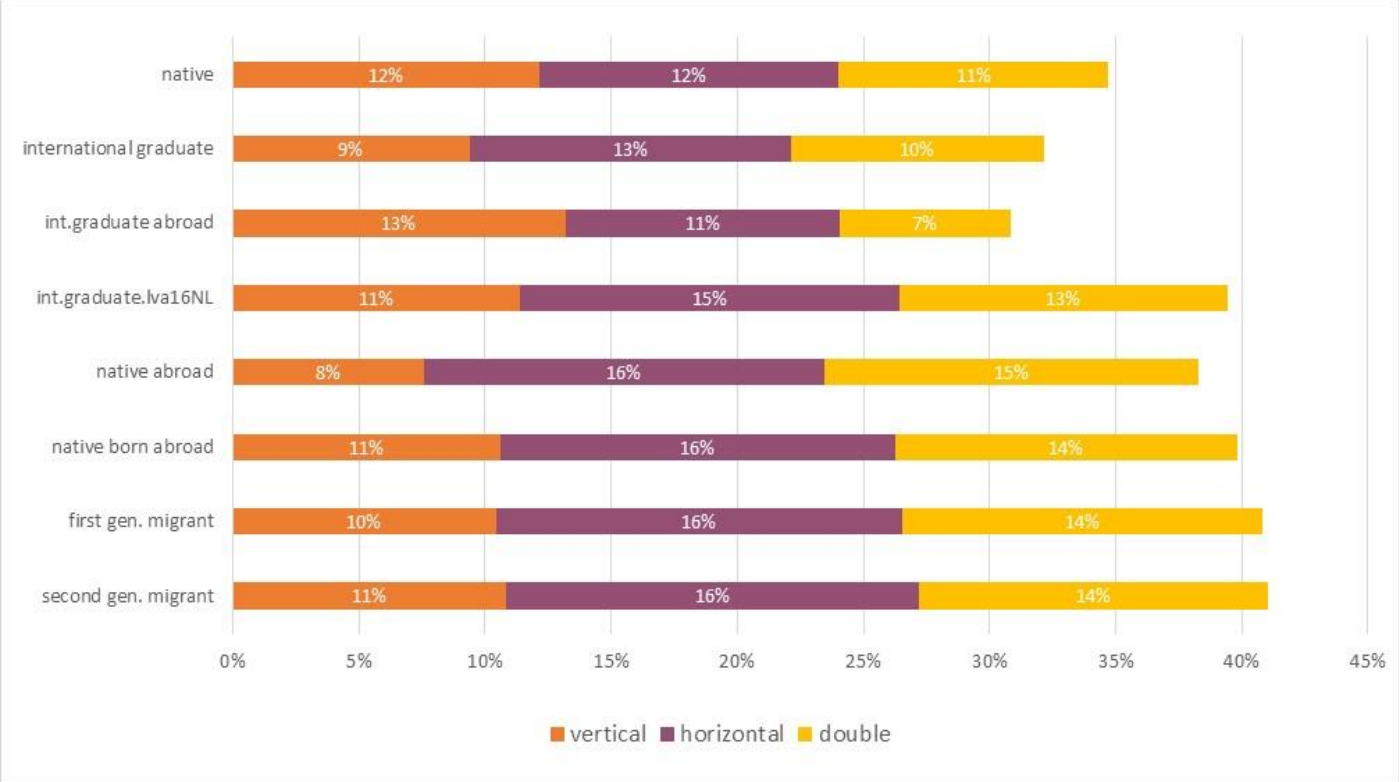

Figure 4.2: Distribution of mismatch according to graduate-background

4.1. Analysis of results

Results of the statistical analyses are summarized in *table 4.1*. The table contains five columns, each representing the last stage of the five models. The first three columns present results for mismatch models and are aimed to find determinants of a mismatch. Thereafter, in the fourth and fifth column results of the job satisfaction and wage model are presented and have the goal to identify consequences of a mismatch. The analysis of results starts by evaluating outcomes for the key variable, the graduate-background. This key variable contains international graduates, the main group of interest in this thesis. Thereafter, multiple control variables are examined grouped by personal, educational, occupational and locational characteristics.

4.1.1. Key variable: Graduate-background

The graduate-background distinguishes in the type of graduate. The reference group is native graduates. Results will be analyzed individually for each group of graduates starting by the main group of interest, international graduates. Unfortunately, outcomes for international graduates are in most models insignificant. Hence, no decisive statements can be made. Only in the horizontal mismatch model, the coefficient is just significant and indicates that international graduates are less likely to experience a horizontal mismatch than natives. However, this claim has to be taken lightly considering the significance level. Therefore, based on these outcomes no link can be made to the labor market position of international graduates who remained to work in the Netherlands.

Furthermore, results for the other group of international graduates who went abroad are only significant in the job satisfaction model. These show that international graduates abroad are significantly more likely to be unsatisfied in their jobs than natives. This outcome actually proves as discouraging for international graduates to go abroad and start working there. It is not a rational decision to choose a job abroad in order to end up unsatisfied working there. Although, graduates do not know this beforehand and other factors like family reunion might outweigh the job dissatisfaction. Other than job satisfaction it is not possible to draw conclusions for international graduates abroad.

The last group consisting of international graduates are those who already lived in the Netherlands before they were sixteen of age. Results demonstrate that this group is less likely to be vertically mismatched and have higher earnings than natives. These are favorable outcomes indicating a good labor market position. Now that all groups of international graduates have been discussed, we move to the groups of native graduates other than the reference category.

Results for native graduates who went abroad demonstrate that they are significantly less likely to experience a vertical mismatch. However, simultaneously these graduates are also considerably more likely to experience a double mismatch. These results are contradictive because a vertical mismatch is required for the double mismatch. Therefore, one would not expect to have both these outcomes. An explanation could be that in practice natives either go abroad for work because they got a good job offer matching their education level or that they work abroad not minding a complete mismatch and doing it for the experience abroad. Besides, the value in the wage model shows that this group has lower earnings. This can be linked to the wage levels in labor markets abroad, which are in most cases considerably lower than in the Netherlands. For the other category, natives who are born abroad, coefficients are slightly significant. There is some evidence that they are more likely to experience a horizontal and double mismatch.

The last two graduate-background categories include first- and second-generation migrants. Results for first-generation migrants demonstrate that they are less likely to experience a vertical mismatch.

For job satisfaction the outcome shows that they are more likely to be unsatisfied. However, the coefficient in the wage model surprisingly shows that first-generation migrants have higher earnings. The first and latter results are in contrast with findings in the literature. Aleksynska and Tritah (2013) found that migrants tend to frequently experience mismatches and are both over- and undereducated in comparison to natives. Besides, Joona et al. (2014) found that migrants have lower earnings than natives. Another contradiction can be noticed in job dissatisfaction and hourly wage. Even though earnings of first-generation migrants are high, they are still unsatisfied. When the values of job satisfaction and wage are considered as independent variables, it becomes clear that higher wage is associated with lower chance to be dissatisfied in jobs and job dissatisfaction is associated with lower wages. Yet, outcomes for first-generation migrants their job satisfaction and wage are contradictive. The job dissatisfaction could arise from other factors, like an ethnic penalty that was found in the research by Falcke et al. (2016). However, except for the job satisfaction results show positive outcomes and demonstrate that first-generation migrants are finding jobs matching their education level with a good hourly wage.

Moreover, results for graduates who are considered to be second-generation migrants show that they are also less likely to be vertically mismatched. Yet, for the horizontal and double mismatch there is a higher likelihood to experience these. Also, the coefficient in the wage model illustrates that earnings of second-generation migrants are lower and can be evidence that this group experiences an ethnic penalty. These findings are indeed in line with the research of Falcke et al. (2016), except the outcome for vertical mismatch. Thus, second-generation migrants have a higher chance to be horizontally and double mismatched with lower wages, which is an undesirable position.

4.2. Control variables

The control variables are categorized as personal, educational, occupational and locational characteristics. Additionally, for the job satisfaction and wage model there are variables included that control for types of mismatch.

4.2.1. Personal

The personal characteristics include age, gender and graduation year. The outcomes for age are significant in all models. Graduates who are older when graduating are less likely to experience a vertical and double mismatch, while for the horizontal mismatch there is a higher chance. Also, older graduates are more likely to be dissatisfied in their jobs. Besides, there is evidence that older graduates have higher earnings even though the education level is the same.

Furthermore, the gender variable finds significant evidence that female graduates are more likely to experience a vertical mismatch than male graduates. This is in line with the findings of Hensen et al. (2009), and Leuven and Oosterbeek (2001). Yet, when it comes to the horizontal mismatch, females are less likely to experience this type of mismatch than males. This same outcome was also found in the work of Wolbers (2003). This is an interesting outcome and raises curiosity for the distribution of gender and field of study. Therefore, in *appendix IV* a cross tabulation can be found with additional information and elaboration upon this finding. Moreover, the outcome that females are more likely to experience a vertical mismatch also raises several questions. For example, could it be that women are more often overeducated than men, taking jobs below their education level because they are limited to locational labor markets as they are ‘tied movers’ (Leuven & Oosterbeek, 2011). Unfortunately, as stated before in the previous section, the vertical mismatch indicator is limited in providing any further information on either under- or overeducation. Also, considering the wage model it was found that women are earning less than their male counterparts. This could be an

indication of wage discrimination regarding gender, since the education level of graduates are identical and other factors are controlled for. All in all, it can be concluded that female graduates are more frequently vertically mismatched but often work in fields matching their education, yet their wages are lower.

The last variable residing under personal characteristics is the graduation year. In all models an interesting trend is visible, which can be linked to a certain phenomenon. That is the global financial crisis (2008-2011), which later transformed into the European financial crisis (2010-2014). In the pre-crisis years before 2008, graduates were less likely to experience vertical and double mismatches, and wages were higher. The negative effects of the crisis first started to become visible in wages, which started to decrease in 2010 and remained to be lower than the pre-crisis period. From 2011 onwards, graduates were strongly more satisfied in their jobs. This might be explained by the fact that graduates are more grateful for having a job during economic downturns, while many others became unemployed or are unable to find a job. In 2012, the impacts of the crisis were the harshest. Consequently, graduates in this year were significantly more likely to experience vertical and double mismatches, and have considerable lower wages. The peak of mismatch among graduates during this year is also visible in *figure 4.1*. In the post-crisis years 2015-2016, graduates more easily found jobs matching their education level and were also less likely to be double mismatched. Yet, the likelihood to experience a horizontal mismatch increased indicating that graduates were working in different fields than their educational field.

4.2.2. Education

The educational characteristics consists of field of study, average grade, and experiences during study. Considering the outcomes for the field of study in the vertical mismatch model, only the field of teaching has a lower likelihood for a vertical mismatch. For all other fields of study there is a higher likelihood to be vertically mismatched than the reference field of economics. This is especially true for graduates in the field of social studies. Results in the horizontal mismatch model demonstrate that all graduates with fields of study other than economics are less likely to experience this type of mismatch. The field of economics was deliberately chosen as a reference category because graduates in this field are known to end up in a wide variety of jobs. Concerning the double mismatch, graduates with fields of study other than economics are found to have a lower likelihood for this mismatch. Thus, graduates who studied economic related fields are most likely to experience a double mismatch. The field agriculture and food shows to be insignificant. In the job satisfaction model, all other fields than the reference field prove to be more satisfied with their jobs. Again, graduates with an economic background are more likely to be dissatisfied. Furthermore, results in the wage model illustrate that there are three fields with higher earnings. These are healthcare, beta and social studies. Specifically, graduates who studied a field related to healthcare have considerably higher earnings. Taking the outcomes into account of the three mismatch models, the best performing field of study with the lowest likelihood for a mismatch is the teaching field. Besides, the healthcare field proves to be the best field considering all models except for the vertical mismatch. However, it could be the case that graduates working in healthcare are performing jobs above their education level but the vertical mismatch indicator is unable to provide this information.

The average grade variable proves to be significant in the vertical and double mismatch model. Graduates with higher average grades are less likely to experience these types of mismatch. Also, the positive value in the wage model shows that higher grades lead to somewhat higher earnings, which is in line with the findings of Chevalier (2003). Thus, school performance is indeed important for the future career of students as found by Naguib et al. (2019).

Furthermore, there is a threefold of variables representing experiences during study. Graduates who did not follow an internship during their study are considerably more likely to be vertically mismatched and unsatisfied in their job but have higher hourly wages. The latter is an unexpected outcome and cannot easily be explained. A possible argument is that the average hourly wage of the small share of graduates who did not follow an internship is higher than those who did an internship. Moreover, graduates with no relevant work experience during their study are less likely to experience a vertical mismatch but have a higher likelihood for a horizontal and double mismatch. Considering, job satisfaction and wage levels both prove to be lower. Additionally, graduates with no board experience are more likely to be vertically mismatched but less likely to be horizontally mismatched, while their job satisfaction and wage levels are lower. For the experience during study variables it is difficult to find clear patterns. Relevant work experience mainly shows to be important as graduates who do not have this, experience the most negative outcomes.

4.2.3. Job

The job characteristics are formed by the following variables: full- or part-time job, type of employment, firm-size, months unemployed and job search. The first indicator represents whether the graduate works in a full- or part-time job. Results demonstrate that graduates in part-time jobs have a lower likelihood for a horizontal mismatch but are more likely to experience a vertical and double mismatch. The values for the double mismatch model are particularly high, indicating that this variable is a strong determinant for this type of mismatch. Besides, graduates with part-time jobs are more likely to be unsatisfied than graduates with full-time jobs. This is not surprising since a full-time job is desirable for most persons because of the certainty it provides. However, the coefficient for hourly wage shows that part-time work earns more than full-time work. In general, full-time jobs have a higher monthly income than part-time jobs because they are working more hours. Yet, when hourly wage is taken into account, apparently graduates in part-time jobs earn more in one hour of work.

Furthermore, there is the type of employment variable with the reference category permanent contract. Graduates who are temporary workers are more likely to experience a horizontal and double mismatch, and have lower job satisfaction and wage levels. Assisting family members have a higher likelihood for a vertical and double mismatch, and higher job satisfaction levels, while their hourly wage is lower. It is surprising that assisting family members have high levels of job satisfaction. An explanation for this result could be that they are more satisfied in their jobs because it serves a getaway from their daily tasks at home. Moreover, for the self-employed graduates it is found that they are less likely to be vertically and double mismatched but more likely to experience a horizontal mismatch. As a reminder, the vertical mismatch is measured as the attained level of education and level as required by their employer. Ironically, the self-employed are their own employer implying that they can set these requirements themselves. Therefore, it would be odd if they regard themselves over- or underqualified for their jobs. Also, there is strong evidence that the self-employed are very satisfied in their jobs. This outcome matches with statements that are often made about being your own boss and scheduling working time yourself leads to higher job satisfaction.

The firm size variable illustrates that generally graduates who work in firms larger than the reference category (1-9 persons) are more likely to be vertically mismatched but less likely to be horizontally mismatched. Considering the vertical mismatch, a smaller firm cannot afford workers who are working below or above their education level because they are associated with lower productivity and inefficiency (Somers et al., 2019). Also, in smaller sized firms employees might have to do varying tasks that require different fields, which explain the higher likelihood of a horizontal mismatch in a

small firm. Additionally, graduates in medium sized firms (10-99) are also more likely to experience a double mismatch. The coefficients in the wage model demonstrate that a larger firm-size also means a higher hourly wage for its employee.

For the time that graduates spent in unemployment before finding their first job there are varying outcomes in each model. In the vertical mismatch model there is a higher likelihood to be vertically mismatched if the graduate is longer unemployed than the reference category of zero months. This is probably due to the fact that graduates are lowering their criteria for jobs and are willing to take positions below their education level or in another field, instead of being unemployed. Graduates could view this as a temporary solution and while being in a mismatched job continue to search for a matching one, the next variable controls for this. Moreover, results surprisingly show that graduates who spent thirteen months or more in unemployment are less likely to experience a vertical and horizontal mismatch. However, for the double mismatch this category shows a significant large value in the opposite direction. Thus, graduates who are unemployed for longer than thirteen months either find a well matching job or are completely mismatched. Besides, in the job satisfaction and wage model the values illustrate that graduates who immediately start working are more satisfied in their job and have higher earnings. The coefficient in the wage model shows a pattern that corresponds with the reservation wage of graduates. For each category representing a longer time in unemployment, the hourly wage gradually decreases. This means that graduates become willing to work for a lower wage the longer they are unemployed.

The last variable residing under the job characteristics is an indicator for whether a graduate is looking for another job. Those who are not looking for another job are significantly less likely to experience a vertical and double mismatch. The coefficient in the job satisfaction model shows to be

the strongest value and proves to be inherently linked to job satisfaction. Obviously, graduates who are not looking for a job are more likely to be satisfied and have higher earnings than those who are. Thus, graduates searching for another job are very likely to be unsatisfied and are earning less explaining why they are doing so in the first place. Among graduates it is possible that they accept non-matching jobs as an alternative to being unemployed and view this as a temporary solution (Sicherman, 1991). Meanwhile, they are searching for another job that matches their educational profile.

4.2.4. Location

The first locational variable represents the provinces where graduates followed their education. In the vertical mismatch model coefficients show that graduates who did not follow their education in the province of Groningen are more likely to be vertically mismatched. Concerning the horizontal mismatch, graduates who studied in the provinces of Overijssel, Gelderland, Zeeland and Limburg have a lower likelihood to experience a horizontal mismatch than those who did in Groningen. Also, graduates who followed their education in Overijssel, Utrecht and Zuid-Holland are less likely to experience a double mismatch. Considering job satisfaction, graduates who studied in Friesland, Overijssel, Zeeland and Noord-Brabant are more likely to satisfied in their jobs. In the wage model there are three provinces with coefficients indicating a higher wage for graduates who studied there, namely Utrecht, Noord-Holland and Zuid-Holland. These provinces together represent the Randstad area, which is the economic center of the Netherlands. Therefore, in this area wages are higher because there is a larger and thicker labor market. People who studied in the Randstad tend to stay and work there after graduating, which is the reason why their earnings are higher.

Moreover, there is a twofold of indicators regarding mobility of graduates. The first variable represents mobility between the location of followed education and current job. Graduates who are now working abroad are more likely to experience a vertical mismatch than those who work in the same province where they studied. Regarding the horizontal mismatch, graduates working in a other provinces than the province of followed education have a higher likely likelihood for this type of mismatch. This finding is in line with the outcome in the study of Hensen et al. who found that "geographic mobility negatively impacts the probability of finding a job within one's study field" (2009, p.673). In the double mismatch, coefficients demonstrate that mobile graduates who did not stay in the same province are less likely to experience a double mismatch. Additionally, the wage model finds that more mobile graduates are earning more than those who studied and work in the same province, which is in line with the findings of Hensen et al. (2009). Judging from the models, there is only significant evidence that more mobile graduates are less likely to experience a double mismatch and have higher earnings.

The other mobility variable represents mobility of graduates between the location of followed education and origin. The coefficients in the horizontal mismatch model demonstrate that graduates who were mobile before their study are more likely to experience a horizontal and double mismatch. Also, those who came from bordering provinces have a slightly lower hourly wage than graduates who study in the same province. These results illustrate that graduates who are more mobile before their education are more likely to experience mismatches and have lower earnings. This is a somewhat unexpected result and in contrast to the other mobility variable. A possible theory explaining this finding could be that since these graduates were already mobile before their education, thereafter they are not keen on moving again. This might especially be true for individuals who moved from peripherical locations to urban areas. However, the data set is constrained in the ability to provide further information regarding location specifics for the origin of the graduates.

4.2.5. Mismatch

In order to confirm effects of a mismatch on job satisfaction and wage, the three dependent variables of the mismatch models are included as independent variables in the other two models. In the literature there are many studies that explored the relationship of a mismatch and job satisfaction, which proved to have a negative impact (Allen & Weert, 2007; Robst, 2007). Not surprisingly that results in the job satisfaction model confirm that mismatched graduates are more likely to be unsatisfied than their well-matched counterparts. Specifically, among the double mismatched graduates a strong negative effect on their job satisfaction levels is found.The vertical mismatch affects job satisfaction to a slightly lower extent, while the horizontal mismatch has the lowest negative impact but is still considerable. Additionally, in the job satisfaction model hourly wage was also added to confirm the positive relationship. The coefficient shows that for every unit increase in wage the odds ratio to be unsatisfied in the job decreases. Thus, higher earnings are associated with higher levels of job satisfaction.

Furthermore, in the literature effects of a mismatch on earnings has been extensively investigated and showed to have a negative impact on income of people (Allen & Van Der Velden, 2001; Hartog, 2000; Leuven & Oosterbeek, 2011; Robst, 2007). The findings in the wage model confirm this, graduates who are experiencing a double mismatch have the lowest hourly wage, followed by vertically mismatched graduates, while the horizontally mismatched graduates are the least affected. This shows a similar pattern regarding the severity of the type of mismatch as in the job satisfaction model.

	Vertical (Logistic)	**Horizontal** (Logistic)	**Double** (Logistic)	**Job dissatisfaction** (Logistic)	**Log hourly wage** (OLS)
Graduate-background					
Ref=Native					
International graduate	1.129|(0.49)	**0.683*|(-1.92)**	0.696|(-1.54)	1.236|(1.32)	-0.021|(-0.95)
International graduate abroad	0.936|(-0.25)	0.827|(-0.87)	0.759|(-1.00)	**1.602***|(2.63)**	-0.023|(-0.88)
Int.graduate.lva16NL	**0.846**|(-2.42)**	1.106|(1.63)	0.962|(-0.59)	1.039|(0.76)	**0.030***|(4.82)**
Native abroad	**0.538***|(-3.50)**	1.201|(1.34)	**1.834***|(3.59)**	0.977|(-0.19)	**-0.054***|(-2.61)**
Native born abroad	0.891|(-1.05)	**1.220**|(2.13)**	**1.193*|(1.69)**	1.105|(1.34)	-0.012|(-1.03)
First-generation migrant	**0.747***|(-4.32)**	1.049|(0.85)	0.943|(-0.93)	**1.256***|(4.70)**	**0.030***|(4.66)**
Second-generation migrant	**0.826***|(-3.45)**	**1.247***|(4.85)**	**1.145**|(2.56)**	1.045|(1.12)	**-0.012***|(-2.59)**
Personal					
Age	**0.984***|(-2.74)**	**1.046***|(8.39)**	**0.982***|(-2.92)**	**1.042***|(9.27)**	**0.020***|(36.33)**
Gender. Ref=male	**1.348***|(10.40)**	**0.943**|(-2.37)**	0.970|(-1.06)	1.006|(0.30)	**-0.055***|(-21.43)**
Year. Ref= 2005					
2006	**0.877**|(-2.19)**	1.006|(0.11)	**0.836***|(-2.73)**	0.971|(-0.72)	**0.015***|(2.80)**
2007	**0.863**|(-2.56)**	1.050|(0.92)	**0.818***|(-3.17)**	1.013|(0.31)	**0.028***|(5.51)**
2008	0.936|(-1.14)	0.929|(-1.32)	1.009|(0.14)	0.987|(-0.31)	**0.018***|(3.45)**
2009	1.053|(0.93)	**0.903*|(-1.84)**	**1.106*|(1.68)**	0.997|(-0.08)	-0.006|(-1.21)
2010	**1.099*|(1.76)**	0.930|(-1.39)	1.023|(0.40)	0.962|(-0.97)	**-0.020***|(-4.00)**
2011	1.079|(1.41)	**0.901*|(-1.92)**	**1.132*|(2.12)**	**0.851***|(-3.97)**	**-0.047***|(-8.94)**
2012	**1.174***|**(2.98)	0.977|(-0.43)	**1.249***|**(3.92)	**0.792***|(-5.70)**	**-0.093***|(-17.55)**
2013	0.984|(-0.29)	1.034|(0.62)	**1.228***|**(3.61)	**0.818***|(-4.94)**	**-0.087***|(-16.57)**
2014	0.956|(-0.82)	1.054|(1.01)	1.028|(0.48)	**0.741***|(-7.36)**	**-0.094***|(-18.18)**
2015	**0.826***|(-3.46)**	**1.117**|(2.15)**	**0.868**|(-2.36)**	**0.748***|(-7.17)**	**-0.067***|(-13.64)**
2016	**0.903*|(-1.72)**	**1.146***|(2.63)**	**0.809***|(-3.29)**	**0.748***|(-6.91)**	**-0.048***|(-9.57)**
Education					
Field of study. Ref=Economics					
Agriculture & Food	**1.573***|(6.29)**	**0.580***|(-8.07)**	0.983|(-0.26)	**0.737***|(-5.55)**	-0.012*|(-1.65)
Teaching	**0.544***|(-10.98)**	**0.176***|(-30.27)**	**0.215***|(-27.52)**	**0.665***|(-12.63)**	0.004|(0.91)
Beta	**1.207***|(4.92)**	**0.416***|(-27.24)**	**0.542***|(-16.30)**	**0.860***|(-5.93)**	**0.024***|(7.58)**
Healthcare	**1.663***|(14.01)**	**0.236***|(-30.42)**	**0.191***|(-31.54)**	**0.608***|(-16.68)**	**0.096***|(25.09)**
Social studies	**3.947***|(43.08)**	**0.358***|(-23.00)**	**0.423***|(-20.88)**	**0.754***|(-9.45)**	**0.010***|(2.64)**
Art	0.946|(-0.27)	**0.633***|(-2.74)**	**0.574***|(-3.23)**	**0.778*|(-1.79)**	-0.022|(-1.10)
Average grade	**0.889***|(-11.50)**	0.987|(-1.37)	**0.864***|(-13.05)**	0.991|(-1.18)	**0.007***|(8.14)**
Internship. Ref= yes	**2.037***|(8.23)**	0.960|(-0.41)	1.118|(0.96)	**1.193*|(2.36)**	**0.029***|(2.61)**
Work experience. Ref=yes	**0.872***|(-5.93)**	**1.120***|(5.12)**	**1.403***|(13.48)**	**1.063***|(3.51)**	**-0.007***|(-3.06)**
Board experience. Ref=yes	**1.279***|(-7.13)**	**0.875***|(4.80)**	1.012|(-0.34)	**1.067***|(-2.78)**	**-0.008*|(2.57)**
Job					
Full-/Part-time. Ref=Full-time	**1.285***|(9.74)**	**0.690***|(-13.18)**	**3.358***|(40.24)**	**1.332***|(13.98)**	**0.050***|(16.84)**
Type of employment. Ref=permanent					
Temporary worker	1.028|(0.73)	**1.529***|(11.81)**	**2.002***|(20.95)**	**1.520***|(13.73)**	**-0.116***|(-26.91)**
Assisting family member	**2.216***|(3.74)**	1.213|(1.17)	**2.695***|(6.66)**	**0.660***|(-2.98)**	**-0.124***|(-3.49)**
Self-employed	**0.613***|(-5.12)**	**1.628***|(7.97)**	**0.546***|(-6.73)**	**0.475***|(-12.22)**	0.000|(0.01)
Otherwise	**0.675***|(-5.16)**	**1.313***|(4.10)**	0.994|(-0.08)	0.979|(-0.37)	**-0.157***|(-14.63)**
Firm-size. Ref=1-9					
10-99	**1.326***|(5.90)**	**0.881***|(-3.17)**	**1.176***|(3.49)**	1.041|(1.27)	**0.021***|(4.81)**
>=100	**1.726***|(12.27)**	**0.837***|(-4.74)**	1.072|(1.58)	0.973|(-0.91)	**0.077***|(18.73)**
Months unemployed. Ref=0					
1-3	**1.124***|(3.70)**	1.037|(1.21)	**0.827***|(-5.33)**	**1.115***|(4.59)**	**-0.013***|(-4.52)**
4-6	**1.161***|(3.44)**	**1.136***|(3.13)**	1.047|(0.98)	**1.104***|(2.94)**	**-0.044***|(-10.17)**
7-12	**1.122*|(2.01)**	1.077|(1.35)	**1.251***|(4.03)**	**1.081*|(1.74)**	**-0.076***|(-11.76)**
>= 13	**0.802*|(-2.54)**	**0.790***|(-2.62)**	**3.356***|(19.69)**	1.072|(1.03)	**-0.114***|(-10.31)**
Looking for another job.R=yes	**0.685***|(-13.74)**	0.971|(-1.04)	**0.327***|(-42.46)**	**0.122***|(-96.58)**	**0.033***|(9.75)**

Table 4.1: summarized regression results of last stage for each model

Location					
Followed education.					
Ref=Groningen					
Friesland	**1.378***|(4.76)**	0.939|(-1.00)	**1.137*|(1.84)**	**0.895**|(-2.14)**	**-0.020***|(-3.16)**
Drenthe	0.756|(-1.28)	**0.744*|(-1.86)**	0.849|(-0.89)	0.854|(-1.31)	0.002|(0.15)
Overijssel	**1.348***|(5.00)**	**0.796***|(-3.85)**	**0.869**|(-2.16)**	**0.877***|(-2.92)**	**-0.011*|(-1.95)**
Gelderland	**1.162**|(2.54)**	**0.782***|(-4.04)**	0.931|(-1.10)	0.934|(-1.52)	-0.001|(-0.14)
Utrecht	1.003|(0.05)	0.911|(-1.59)	**0.831***|(-2.81)**	0.996|(-0.08)	**0.029***|(4.74)**
Noord-Holland	**1.131**|(1.99)**	**1.107*|(1.80)**	0.966|(-0.55)	1.000|(0.00)	**0.024***|(3.98)**
Zuid-Holland	1.006|(0.11)	**1.101*|(1.77)**	**0.875**|(-2.19)**	0.957|(-1.05)	**0.018***|(3.29)**
Zeeland	**1.473***|(3.47)**	**0.645***|(-3.74)**	0.941|(-0.52)	**0.773***|(-3.13)**	-0.006|(-0.60)
Noord-Brabant	**1.258***|(3.93)**	0.916|(-1.62)	0.923|(-1.31)	**0.907**|(-2.29)**	-0.001|(-0.23)
Limburg	**1.159**|(1.98)**	**0.826***|(-2.79)**	1.029|(0.37)	0.947|(-0.99)	**0.012*|(1.82)**
Flevoland	**1.465**|(2.04)**	0.819|(-1.12)	1.091|(0.46)	0.876|(-0.92)	-0.021|(-1.09)
Job mobility					
Ref=same province					
Bordering province	0.955|(-1.55)	1.041|(1.34)	**0.863***|(-4.74)**	0.973|(-1.22)	**0.014***|(5.09)**
Other province	**0.917*|(-1.89)**	**1.221***|(4.86)**	**0.796***|(-4.67)**	0.979|(-0.65)	**0.012***|(3.05)**
Abroad	**1.556***|(3.45)**	1.070|(0.61)	0.826|(-1.28)	0.954|(-0.50)	-0.018|(-1.19)
Education mobility.					
Ref=same province					
Bordering province	0.967|(-1.15)	**1.088***|(2.89)**	**1.119***|(3.65)**	1.016|(0.69)	**-0.006**|(-2.01)**
Other province	**0.913*|(-1.83)**	**1.155***|(3.33)**	**1.105*|(1.94)**	1.020|(0.56)	-0.002|(-0.52)
Abroad	0.840|(-0.83)	1.077|(0.45)	1.367|(1.58)	0.884|(-0.91)	0.016|(0.88)
Economic					
Graduate unemployment	0.927|(-1.23)	**0.887**|(-2.33)**	0.979|(-0.35)	0.952|(-1.18)	**-0.038***|(-5.40)**
Mismatch					
Vertical mismatch	-	-	-	**2.327***|(31.96)**	**-0.091***|(-26.74)**
Horizontal mismatch	-	-	-	**1.439***|(14.37)**	**-0.033***|(-9.41)**
Double mismatch	-	-	-	**3.294***|(40.30)**	**-0.203***|(-47.54)**
Log hourly wage	-	-	-	**0.638***|(-14.37)**	-
Job dissatisfaction	-	-	-	-	**-0.040***|(-15.26)**
Constant	-	-	-	-	**2.168***|(118.16)**
Observations	96033	96033	96033	96033	96033
Pseudo R^2	0.096	0.076	0.168	0.202	
Adjusted R^2					0.172

Exponentiated coefficients; *z* statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

t statistics in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Continued Table 4.1: summarized regression results of last stage for each model

5. Conclusion

Upon presenting the results in the previous section, it is time now to draw conclusions and answer the research questions posed in the introduction of this thesis. First, the incidence of mismatch among graduates in higher vocational education is addressed. Thereafter, the determinants of a mismatch are identified, followed by the consequences on job satisfaction and hourly wage of graduates. Lastly, the status of being an international graduate in relation to the labor market position is given. All together, these answers will provide the final answer to the main research question: *"To what extent are there education-job mismatches among international graduates of Dutch higher vocational education and what are the determinants and consequences of such a mismatch?"*

The first question being addressed is: '*To what extent are there mismatches among graduates of higher vocational education?*'

In order to answer this, it is necessary to return to the figures in section four. When observing *figure 4.1*, it became visible that the vertical and double mismatch follow the same trend. Only at the end of the period the lines diverge somewhat from each other, the vertical mismatch rate being slightly higher. The incidence of horizontal mismatch among graduates remains rather constant throughout the years. At the beginning of the period, the percentage of all mismatches among graduates was relatively low. In 2006, the lowest incidence of mismatch was reached. With the start of the crisis in 2008, an upward trend in the share of mismatched graduates commenced. Consequently, in 2012 the incidence of mismatch was at a peak, more than 40% of graduates was experiencing a mismatch. Thereafter, a decline followed and graduates more frequently found matching jobs again. In 2016, the share of mismatched graduates was at a similar level as a decade before. Therefore, it can be concluded that graduates of higher vocational education are recently experiencing positive job matching outcomes.

In *figure 4.2,* the incidence of mismatch according to graduate-background is depicted. The total percentage of mismatch among the international graduate category is relatively low. In comparison, other graduate-backgrounds such as first- and second-generation migrants demonstrate higher rates for mismatch. Furthermore, concerning vertical and double mismatch it is particularly noticeable that international graduates have low rates and score the second lowest percentage. For the horizontal mismatch international graduates rank as third lowest just after natives and international graduates abroad. However, this latter counterpart group are doing even slightly better. Specifically, concerning the horizontal and double mismatch international graduates abroad have the lowest percentage. Yet, for the vertical mismatch the opposite is true where they note the highest percentage. Thus, from *figure 4.2* it can be concluded that both types of international graduates are experiencing in comparison to the other graduate-backgrounds mismatches to a lower extent.

The second question is written as follows: *'What are the key factors that determine a mismatch for graduates?*'

First, educational characteristics are significant factors in determining a vertical and horizontal mismatch. Specifically, the field of study is a strong determinant as certain fields are more frequently associated with a mismatch. For example, the field of economics is linked to the horizontal and

double mismatch. On the other side, there are also certain fields associated with well-matching outcomes like the teaching and beta fields. Moreover, evidence was found that graduates with higher grades were less likely to experience a vertical and double mismatch. Thus, field of study and school performance are significant determinants for a mismatch.

Secondly, job characteristics proved to be other determining factors for a mismatch. This is especially true for the double mismatch. It was found that working in part-time employment is clearly linked to a vertical and double mismatch. For different types of employment evidence was found that graduates who are temporary workers and assisting family members are particularly susceptible to a mismatch. Furthermore, time spent in unemployment before finding a job is a valid indicator for the likelihood of being vertically mismatched. It showed that the longer a graduate spends time being unemployed, the chance to find a job matching their education level also decreases. Lastly, the clearest determinant for a mismatch is when a graduate is searching for another job when they are already employed. All in all, it is not a great surprise that education and job characteristics are the main determinants in education-job mismatch, as the name already suggests this.

The third question is noted as follows: *'To what extent and in what ways do education-job mismatches influence job satisfaction and wage?'*

There are negative consequences of a mismatch on job satisfaction and hourly wage of graduates. Specifically, the double mismatch has a strong negative effect on job satisfaction and hourly income. Besides, the vertical and horizontal mismatch were also found to negatively impact job satisfaction and hourly wage but to a lesser extent. Considering the three types of mismatch, the horizontal mismatch is actually the least worst possible outcome with mildest effects.

Furthermore, it was found that personal characteristics influence the income of graduates. For example, the gender variable proved that female graduates are earning significantly less. Besides, women were found to be more frequently vertically mismatched, which might indicate that they are overeducated. Yet, female graduates do find jobs that match their field of study and often work in healthcare and teaching sector. Nevertheless, no conclusions can be drawn for the job satisfaction since the result was insignificant. Therefore, it is not possible to state whether female graduates are satisfied and accepting to work in lower functions with wage.

Additionally, the year of graduation showed to have an impact on job satisfaction and wage, which became particularly clear during the crisis period. During the crisis graduates were significantly more likely to be satisfied in their jobs, while their wage level was considerably lower than the pre-crisis levels. This outcome is contradictive because results also proved that job satisfaction has a positive relation with wage. That is a higher job satisfaction is associated with higher wage and vice versa.

Moreover, job characteristics are of great significance for consequences on job satisfaction and income. Graduates who are temporary workers are negatively affected on both aspects. Again, the indicator for graduates who are looking for another job demonstrates to be a crucial factor in affecting job satisfaction and hourly wage. Thus, the same determinants of a mismatch also negatively affect wage and job satisfaction, making it likely for mismatched graduates to experience these negative consequences as well.

The last question reads as follows: *'How does being an international graduate influences the labor market position?'*

In this thesis, the main group of focus were international graduates who remained to work in the Netherlands after finishing their higher vocational education. Unfortunately, most results for this group in the empirical analysis came out to be insignificant. There was only some evidence showing that the status of being an international graduate influences the likelihood of experiencing a horizontal mismatch but this was slightly significant. Therefore, based on the results it is not possible to make a definite statement regarding the labor market position of international graduates.

For the counterpart group, international graduates who went abroad, significant evidence was found. Job satisfaction levels of international graduates abroad were considerably lower, when controlling for all factors. However, this result can also not be linked to the occurrence of international graduates leaving because it is not a rational motivation for someone to leave in order to be unsatisfied in the job they end up working in. Other individual factors such as reunification with family and friends might outweigh the job dissatisfaction.

Even though the statistical analysis did not find any evidence for clarifying the labor market position of international graduates in relation to mismatch, *figure 4.2* still provides some useful answers. Both international graduates who stayed and those who went abroad are groups with the lowest percentage of mismatch. For the vertical mismatch international graduates abroad have more difficulty to find jobs matching their education level than international graduates who remained. Considering the horizontal and double mismatch international graduates who remained are more frequently mismatched. However, in comparison to other graduate-backgrounds both groups of international graduates rank as lowest for being mismatched. Thus, the labor market position of international graduates who remained and those who went abroad is nearly equally good. Therefore, it is difficult to argue for why international graduates are remaining or leaving.

Additionally, interesting findings for other graduate-backgrounds did became apparent in the empirical analysis. For first-generation migrants there was evidence that they are less likely to experience a vertical mismatch but are more likely to be unsatisfied in their job, while having a higher hourly income. These outcomes are rather surprising and contradicting, as in the literature was found that migrants are often linked to be more frequently mismatched (Boudarbat & Chernoff, 2012) and have lower earnings (Joona et al., 2014). Thus, there seems to be no explanation available in the literature for these findings. Therefore, a cautious attempt to explain these results is provided here. It might be the case that first-generation migrants are motivated more to find matching jobs because of the existing ethnic penalty, where non-natives are disadvantaged (Falcke et al., 2016). Hence, these migrants try to prevent being vertically mismatched, by acquiring a job at the right education level with a good wage. Unfortunately, discrimination might still exist in their job explaining lower job satisfaction levels.

Besides, for second-generation migrants findings were more in line with the literature. It was found that they experience more often a horizontal and double mismatch, and have a lower hourly wage. Thus, for this non-native group there seems to be evidence for the ethnic penalty. Only for the vertical mismatch a deviating result was found, second-generation migrants are less likely to experience this mismatch. A similar approach can be taken as for first-generation migrants to provide a possible explanation for this outcome.

5.1. Contribution, limitations and research recommendations

In the first section of this thesis, the trend of international students leaving upon graduation was presented. By investigating the education-job mismatch of international graduates who remained to work, this research was aimed to get a better understanding of their labor market position. Yet, it was not possible to link the empirical results of international graduates to the occurrence of them leaving. Therefore, future research should aim to further investigate the group of international graduates to find motives for the decision to stay or leave. This could be done through qualitative research methods, like in-depth interviews.

Moreover, other avenues for further research on education-job mismatch and international graduates are summarized here. The research in this thesis was constrained by variables that were available in the data set. Even though, the HBO Monitor is very extensive with a lot of information and variables available, it can still include several valuable additions for future research. For example, a distinction in the vertical mismatch between over- and undereducation. Also, information on marital status, significant others, and command of Dutch language, can all strongly influence the decision to remain after graduation.

Furthermore, for following-up research on international graduates in Dutch higher education, it is recommended to use this research design and expand to other education levels such as the research universities' Bachelor and Master programs. Besides, a strength of this research was the ability to distinguish in different backgrounds of graduates, which yielded significant findings. On the one hand these confirmed the existing literature, but on the other hand also contradicted it. This raises the opportunity to further investigate these backgrounds in relation to education-job mismatch. Also, results for gender demonstrated that there are different outcomes for female and male graduates, which is another interesting aspect to further investigate. Additionally, the research design that was applied in this thesis can be easily replicated and used for future research.

At last, a concluding note, inspired by the recently famous historian and futurologist Yuval Noah Hariri. In my eyes, education-job mismatch will be more common in the future. The variety of professions is changing at a fast pace, mostly due to technological changes such as automation. It is becoming more complicated to predict the occupations and tasks performed in these jobs, which will exist ten years from now. Nevertheless, these future workers are currently still in school and learning skills based on present-day jobs. In general, education systems remain largely the same and unchanged in the subjects being taught. Consequently, the education-job mismatch will be more prevalent, especially the horizontal mismatch. A remedy for this could be to focus in education on versatility and flexibility, which could prove to be key abilities to possess in the future.

6. Bibliography

Aleksynska, M., & Tritah, A. (2013). Occupation–education mismatch of immigrant workers in Europe: Context and policies. *Economics of Education Review*, *36*, 229-244.

Allen, J., & van der Velden, R. (2001). Educational mismatches versus skill mismatches: Effects on wages, job satisfaction, and on-the-job search. *Oxford Economic Papers, 53*(3), 434-452.

Allen, J., & de Weert, E. (2007). What do educational mismatches tell us about skill mismatches? a cross-country analysis. *European Journal of Education*, 42(1), 59-73.

Battu, H., & Sloane, P. J. (2004). Over-education and ethnic minorities in Britain. *The Manchester School*, *72*(4), 535-559.

Boudarbat, B., & Chernoff, V. (2012). Education–job match among recent Canadian university graduates. *Applied Economics Letters*, *19*(18), 1923-1926.

Cabus, S. J., & Somers, M. A. (2018). Mismatch between education and the labour market in the Netherlands: is it a reality or a myth? The employers' perspective. *Studies in Higher Education*, *43*(11), 1854-1867.

Falcke, S., Meng, C., & Nollen, R. (2016). *Educational mismatches for second generation migrants: An analysis of applied science graduates in the Netherlands* (ROA research memorandum / researchcentrum voor onderwijs en arbeidsmarkt, roa-rm-2016/10 (september 2016)). Maastricht: Research Centre for Education and the Labour Market. (2016). Retrieved September 30, 2019, from SmartCat.

Galasi, P. (2008). *The effect of educational mismatch on wages for 25 countries* (No. BWP-2008/8). Budapest Working Papers on the Labour Market.

García-Aracil, A., & Van der Velden, R. (2008). Competencies for young European higher education graduates: labor market mismatches and their payoffs. *Higher Education*, *55*(2), 219-239.

Hartog, J., & Oosterbeek, H. (1988). Education, allocation and earnings in the Netherlands: 0verschooling? Economics of Education Review, 7(2), 185-194.

Hartog, J. (2000). Over-education and earnings: Where are we, where should we go? *Economics of Education Review*, 19(2), 131-47.

Hensen, M. M., De Vries, M. R., & Cörvers, F. (2009). The role of geographic mobility in reducing education-job mismatches in the Netherlands. *Papers in Regional Science*, *88*(3), 667-682.

Joona, P. A., Gupta, N. D., & Wadensjö, E. (2014). Overeducation among immigrants in Sweden: incidence, wage effects and state dependence. *IZA Journal of Migration*, *3*(1), 9.

Kõu, A., Mulder, C. H., & Bailey, A. (2017). 'For the sake of the family and future': the linked lives of highly skilled Indian migrants. *Journal of Ethnic and Migration Studies*, *43*(16), 2788-2805.

Kucel, A. and Vilalta-Bufi, M. (2013) Why do tertiary education graduates regret their study program? A comparison between Spain and the Netherlands. *Higher Education* 65: 565–579.

Leuven, E., & Oosterbeek, H. (2011). Overeducation and mismatch in the labor market. In *Handbook of the Economics of Education* (Vol. 4, pp. 283-326). Elsevier.

Mavromaras, K., Sloane, P., & Wei, Z. (2012). The role of education pathways in the relationship between job mismatch, wages and job satisfaction: a panel estimation approach. *Education Economics*, *20*(3), 303-321.

McGuinness, S. (2006). Overeducation in the labour market. *Journal of Economic Surveys*, *20*(3), 387-418.

Naguib, C., Baruffini, M., & Maggi, R. (2019). Do wages and job satisfaction really depend on educational mismatch? evidence from an international sample of master graduates. *Education Training, 61*(2), 201-221. doi:10.1108/ET-06-2018-0137

Nuffic (2018). *Stayrate van internationale afgestudeerden in Nederland.* Den Haag: De Nederlandse organisatie voor internationalisering in onderwijs.

Nuffic (2019). *Incoming degree student mobility in Dutch higher education 2018-2019.* Den Haag: De Nederlandse organisatie voor internationalisering in onderwijs.

Piracha, M., & Vadean, F. (2013). Migrant educational mismatch and the labor market. In *International handbook on the economics of migration*. Edward Elgar Publishing.

Quintini, G. (2011). Over-qualified or under-skilled: A review of existing literature, OECD social, employment and migration. In *Working papers no. 121*. OECD Publishing.

Robst, J. (2007). Education and job match: The relatedness of college major and work. *Economics of Education Review*, *26*(4), 397-407.

Sellami, S., Verhaest, D., & Van Trier, W. (2018). How to Measure Field-of-Study Mismatch? A Comparative Analysis of the Different Methods. *LABOUR*, *32*(4), 141-173.

Sicherman, N. (1991). "overeducation" in the labor market. Journal of Labor Economics, 9(2), 101-122.

Somers, M. A., Cabus, S. J., Groot, W., & van den Brink, H. M. (2019). Horizontal mismatch between employment and field of education: Evidence from a systematic literature review. *Journal of Economic Surveys*, *33*(2), 567-603.

Van der Velden, R. K. W., & van Smoorenburg, M. S. M. (1997). The measurement of overeducation and undereducation: self-report vs. job-analyst method. (ROA Research Memoranda; No. 2E). Maastricht: Researchcentrum voor Onderwijs en Arbeidsmarkt, Faculteit der Economische Wetenschappen.

Venhorst, V. A., & Cörvers, F. (2018). Entry into working life: Internal migration and the job match quality of higher-educated graduates. *Journal of regional science*, *58*(1), 116-140.

Verhaest, D., Sellami, S., & van der Velden, R. (2017). Differences in horizontal and vertical mismatches across countries and fields of study. *International Labour Review*, 156(1), 1-23.

Witte, J., & Kalleberg, A. (1995). Matching training and jobs: The fit between vocational education and employment in the German labour market. *European Sociological Review*, 11(3), 293-317.

Wolbers, M. H. (2003). Job mismatches and their labour-market effects among school-leavers in Europe. *European Sociological Review, 19*(3), 249-266.

Appendix I

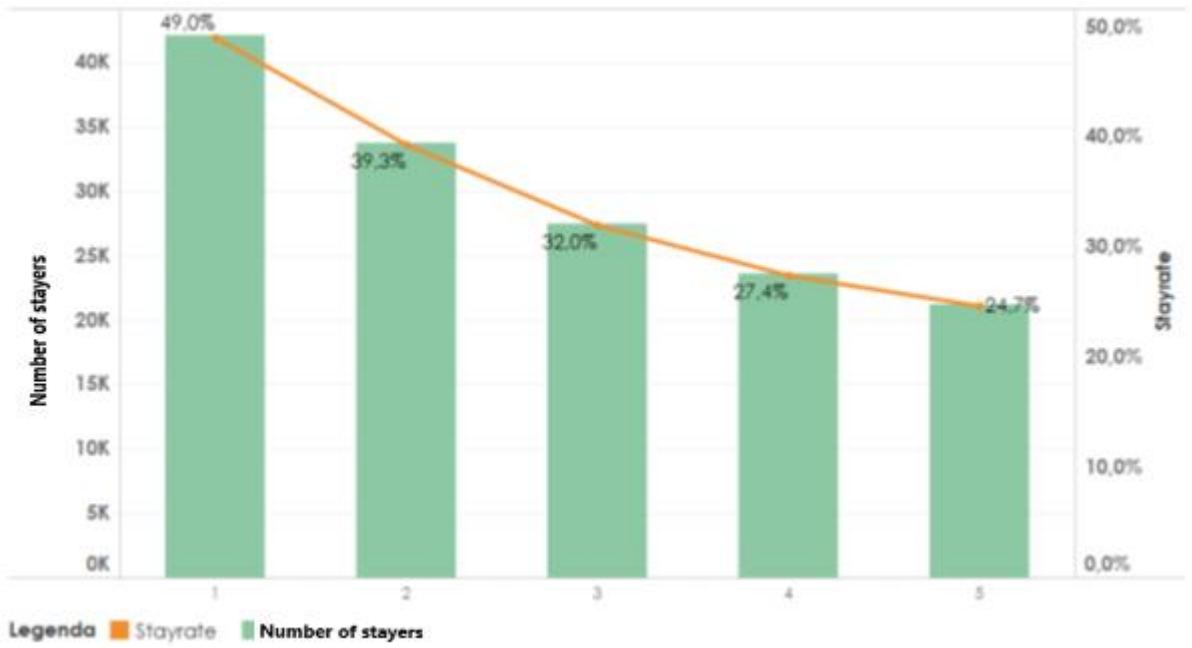

Figure 6.1: Stayrate of international graduates in the combined study cohorts for the period between 2006-07 till 2012-13, after 1 till 5 years. (Source: Nuffic, 2018)

graduate unemployment rate	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Groningen	1,69	0,94	1,45	1,22	0,59	1,20	1,72	0,83	1,24	1,31	1,24	1,34
Friesland	1,86	1,49	1,52	1,49	1,56	1,42	1,31	1,09	1,22	1,33	1,33	1,19
Drenthe	1,61	1,77	1,64	1,00	0,96	0,97	0,54	1,28	1,12	1,15	0,85	0,93
Overijssel	1,10	1,06	1,20	0,74	0,97	0,94	1,05	0,99	1,20	0,91	0,83	1,13
Gelderland	1,20	1,02	0,67	0,92	0,80	0,85	0,85	1,07	1,13	1,09	1,03	0,96
Utrecht	1,07	0,72	1,22	0,86	0,89	1,06	0,96	0,93	0,81	0,75	0,96	1,10
Noord-Holland	0,70	1,17	1,04	0,96	1,19	0,99	1,05	1,06	0,93	0,99	0,98	0,79
Zuid-Holland	0,86	1,05	0,92	1,00	1,02	1,03	0,92	0,96	1,02	0,93	1,03	0,99
Zeeland	1,07	0,55	0,74	0,92	0,86	1,00	0,83	1,11	0,47	0,22	1,45	0,65
Noord-Brabant	0,75	0,81	0,81	1,05	0,90	0,84	1,02	0,91	0,97	1,06	0,80	0,90
Limburg	0,86	1,15	1,10	1,31	1,38	1,17	1,35	1,15	0,94	1,05	1,29	1,17
Flevoland	0,33	0,58	0,91	0,85	0,42	0,51	0,60	1,12	0,94	1,28	1,14	1,85
Buitenland	3,43	2,64	3,70	2,59	1,44	2,08	1,34	1,31	1,66	1,84	1,93	2,14

Table 6.1: The graduate unemployment rate according to province and year

Appendix II

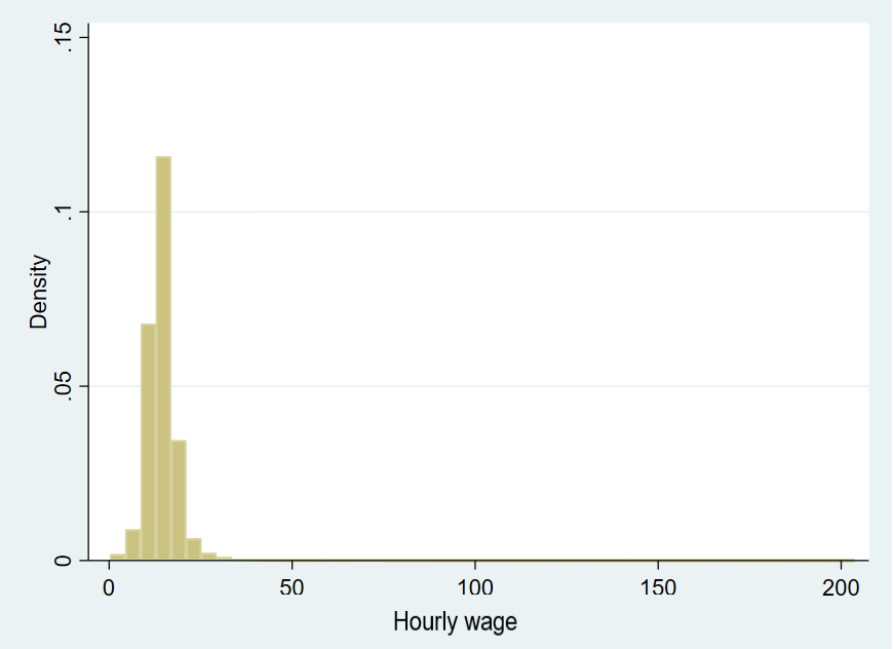

Figure 6.2: Distribution of the original hourly wage

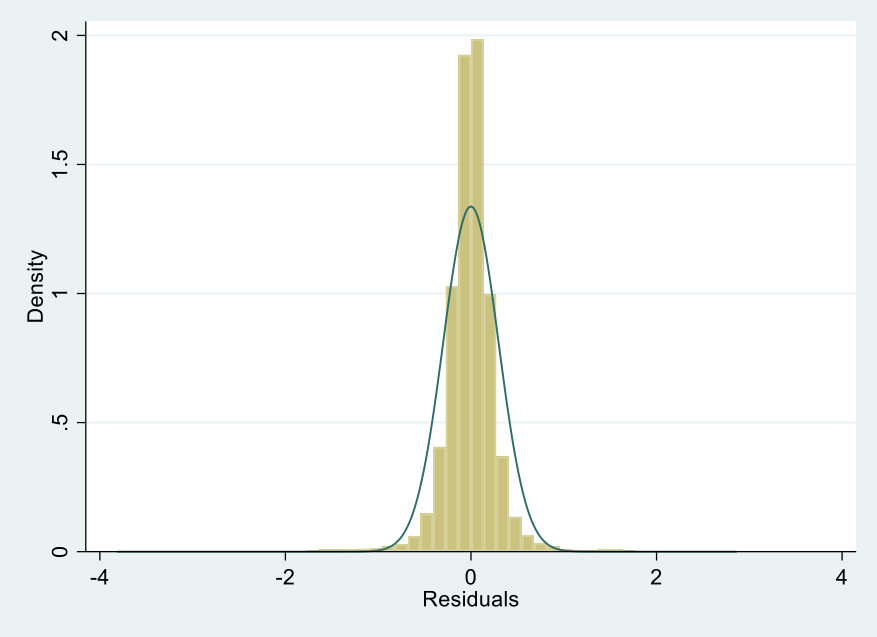

Figure 6.3: Distribution of the residuals

Appendix III

Vertical Mismatch	**1**	**2**	**`3**	**4**	**5**	**6**
Graduate-background						
Ref=Native						
International graduate	0.812*|(-1.70)	0.782**|(-1.97)	0.961|(-0.31)	0.953|(-0.37)	1.128|(0.49)	1.129|(0.49)
International graduate abroad	0.973|(-0.35)	0.883|(-1.54)	1.079|(0.91)	1.200**|(2.16)	0.873|(-0.53)	0.936|(-0.25)
Int.graduate.lva16NL	0.938|(-0.96)	0.903|(-1.52)	0.845**|(-2.44)	0.821***|(-2.85)	0.847**|(-2.41)	0.846**|(-2.42)
Native abroad	0.600***|(-4.38)	0.613***|(-4.16)	0.692***|(-2.99)	0.744**|(-2.37)	0.497***|(-4.16)	0.538***|(-3.50)
Native born abroad	0.895|(-1.08)	0.882|(-1.21)	0.885|(-1.13)	0.872|(-1.25)	0.890|(-1.05)	0.891|(-1.05)
First-generation migrant	0.822***|(-3.13)	0.795***|(-3.62)	0.751***|(-4.28)	0.716***|(-5.01)	0.748***|(-4.31)	0.747***|(-4.32)
Second-generation migrant	0.865***|(-2.77)	0.856***|(-2.95)	0.820***|(-3.60)	0.811***|(-3.79)	0.826***|(-3.44)	0.826***|(-3.45)
Personal						
Age		1.007|(1.28)	0.985***|(-2.69)	0.981***|(-3.36)	0.984***|(-2.75)	0.984***|(-2.74)
Gender. Ref=male		1.950***|(27.47)	1.420***|(12.31)	1.341***|(10.28)	1.349***|(10.43)	1.348***|(10.40)
Year. Ref= 2005						
2006		0.876**|(-2.29)	0.861**|(-2.50)	0.878**|(-2.16)	0.878**|(-2.17)	0.877**|(-2.19)
2007		0.866***|(-2.61)	0.855***|(-2.74)	0.870**|(-2.43)	0.865**|(-2.53)	0.863**|(-2.56)
2008		0.982|(-0.33)	0.937|(-1.13)	0.944|(-0.99)	0.935|(-1.16)	0.936|(-1.14)
2009		1.142**|(2.49)	1.082|(1.43)	1.080|(1.39)	1.056|(0.98)	1.053|(0.93)
2010		1.223***|(3.92)	1.125**|(2.23)	1.099*|(1.77)	1.103*|(1.83)	1.099*|(1.76)
2011		1.242***|(4.22)	1.135**|(2.37)	1.103*|(1.82)	1.082|(1.45)	1.079|(1.41)
2012		1.357***|(5.98)	1.233***|(3.96)	1.177***|(3.05)	1.179***|(3.08)	1.174***|(2.98)
2013		1.161***|(2.89)	1.045|(0.82)	1.015|(0.27)	0.985|(-0.27)	0.984|(-0.29)
2014		1.092*|(1.70)	0.970|(-0.57)	0.962|(-0.72)	0.956|(-0.83)	0.956|(-0.82)
2015		0.976|(-0.45)	0.860***|(-2.77)	0.862***|(-2.72)	0.828***|(-3.42)	0.826***|(-3.46)
2016		1.100|(1.61)	0.909|(-1.60)	0.927|(-1.27)	0.903*|(-1.72)	0.903*|(-1.72)
Education						
Field of study. Ref=Economics						
Agriculture & Food			1.639***|(7.24)	1.702***|(7.77)	1.573***|(6.29)	1.573***|(6.29)
Teaching			0.528***|(-11.80)	0.535***|(-11.45)	0.544***|(-10.98)	0.544***|(-10.98)
Beta			1.133***|(3.30)	1.210***|(5.00)	1.206***|(4.91)	1.207***|(4.92)
Healthcare			1.617***|(14.35)	1.618***|(13.47)	1.663***|(14.01)	1.663***|(14.01)
Social studies			4.536***|(49.92)	3.952***|(43.49)	3.944***|(43.04)	3.947***|(43.08)
Art			0.974|(-0.13)	1.012|(0.06)	0.946|(-0.27)	0.946|(-0.27)
Average grade			0.883***|(-12.20)	0.889***|(-11.50)	0.889***|(-11.50)	0.889***|(-11.50)
Internship. Ref= yes			2.019***|(8.19)	2.058***|(8.36)	2.044***|(8.28)	2.037***|(8.23)
Work experience. Ref=yes			0.887***|(-5.22)	0.872***|(-5.92)	0.872***|(-5.92)	0.872***|(-5.93)
Board experience. Ref=yes			1.294***|(-7.51)	1.284***|(-7.28)	1.279***|(-7.13)	1.279***|(-7.13)
Job						
Full-/Part-time. Ref=Full-time				1.282***|(9.72)	1.285***|(9.73)	1.285***|(9.74)
Type of employment.						
Ref=permanent						
Temporary worker				1.023|(0.61)	1.028|(0.73)	1.028|(0.73)
Assisting family member				2.188***|(3.66)	2.211***|(3.73)	2.216***|(3.74)
Self-employed				0.602***|(-5.33)	0.613***|(-5.12)	0.613***|(-5.12)
Otherwise				0.675***|(-5.18)	0.676***|(-5.16)	0.675***|(-5.16)
Firm-size. Ref=1-9						
10-99				1.321***|(5.81)	1.326***|(5.89)	1.326***|(5.90)
>=100				1.733***|(12.36)	1.726***|(12.26)	1.726***|(12.27)
Months unemployed. Ref=0						
1-3				1.118***|(3.56)	1.124***|(3.70)	1.124***|(3.70)
4-6				1.151***|(3.25)	1.161***|(3.43)	1.161***|(3.44)
7-12				1.112*|(1.86)	1.121**|(1.99)	1.122**|(2.01)
>= 13				0.799***|(-2.60)	0.802**|(-2.54)	0.802**|(-2.54)
Looking for another job.				0.686***|(-13.72)	0.685***|(-13.73)	0.685***|(-13.74)
Ref=yes.						

Location						
Followed education.						
Ref=Groningen						
Friesland					1.375***|(4.73)	1.378***|(4.76)
Drenthe					0.757|(-1.27)	0.756|(-1.28)
Overijssel					1.367***|(5.37)	1.348***|(5.00)
Gelderland					1.182***|(2.90)	1.162**|(2.54)
Utrecht					1.021|(0.35)	1.003|(0.05)
Noord-Holland					1.151**|(2.33)	1.131**|(1.99)
Zuid-Holland					1.024|(0.42)	1.006|(0.11)
Zeeland					1.510***|(3.73)	1.473***|(3.47)
Noord-Brabant					1.282***|(4.42)	1.258***|(3.93)
Limburg					1.158**|(1.96)	1.159**|(1.98)
Flevoland					1.490**|(2.15)	1.465**|(2.04)
Job mobility						
Ref=same province						
Bordering province					0.955|(-1.54)	0.955|(-1.55)
Other province					0.921*|(-1.79)	0.917*|(-1.89)
Abroad					1.558***|(3.46)	1.556***|(3.45)
Education mobility.						
Ref=same province						
Bordering province					0.966|(-1.17)	0.967|(-1.15)
Other province					0.914*|(-1.81)	0.913*|(-1.83)
Abroad					0.842|(-0.82)	0.840|(-0.83)
Economic						
Graduate UR						0.927|(-1.23)
Observations	96033	96033	96033	96033	96033	96033
Pseudo R^2	0.001	0.017	0.082	0.094	0.096	0.096

Exponentiated coefficients; *z* statistics in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6.2: Logistic Regression results for vertical mismatch

Horizontal Mismatch	**1**	**2**	**`3**	**4**	**5**	**6**
Graduate-background						
Ref=Native						
International graduate	1.067|(0.60)	0.938|(-0.58)	0.746***|(-2.60)	0.744***|(-2.62)	0.682*|(-1.93)	0.683*|(-1.92)
International graduate abroad	0.993|(-0.08)	0.949|(-0.58)	0.753***|(-3.03)	0.727***|(-3.39)	0.733|(-1.46)	0.827|(-0.87)
Int.graduate.lva16NL	1.342***|(4.99)	1.330***|(4.78)	1.154**|(2.35)	1.147**|(2.23)	1.107|(1.64)	1.106|(1.63)
Native abroad	1.414***|(4.27)	1.357***|(3.75)	1.116|(1.33)	1.087|(1.00)	1.045|(0.35)	1.201|(1.34)
Native born abroad	1.428***|(4.07)	1.392***|(3.74)	1.283***|(2.73)	1.268***|(2.59)	1.219**|(2.12)	1.220**|(2.13)
First-generation migrant	1.432***|(6.72)	1.380***|(5.97)	1.119**|(2.04)	1.110*|(1.87)	1.051|(0.87)	1.049|(0.85)
Second-generation migrant	1.437***|(8.29)	1.403***|(7.71)	1.288***|(5.63)	1.286***|(5.55)	1.248***|(4.87)	1.247***|(4.85)
Personal						
Age		1.050***|(10.12)	1.055***|(10.47)	1.050***|(9.36)	1.046***|(8.37)	1.046***|(8.39)
Gender. Ref=male		0.742***|(-13.87)	0.931***|(-2.89)	0.962|(-1.57)	0.944**|(-2.33)	0.943**|(-2.37)
Year. Ref= 2005						
2006		0.971|(-0.56)	0.994|(-0.10)	1.004|(0.08)	1.005|(0.10)	1.006|(0.11)
2007		1.004|(0.07)	1.026|(0.49)	1.044|(0.81)	1.049|(0.91)	1.050|(0.92)
2008		0.917|(-1.61)	0.904*|(-1.84)	0.917|(-1.57)	0.926|(-1.39)	0.929|(-1.32)
2009		0.860***|(-2.80)	0.881**|(-2.32)	0.882**|(-2.27)	0.905*|(-1.80)	0.903*|(-1.84)
2010		0.892**|(-2.23)	0.921|(-1.59)	0.921|(-1.57)	0.934|(-1.30)	0.930|(-1.39)
2011		0.849***|(-3.09)	0.879**|(-2.39)	0.881**|(-2.34)	0.903*|(-1.87)	0.901*|(-1.92)
2012		0.981|(-0.37)	0.977|(-0.45)	0.971|(-0.55)	0.984|(-0.31)	0.977|(-0.43)
2013		1.020|(0.39)	1.029|(0.55)	1.018|(0.34)	1.036|(0.66)	1.034|(0.62)
2014		1.028|(0.55)	1.050|(0.94)	1.050|(0.94)	1.054|(1.00)	1.054|(1.01)
2015		1.056|(1.11)	1.089*|(1.69)	1.095*|(1.77)	1.120**|(2.21)	1.117**|(2.15)
2016		1.039|(0.76)	1.115**|(2.12)	1.134**|(2.43)	1.147***|(2.66)	1.146***|(2.63)
Education						
Field of study. Ref=Economics						
Agriculture & Food			0.585***|(-8.45)	0.571***|(-8.79)	0.580***|(-8.09)	0.580***|(-8.07)
Teaching			0.158***|(-32.61)	0.169***|(-30.88)	0.176***|(-30.27)	0.176***|(-30.27)
Beta			0.413***|(-27.81)	0.407***|(-27.94)	0.415***|(-27.25)	0.416***|(-27.24)
Healthcare			0.207***|(-34.76)	0.233***|(-30.96)	0.236***|(-30.43)	0.236***|(-30.42)
Social studies			0.293***|(-29.09)	0.340***|(-24.15)	0.357***|(-23.03)	0.358***|(-23.00)
Art			0.569***|(-3.46)	0.584***|(-3.24)	0.634***|(-2.73)	0.633***|(-2.74)
Average grade			0.985|(-1.56)	0.990|(-1.10)	0.987|(-1.38)	0.987|(-1.37)
Internship. Ref= yes			0.936|(-0.67)	0.948|(-0.54)	0.963|(-0.38)	0.960|(-0.41)
Work experience. Ref=yes			1.110***|(4.72)	1.110***|(4.69)	1.120***|(5.11)	1.120***|(5.12)
Board experience. Ref=yes			0.864***|(5.30)	0.867***|(5.17)	0.876***|(4.78)	0.875***|(4.80)
Job						
Full-/Part-time. Ref=Full-time				0.689***|(-13.25)	0.690***|(-13.20)	0.690***|(-13.18)
Type of employment.						
Ref=permanent						
Temporary worker				1.505***|(11.41)	1.527***|(11.78)	1.529***|(11.81)
Assisting family member				1.208|(1.16)	1.207|(1.13)	1.213|(1.17)
Self-employed				1.657***|(8.27)	1.628***|(7.97)	1.628***|(7.97)
Otherwise				1.300***|(3.97)	1.314***|(4.11)	1.313***|(4.10)
Firm-size. Ref=1-9						
10-99				0.885***|(-3.05)	0.881***|(-3.17)	0.881***|(-3.17)
>=100				0.838***|(-4.70)	0.837***|(-4.73)	0.837***|(-4.74)
Months unemployed. Ref=0						
1-3				1.039|(1.28)	1.037|(1.21)	1.037|(1.21)
4-6				1.143***|(3.28)	1.136***|(3.13)	1.136***|(3.13)
7-12				1.085|(1.48)	1.077|(1.34)	1.077|(1.35)
>= 13				0.801**|(-2.47)	0.790***|(-2.62)	0.790***|(-2.62)
Looking for another job.				0.973|(-0.97)	0.972|(-1.01)	0.971|(-1.04)
Ref=yes.						

Location						
Followed education.						
Ref=Groningen						
Friesland					0.939|(-1.00)	0.939|(-1.00)
Drenthe					0.746*|(-1.84)	0.744*|(-1.86)
Overijssel					0.814***|(-3.52)	0.796***|(-3.85)
Gelderland					0.803***|(-3.68)	0.782***|(-4.04)
Utrecht					0.936|(-1.14)	0.911|(-1.59)
Noord-Holland					1.137**|(2.33)	1.107*|(1.80)
Zuid-Holland					1.130**|(2.32)	1.101*|(1.77)
Zeeland					0.671***|(-3.44)	0.645***|(-3.74)
Noord-Brabant					0.944|(-1.11)	0.916|(-1.62)
Limburg					0.827***|(-2.76)	0.826***|(-2.79)
Flevoland					0.841|(-0.97)	0.819|(-1.12)
Job mobility						
Ref=same province						
Bordering province					1.041|(1.34)	1.041|(1.34)
Other province					1.230***|(5.08)	1.221***|(4.86)
Abroad					1.074|(0.65)	1.070|(0.61)
Education mobility.						
Ref=same province						
Bordering province					1.087***|(2.86)	1.088***|(2.89)
Other province					1.158***|(3.39)	1.155***|(3.33)
Abroad					1.080|(0.47)	1.077|(0.45)
Economic						
Graduate UR						0.887**|(-2.33)
Observations	96033	96033	96033	96033	96033	96033
Pseudo R^2	0.002	0.009	0.067	0.073	0.076	0.076

Exponentiated coefficients; *z* statistics in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6.3: Logistic Regression results for horizontal mismatch

Double Mismatch	1	2	`3	4	5	6
Graduate-background						
Ref=Native						
International graduate	0.936|(-0.57)	0.956|(-0.38)	0.923|(-0.66)	0.885|(-0.94)	0.696|(-1.54)	0.696|(-1.54)
International graduate abroad	0.654***|(-3.90)	0.609***|(-4.53)	0.654***|(-3.80)	0.880|(-1.08)	0.744|(-1.10)	0.759|(-1.00)
Int.graduate.lva16NL	1.192***|(2.90)	1.197***|(2.94)	1.054|(0.84)	0.955|(-0.69)	0.962|(-0.59)	0.962|(-0.59)
Native abroad	1.398***|(3.67)	1.398***|(3.64)	1.307***|(2.80)	1.654***|(5.11)	1.793***|(3.74)	1.834***|(3.59)
Native born abroad	1.331***|(3.09)	1.336***|(3.10)	1.262**|(2.46)	1.214*|(1.91)	1.193*|(1.69)	1.193*|(1.69)
First-generation migrant	1.419***|(6.35)	1.413***|(6.22)	1.148**|(2.43)	0.924|(-1.26)	0.943|(-0.92)	0.943|(-0.93)
Second-generation migrant	1.326***|(6.00)	1.331***|(6.05)	1.238***|(4.41)	1.138**|(2.46)	1.145**|(2.56)	1.145**|(2.56)
Personal						
Age		1.001|(0.25)	0.994|(-1.01)	0.985**|(-2.53)	0.982***|(-2.92)	0.982***|(-2.92)
Gender. Ref=male		1.134***|(5.43)	1.210***|(7.11)	0.977|(-0.81)	0.970|(-1.05)	0.970|(-1.06)
Year. Ref= 2005						
2006		0.771***|(-4.16)	0.779***|(-3.96)	0.840***|(-2.66)	0.837***|(-2.72)	0.836***|(-2.73)
2007		0.780***|(-4.10)	0.787***|(-3.92)	0.828***|(-2.97)	0.818***|(-3.16)	0.818***|(-3.17)
2008		1.080|(1.31)	1.063|(1.04)	1.021|(0.33)	1.008|(0.14)	1.009|(0.14)
2009		1.304***|(4.77)	1.337***|(5.17)	1.115*|(1.82)	1.107*|(1.70)	1.106*|(1.68)
2010		1.266***|(4.40)	1.285***|(4.64)	1.036|(0.61)	1.025|(0.43)	1.023|(0.40)
2011		1.426***|(6.60)	1.475***|(7.11)	1.132**|(2.13)	1.133**|(2.13)	1.132**|(2.12)
2012		1.773***|(11.09)	1.746***|(10.62)	1.261***|(4.11)	1.251***|(3.96)	1.249***|(3.92)
2013		1.660***|(9.70)	1.643***|(9.35)	1.231***|(3.67)	1.229***|(3.62)	1.228***|(3.61)
2014		1.324***|(5.25)	1.290***|(4.68)	1.041|(0.70)	1.029|(0.49)	1.028|(0.48)
2015		1.030|(0.54)	0.997|(-0.05)	0.875**|(-2.25)	0.869**|(-2.35)	0.868**|(-2.36)
2016		0.883**|(-2.06)	0.868**|(-2.31)	0.822***|(-3.03)	0.809***|(-3.28)	0.809***|(-3.29)
Education						
Field of study. Ref=Economics						
Agriculture & Food			1.034|(0.57)	1.032|(0.50)	0.983|(-0.26)	0.983|(-0.26)
Teaching			0.325***|(-22.83)	0.213***|(-27.85)	0.215***|(-27.52)	0.215***|(-27.52)
Beta			0.454***|(-21.62)	0.533***|(-16.83)	0.542***|(-16.30)	0.542***|(-16.30)
Healthcare			0.274***|(-27.28)	0.188***|(-32.02)	0.191***|(-31.54)	0.191***|(-31.54)
Social studies			0.775***|(-7.44)	0.422***|(-21.02)	0.423***|(-20.87)	0.423***|(-20.88)
Art			0.863|(-0.92)	0.578***|(-3.22)	0.574***|(-3.23)	0.574***|(-3.23)
Average grade			0.853***|(-15.05)	0.865***|(-12.95)	0.864***|(-13.05)	0.864***|(-13.05)
Internship. Ref= yes			1.057|(0.53)	1.106|(0.87)	1.118|(0.96)	1.118|(0.96)
Work experience. Ref=yes			1.416***|(14.91)	1.404***|(13.52)	1.403***|(13.48)	1.403***|(13.48)
Board experience. Ref=yes			1.020|(-0.64)	1.003|(-0.08)	1.002|(-0.34)	1.012|(-0.34)
Job						
Full-/Part-time. Ref=Full-time				3.376***|(40.46)	3.358***|(40.25)	3.358***|(40.24)
Type of employment.						
Ref=permanent						
Temporary worker				2.020***|(21.33)	2.001***|(20.95)	2.002***|(20.95)
Assisting family member				2.674***|(6.63)	2.693***|(6.66)	2.695***|(6.66)
Self-employed				0.542***|(-6.82)	0.546***|(-6.73)	0.546***|(-6.73)
Otherwise				0.988|(-0.16)	0.994|(-0.08)	0.994|(-0.08)
Firm-size. Ref=1-9						
10-99				1.168***|(3.33)	1.176***|(3.49)	1.176***|(3.49)
>=100				1.069|(1.50)	1.072|(1.59)	1.072|(1.58)
Months unemployed. Ref=0						
1-3				0.825***|(-5.42)	0.827***|(-5.33)	0.827***|(-5.33)
4-6				1.041|(0.86)	1.047|(0.98)	1.047|(0.98)
7-12				1.235***|(3.81)	1.251***|(4.03)	1.251***|(4.03)
>= 13				3.330***|(19.58)	3.355***|(19.69)	3.356***|(19.69)
Looking for another job.				0.325***|(-42.72)	0.327***|(-42.47)	0.327***|(-42.46)
Ref=yes.						

Location						
Followed education.						
Ref=Groningen						
Friesland					0.935|(-1.05)	0.931|(-1.10)
Drenthe					0.835***|(-2.79)	0.831***|(-2.81)
Overijssel					0.970|(-0.49)	0.966|(-0.55)
Gelderland					0.879**|(-2.16)	0.875**|(-2.19)
Utrecht					0.947|(-0.48)	0.941|(-0.52)
Noord-Holland					0.928|(-1.27)	0.923|(-1.31)
Zuid-Holland					1.029|(0.37)	1.029|(0.37)
Zeeland					1.096|(0.48)	1.091|(0.46)
Noord-Brabant					0.935|(-1.05)	0.931|(-1.10)
Limburg					0.835***|(-2.79)	0.831***|(-2.81)
Flevoland					0.970|(-0.49)	0.966|(-0.55)
Job mobility						
Ref=same province						
Bordering province					0.863***|(-4.74)	0.863***|(-4.74)
Other province					0.797***|(-4.64)	0.796***|(-4.67)
Abroad					0.827|(-1.27)	0.826|(-1.28)
Education mobility.						
Ref=same province						
Bordering province					1.118***|(3.64)	1.119***|(3.65)
Other province					1.106*|(1.96)	1.105*|(1.94)
Abroad					1.367|(1.58)	1.367|(1.58)
Economic						
Graduate UR						0.979|(-0.35)
Observations	96033	96033	96033	96033	96033	96033
Pseudo R^2	0.002	0.012	0.052	0.167	0.168	0.168

Exponentiated coefficients; *z* statistics in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6.4: Logistic Regression results for double mismatch

Job dissatisfaction	1	2	`3	4	5	6	7
Graduate-background							
Ref=Native							
International graduate	1.305***|(3.60)	1.384***|(4.22)	1.193**|(2.24)	1.177**|(2.06)	1.099|(1.05)	1.247|(1.38)	1.236|(1.32)
International graduate abroad	1.169***|(2.69)	1.277***|(3.99)	1.174**|(2.57)	1.207***|(2.97)	1.314***|(3.99)	1.560***|(2.58)	1.602***|(2.63)
Int.graduate.lva16NL	1.270***|(5.63)	1.239***|(4.80)	1.145***|(3.01)	1.101**|(2.15)	1.040|(0.77)	1.027|(0.52)	1.039|(0.76)
Native abroad	0.979|(-0.33)	0.929|(-1.05)	0.931|(-1.01)	0.920|(-1.20)	0.954|(-0.63)	0.969|(-0.29)	0.977|(-0.19)
Native born abroad	1.270***|(3.68)	1.208***|(2.74)	1.154**|(2.08)	1.140*|(1.90)	1.103|(1.33)	1.109|(1.39)	1.105|(1.34)
First-generation migrant	1.599***|(11.99)	1.550***|(10.56)	1.476***|(9.32)	1.380***|(7.71)	1.266***|(4.91)	1.242***|(4.46)	1.256***|(4.70)
Second-generation migrant	1.198***|(5.38)	1.136***|(3.57)	1.112***|(2.96)	1.088**|(2.34)	1.061|(1.50)	1.052|(1.28)	1.045|(1.12)
Mismatch							
Vertical mismatch		2.958***|(47.34)	2.897***|(46.33)	2.800***|(43.62)	2.417***|(33.70)	2.427***|(33.78)	2.327***|(31.96)
Horizontal mismatch		1.803***|(26.11)	1.800***|(25.90)	1.650***|(21.53)	1.467***|(15.17)	1.462***|(15.04)	1.439***|(14.37)
Double mismatch		6.484***|(75.47)	6.396***|(74.66)	5.886***|(70.09)	3.608***|(44.65)	3.607***|(44.58)	3.294***|(40.30)
Personal							
Age			1.053***|(13.62)	1.052***|(13.18)	1.033***|(7.51)	1.032***|(7.18)	1.042***|(9.27)
Gender. Ref=male			1.158***|(9.05)	1.153***|(7.65)	1.033|(1.57)	1.031|(1.50)	1.006|(0.30)
Year. Ref= 2005							
2006			0.906**|(-2.55)	0.910**|(-2.42)	0.965|(-0.85)	0.964|(-0.88)	0.971|(-0.72)
2007			0.954|(-1.26)	0.952|(-1.31)	1.001|(0.02)	1.000|(0.00)	1.013|(0.31)
2008			0.978|(-0.57)	0.973|(-0.71)	0.977|(-0.56)	0.977|(-0.54)	0.987|(-0.31)
2009			1.054|(1.39)	1.057|(1.46)	0.994|(-0.14)	1.001|(0.02)	0.997|(-0.08)
2010			1.097**|(2.57)	1.098***|(2.58)	0.975|(-0.64)	0.972|(-0.72)	0.962|(-0.97)
2011			1.007|(0.18)	1.010|(0.28)	0.865***|(-3.57)	0.869***|(-3.44)	0.851***|(-3.97)
2012			1.052|(1.38)	1.046|(1.24)	0.831***|(-4.57)	0.827***|(-4.66)	0.792***|(-5.70)
2013			1.048|(1.29)	1.045|(1.20)	0.849***|(-4.05)	0.851***|(-3.98)	0.818***|(-4.94)
2014			0.904***|(-2.74)	0.896***|(-2.97)	0.777***|(-6.22)	0.773***|(-6.35)	0.741***|(-7.36)
2015			0.822***|(-5.32)	0.812***|(-5.61)	0.767***|(-6.61)	0.772***|(-6.42)	0.748***|(-7.17)
2016			0.760***|(-6.94)	0.754***|(-7.14)	0.764***|(-6.42)	0.764***|(-6.43)	0.748***|(-6.91)
Education							
Field of study. Ref=Economics							
Agriculture & Food				0.733***|(-6.57)	0.718***|(-6.27)	0.742***|(-5.46)	0.737***|(-5.55)
Teaching				0.798***|(-8.18)	0.659***|(-12.96)	0.663***|(-12.75)	0.665***|(-12.63)
Beta				0.769***|(-11.11)	0.845***|(-6.66)	0.850***|(-6.39)	0.860***|(-5.93)
Healthcare				0.654***|(-16.44)	0.587***|(-18.16)	0.583***|(-18.20)	0.608***|(-16.68)
Social studies				0.946**|(-2.19)	0.749***|(-9.74)	0.749***|(-9.68)	0.754***|(-9.45)
Art				0.912|(-0.78)	0.757**|(-2.01)	0.786*|(-1.74)	0.778*|(-1.79)
Average grade				0.967***|(-4.86)	0.988|(-1.58)	0.988|(-1.63)	0.991|(-1.18)
Internship. Ref= yes				1.086|(1.17)	1.172**|(2.10)	1.178**|(2.17)	1.193**|(2.36)
Work experience. Ref=yes				1.072***|(4.39)	1.066***|(3.69)	1.066***|(3.71)	1.063***|(3.51)
Board experience. Ref=yes				1.060***|(-2.68)	1.072***|(-2.97)	1.073***|(-2.93)	1.067***|(-2.78)
Job							
Full-/Part-time. Ref=Full-time							
Type of employment.					1.311***|(13.33)	1.307***|(13.12)	1.332***|(13.98)
Ref=permanent							
Temporary worker					1.605***|(15.63)	1.606***|(15.67)	1.520***|(13.73)
Assisting family member					0.700***|(-2.61)	0.702***|(-2.59)	0.660***|(-2.98)
Self-employed					0.486***|(-12.07)	0.483***|(-12.17)	0.475***|(-12.22)
Otherwise					1.052|(0.90)	1.055|(0.96)	0.979|(-0.37)
Firm-size. Ref=1-9							
10-99					1.032|(0.97)	1.030|(0.94)	1.041|(1.27)
>=100					0.936**|(-2.20)	0.937**|(-2.17)	0.973|(-0.91)
Months unemployed. Ref=0							
1-3					1.120***|(4.78)	1.121***|(4.81)	1.115***|(4.59)
4-6					1.123***|(3.48)	1.123***|(3.47)	1.104***|(2.94)
7-12					1.118**|(2.50)	1.118**|(2.49)	1.081*|(1.74)
>= 13					1.124*|(1.75)	1.125*|(1.76)	1.072|(1.03)
Looking for another job.					0.121***|(-97.47)	0.121***|(-97.49)	0.122***|(-96.58)
Ref=yes.							
Location							
Followed education.							
Ref=Groningen							
Friesland						0.903**|(-1.99)	0.895**|(-2.14)
Drenthe						0.853|(-1.32)	0.854|(-1.31)
Overijssel						0.887***|(-2.73)	0.877***|(-2.92)
Gelderland						0.941|(-1.38)	0.934|(-1.52)
Utrecht						0.992|(-0.19)	0.996|(-0.08)
Noord-Holland						0.996|(-0.09)	1.000|(0.00)
Zuid-Holland						0.956|(-1.10)	0.957|(-1.05)
Zeeland						0.781***|(-3.03)	0.773***|(-3.13)
Noord-Brabant						0.915**|(-2.16)	0.907**|(-2.29)
Limburg						0.943|(-1.07)	0.947|(-0.99)
Flevoland						0.889|(-0.83)	0.876|(-0.92)
Job mobility							
Ref=same province							
Bordering province						0.968|(-1.46)	0.973|(-1.22)
Other province						0.976|(-0.75)	0.979|(-0.65)
Abroad						0.969|(-0.34)	0.954|(-0.50)
Education mobility.							
Ref=same province						1.018|(0.79)	1.016|(0.69)
Bordering province						1.023|(0.63)	1.020|(0.56)
Other province						0.880|(-0.95)	0.884|(-0.91)
Abroad							
Economic							
Graduate unemployment							0.952|(-1.18)
Log hourly wage							0.638***|(-14.37)
Observations	96033	96033	96033	96033	96033	96033	96033
Pseudo R^2	0.002	0.072	0.076	0.080	0.199	0.199	0.002

Exponentiated coefficients; *z* statistics in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6.5: Logistic Regression results for job satisfaction

Hourly wage	1	2	`3	4	5	6	7
Graduate-background							
Ref=Native							
International graduate	0.053***|(3.67)	0.049***|(3.45)	-0.009|(-0.62)	-0.007|(-0.52)	0.001|(0.08)	-0.023|(-1.03)	-0.021|(-0.95)
International graduate abroad	-0.049***|(-3.15)	-0.059***|(-3.77)	-0.068***|(-4.39)	-0.088***|(-5.66)	-0.074***|(-4.90)	-0.064**|(-2.39)	-0.023|(-0.88)
Int.graduate.lva16NL	0.048***|(7.12)	0.054***|(8.29)	0.027***|(4.18)	0.031***|(4.82)	0.035***|(5.64)	0.030***|(4.82)	0.030***|(4.82)
Native abroad	-0.134***|(-8.22)	-0.127***|(-7.80)	-0.128***|(-7.95)	-0.124***|(-7.78)	-0.119***|(-7.62)	-0.097***|(-5.13)	-0.054***|(-2.61)
Native born abroad	-0.005|(-0.44)	0.004|(0.34)	-0.013|(-1.09)	-0.012|(-1.03)	-0.009|(-0.78)	-0.013|(-1.11)	-0.012|(-1.03)
First-generation migrant	0.025***|(3.54)	0.035***|(5.23)	0.020***|(3.03)	0.030***|(4.54)	0.038***|(5.86)	0.029***|(4.46)	0.030***|(4.66)
Second-generation migrant	-0.014***|(-2.78)	-0.005|(-1.07)	-0.013***|(-2.73)	-0.011**|(-2.36)	-0.009*|(-1.84)	-0.012***|(-2.61)	-0.012***|(-2.59)
Mismatch							
Vertical mismatch		-0.115***|(-34.60)	-0.102***|(-30.36)	-0.104***|(-30.40)	-0.099***|(-29.29)	-0.097***|(-28.91)	-0.091***|(-26.74)
Horizontal mismatch		-0.059***|(-16.05)	-0.064***|(-17.99)	-0.049***|(-13.66)	-0.035***|(-9.88)	-0.036***|(-10.13)	-0.033***|(-9.41)
Double mismatch		-0.274***|(-68.88)	-0.262***|(-66.88)	-0.246***|(-61.38)	-0.214***|(-50.34)	-0.213***|(-50.19)	-0.203***|(-47.54)
Personal							
Age			0.019***|(33.98)	0.019***|(33.97)	0.020***|(36.24)	0.020***|(35.86)	0.020***|(36.33)
Gender. Ref=male			-0.043***|(-18.61)	-0.055***|(-21.12)	-0.055***|(-21.24)	-0.055***|(-21.33)	-0.055***|(-21.43)
Year. Ref= 2005							
2006			0.021***|(3.82)	0.021***|(3.85)	0.016***|(2.94)	0.016***|(2.93)	0.015***|(2.80)
2007			0.038***|(7.16)	0.037***|(7.03)	0.029***|(5.63)	0.029***|(5.58)	0.028***|(5.51)
2008			0.022***|(4.19)	0.022***|(4.25)	0.017***|(3.35)	0.017***|(3.36)	0.018***|(3.45)
2009			-0.006|(-1.11)	-0.009*|(-1.71)	-0.006|(-1.06)	-0.005|(-0.93)	-0.006|(-1.21)
2010			-0.018***|(-3.52)	-0.022***|(-4.21)	-0.018***|(-3.50)	-0.018***|(-3.53)	-0.020***|(-4.00)
2011			-0.045***|(-8.36)	-0.050***|(-9.40)	-0.044***|(-8.38)	-0.044***|(-8.42)	-0.047***|(-8.94)
2012			-0.096***|(-17.50)	-0.100***|(-18.29)	-0.089***|(-16.65)	-0.089***|(-16.71)	-0.093***|(-17.55)
2013			-0.093***|(-17.19)	-0.097***|(-18.06)	-0.084***|(-16.03)	-0.085***|(-16.12)	-0.087***|(-16.57)
2014			-0.095***|(-18.00)	-0.097***|(-18.55)	-0.091***|(-17.67)	-0.092***|(-17.76)	-0.094***|(-18.18)
2015			-0.061***|(-12.08)	-0.064***|(-12.68)	-0.065***|(-13.05)	-0.064***|(-12.91)	-0.067***|(-13.64)
2016			-0.035***|(-6.81)	-0.040***|(-7.77)	-0.046***|(-9.23)	-0.045***|(-9.12)	-0.048***|(-9.57)
Education							
Field of study. Ref=Economics							
Agriculture & Food				-0.033***|(-4.37)	-0.023***|(-3.25)	-0.010|(-1.39)	-0.012*|(-1.65)
Teaching				0.000|(0.05)	0.005|(1.36)	0.006*|(1.68)	0.004|(0.91)
Beta				0.022***|(6.84)	0.026***|(8.06)	0.025***|(7.89)	0.024***|(7.58)
Healthcare				0.120***|(34.06)	0.101***|(26.74)	0.099***|(26.09)	0.096***|(25.09)
Social studies				0.030***|(8.57)	0.010***|(2.82)	0.011***|(3.06)	0.010***|(2.64)
Art				-0.035*|(-1.69)	-0.034*|(-1.70)	-0.020|(-1.01)	-0.022|(-1.10)
Average grade				0.010***|(10.40)	0.008***|(8.37)	0.008***|(8.20)	0.007***|(8.14)
Internship. Ref= yes				0.034***|(2.95)	0.029***|(2.60)	0.029***|(2.61)	0.029***|(2.61)
Work experience. Ref=yes				-0.011***|(-5.10)	-0.007***|(-3.39)	-0.007***|(-3.27)	-0.007***|(-3.06)
Board experience. Ref=yes				-0.007**|(2.29)	-0.007**|(2.31)	-0.008***|(2.69)	-0.008**|(2.57)
Job							
Full-/Part-time. Ref=Full-time							
Type of employment.					0.048***|(16.04)	0.048***|(16.15)	0.050***|(16.84)
Ref=permanent							
Temporary worker					-0.122***|(-28.22)	-0.120***|(-27.74)	-0.116***|(-26.91)
Assisting family member					-0.123***|(-3.42)	-0.123***|(-3.45)	-0.124***|(-3.49)
Self-employed					0.007|(0.61)	0.005|(0.39)	0.000|(0.01)
Otherwise					-0.159***|(-14.78)	-0.157***|(-14.66)	-0.157***|(-14.63)
Firm-size. Ref=1-9							
10-99					0.022***|(5.04)	0.021***|(4.77)	0.021***|(4.81)
>=100					0.078***|(18.75)	0.078***|(18.81)	0.077***|(18.73)
Months unemployed. Ref=0							
1-3					-0.014***|(-4.82)	-0.014***|(-4.79)	-0.013***|(-4.52)
4-6					-0.044***|(-10.23)	-0.045***|(-10.35)	-0.044***|(-10.17)
7-12					-0.075***|(-11.65)	-0.077***|(-11.89)	-0.076***|(-11.76)
>= 13					-0.113***|(-10.22)	-0.115***|(-10.35)	-0.114***|(-10.31)
Looking for another job.					0.051***|(16.68)	0.051***|(16.58)	0.033***|(9.75)
Ref=yes.					-0.014***|(-4.82)	-0.014***|(-4.79)	-0.013***|(-4.52)
Location							
Followed education.							
Ref=Groningen							
Friesland						-0.021***|(-3.18)	-0.020***|(-3.16)
Drenthe						0.004|(0.26)	0.002|(0.15)
Overijssel						-0.003|(-0.51)	-0.011*|(-1.95)
Gelderland						0.008|(1.46)	-0.001|(-0.14)
Utrecht						0.038***|(6.55)	0.029***|(4.74)
Noord-Holland						0.033***|(5.68)	0.024***|(3.98)
Zuid-Holland						0.027***|(5.13)	0.018***|(3.29)
Zeeland						0.008|(0.94)	-0.006|(-0.60)
Noord-Brabant						0.009*|(1.70)	-0.001|(-0.23)
Limburg						0.012*|(1.92)	0.012*|(1.82)
Flevoland						-0.012|(-0.61)	-0.021|(-1.09)
Job mobility							
Ref=same province							
Bordering province						0.014***|(5.13)	0.014***|(5.09)
Other province						0.015***|(3.72)	0.012***|(3.05)
Abroad						-0.017|(-1.14)	-0.018|(-1.19)
Education mobility.							
Ref=same province							
Bordering province						-0.006**|(-2.19)	-0.006**|(-2.01)
Other province						-0.002|(-0.44)	-0.002|(-0.52)
Abroad						0.017|(0.97)	0.016|(0.88)
Economic							
Graduate unemployment							-0.038***|(-5.40)
Log hourly wage							-0.040***|(-15.26)
Constant	2.638***|(2208.32)	2.688***|(1989.34)	2.269***|(156.48)	2.219***|(146.59)	2.117***|(135.41)	2.099***|(125.88)	2.168***|(118.16)
Observations	96033	96033	96033	96033	96033	96033	96033
Pseudo R^2	0.004	0.074	0.115	0.129	0.167	0.169	0.172

t statistics in parentheses * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6.6: Robust OLS Regression results for log hourly wage

Appendix IV

Table 6.7: Cross tabulation of gender x field of study

Gender	Agriculture & Food	Teaching	Beta	Economics	Healthcare	Social	Art	Total
Male	1777 4.47%	2238 5.63%	14476 36.44%	17274 43.48%	2117 5.33%	1710 4.30%	134 0.34%	39726 100%
Female	1492 2.65%	8478 15.06%	3141 5.58%	20018 35.55%	11032 19.59	11907 21.15%	239 0.42%	56307 100%
Total	3269 3.40%	10716 11.16%	17617 18.34%	37292 38.83%	13149 13.69%	13617 14.18%	373 0.39%	96033 100%

From this table it becomes clear that the largest groups of both male and female are graduated in the field of economics. Moreover, there is a large share of men who studied the beta field. With regards to females their choice for fields of study is more diverse. However, there are three fields that stand out besides economics, namely social, healthcare and teaching. When results for field of study of the horizontal mismatch model are taken into account, one can notice that these field are among the lowest likelihood to experience such a mismatch. Accordingly, the relatively large group of females in these fields explains why they are less likely to experience a horizontal mismatch, whereas males have mostly a background in economics, which is sensitive for being horizontally mismatched.