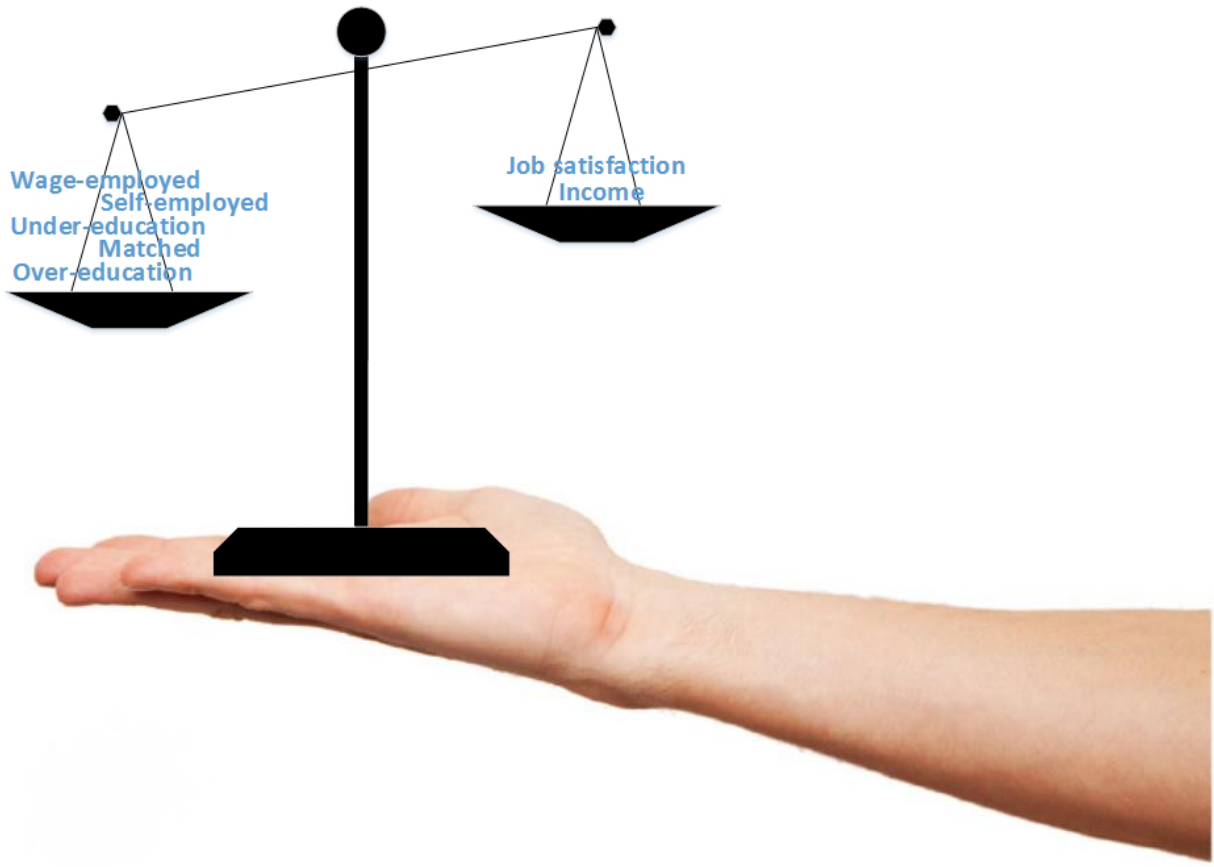


# Educational mismatching: effects on income and job satisfaction

*"A study on the difference between self-employment and wage-employment with regards to the effect of educational mismatching on income and job satisfaction."*

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Bachelor thesis
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# Preface

This is a bachelor thesis on educational mismatching, written in the context of my graduation of the bachelor program European Public Administration at the University of Twente. From February 2016 up until June 2016 I have been working on this bachelor thesis. Over this period of time the progress of my thesis had its ups and downs but this always resulted into new ideas and different perspectives.

When searching for literature on self-employment I was not immediately drawn to the mismatching literature. When reading literature on self-employment I came across mismatching literature more and more and started to get interested in the matter. Mismatching is a very broad concept and I was not aware of the effects it could have on society and on people their personal life. Since I was looking for literature on self-employment I immediately started to wonder about how mismatching would affect self-employed people and how whether this would differ from other types of employment. I started looking for more literature on specifically this topic and this resulted in a research on educational mismatching and the different effects it has on types of employment.

In the course of this research I had to recover some of the knowledge and skills on statistics that we learned during the first two years of this bachelor. This turned out to be less hard than expected, and by practicing and trying a lot of difficulties were overcome. The complicated character of the statistical framework turned out to be a very time consuming task, but this was an interesting challenge.

This thesis was written under the supervision of Dr. G. Jansen and with a bachelor circle of four students that could provide each other with feedback. I wish to thank my supervisor Dr. G. Jansen for his guidance and support in conducting this research, he has been truly helpful and understanding during this period of time. Also, I wish to thank my fellow students in the bachelor circle for their feedback and help. Lastly I want to thank my family and friends, who were always willing to hear me out and provided me with the much needed support.

Marleen Schlömer

Enschede, 29th of June 2016.

# Abstract

In literature educational mismatching remains an issue of all times because of education costs and the fact that it is impossible to predetermine the (educational) career of individuals. The previous mismatching literature mostly focuses on the over-education aspect of mismatching and in wage-employment only. In attempt to make an addition to the already existing body of knowledge on this matter this research focuses on the differences between self-employment and wage-employment and on differences between over-education and under-education with the use of data from the Labour Supply Panel 2010. The research question of this research is: To what extent does the effect of vertical mismatching on income and job satisfaction differ between people in wage-employment and self-employment?

The results of this research indicate that there seem to be no differences between wage- and self-employment looking at the effect of vertical mismatching on income. They however do indicate a difference between the two groups with regards to the effect of vertical mismatching on job satisfaction. It seems that for the wage-employed there certainly are effects of vertical mismatching on job satisfaction whilst the self-employed their job satisfaction seems unaffected by vertical mismatching.

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# 1. Introduction

The costs of education are very high, due to this policy makers, economists and the public question whether or not employees utilize the knowledge and skills they acquired in their education in their work. Not utilizing the knowledge and skills acquired in education is conceptualized as mismatching, a mismatch being a characteristic of someone that does not use the knowledge and skills, that he acquired during his education, in his daily work (Bender & Roche, 2013).

Research on the topic of educational matching mainly focuses on having a job that is not well matched with education and the effects thereof. One of those effects of mismatching that studies focus on is lower earnings, researchers found that mismatch is positively correlated with lower earnings (Borghans & Grip, 2000; Groot, Maassen, & van den Brink, 2000). This positive correlation means that someone whose job is not matched to his education is most likely earning less than he could have when his job was well matched with his education. Other researchers found that educational mismatching is negatively correlated with job satisfaction (Belfield & Harris, 2002; Bender & Heywood, 2006; Moshavi & Terborg, 2002), meaning that people that are mismatched are less satisfied with their job than people that are well matched.

Bender & Roche (2013) suggest that although the abovementioned results are important, there is another angle from which mismatching can be looked at. They state that there is a complete area that has not yet been considered in the mismatching literature, the area of differences in mismatching between people in wage-employment and self-employment. There is one research that comes close to this area by comparing mismatching amongst occupational levels (Nordin, Persson, & Rooth, 2010), their main focus however lies on differences between women and men.

What is striking in all these studies is that the primary focus is on over-education, the “too much” aspect of vertical mismatching. Baumann and Brändle (2012) argue that under-education is of high importance as well, because the amount of entrepreneurial activity has been and is rising. They link entrepreneurship to under-education, saying that there are a lot of entrepreneurs that without (proper) education still attain a certain high level job. They argue that over-education is the predominant issue in wage-employment whilst under-education is the predominant issue in self-employment. Although Baumann and Brändle (2012) put forward this highly interesting hypothesis, they do not test this hypothesis in their research but lay the focus elsewhere.

This research combines the suggestions that Baumann and Brändle (2012) and Bender & Roche (2013) posed in their studies. Meaning, that this research will focus on mismatching differences between self-employment and wage-employment and also distinguish between under-education and over-education. Thus further exploring the idea of Bender & Roche (2013), to look at the difference in mismatching between people in wage-employment and people in self-employment, in combination with the suggestion of Baumann and Brändle (2012) to distinguish between over- and under-education. In doing so, this proposal seeks to answer the following explanatory research question: **To what extent does the effect of vertical mismatching on income and job satisfaction differ between people in wage-employment and self-employment?**

This research has scientific as well as social relevance. The scientific relevance of this research is the combination of present studies on the matter. As mentioned, previous researchers have tested the relationship between mismatching and income (Borghans & Grip, 2000; Groot et al., 2000), and researchers have tested the relationship between mismatching and job satisfaction (Belfield & Harris, 2002; Bender & Heywood, 2006; Moshavi & Terborg, 2002). This research seeks to combine the two and test the

relationship between mismatching on income and job satisfaction. In addition to this, by focusing on different types of employment this research tries to shed a light on the rather under-investigated area of mismatching, namely looking at the effects of mismatching on self-employment. Lastly, this research will split mismatching into over- and under-education as Baumann and Brändle (2012) suggest. The scientific relevance of this research is therefore the adding of new knowledge to the already existing body of knowledge on the matter.

The social relevance mostly focuses on education, as education is a crucial aspect of life. As mentioned earlier, the costs of education are rather high and therefore it is worthwhile to investigate mismatching. People that are mismatched might have acquired a (high) level of education they do not even need in order to have the job they want. For society this is of high importance, if mismatching is prevented the costs that go along with education will decrease. Also, whether or not someone is mismatched has a large impact on the life of someone, especially on income and job satisfaction. If a mismatched person is not satisfied with his job this can translate into a larger dissatisfaction, for example in his personal life. Education is very important for the development of a person it determines the path of a person and lets people discover who they are. Education can however, when people are not properly guided, have a negative effect on the course of someone his life. Especially mismatched people, because their current position does not reflect their level of education. It is therefore important to research the effects of mismatching because it gives an insight into the influence of education on the life of people.

# 2. Theoretical Framework

In order to understand what this research will incorporate, the concepts and theories will first be defined and explained. It is very important to define the concepts and theories that will be used in the research because in this way misunderstandings about the concepts and/or theories can be prevented and it is abundantly clear what is meant with certain concepts and theories. We will discuss the theoretical framework of mismatching with the use of its concepts and results on mismatching from other studies. These will be combined into new ideas and concepts on mismatching and five hypotheses will be posed as a framework for testing these new ideas and concepts.

In mismatching literature there is assumed that for every occupation there is a certain level of education. Workers that have a certain level of education that resembles their profession are seen as people that are matched. The opposite is also possible, the overarching concept of this research is educational mismatching, educational mismatching occurs when an employee presents a mismatch between his educational attainment and the level of education/skills required in their job (Rahona-Lopez & Perez-Esparrells, 2013). Mismatching happens when workers have a higher or lower level of education than that which is usual for the profession they have.

Within mismatching there are two possible distinctions that can be made, we can distinguish between vertical and horizontal mismatching and between splitting mismatching up in over- and under-education. The first distinction, vertical and horizontal mismatching, is about the difference between attained skills and acquired educational level. Horizontal mismatching is about whether the gained skills match the job or not. A horizontally matched person being someone who his skills match the job he has, and a horizontally mismatched person being someone who his skills do not match his job. A horizontally mismatched person for example is someone that has studied for being a carpenter but ended up being a plumber. This person his skills (carpenter skills) do not match his current profession of plumber.

Vertical mismatching, however, is about being ‘too much’ or ‘too little’ educated for the job at hand. Someone that is “too much” educated for the job he has, is overeducated and someone that is “too little” educated for the job he has, is undereducated (Bender & Roche, 2013). Over-educated workers are people with a “surplus” when it comes to years of schooling. This means that a worker has excess education and/or skills to do his work and is therefore over-educated. Under-educated workers are people with a lower level of education and/or skills than that which is usual for doing their job and are therefore under-educated (Chiswick & Miller, 2009; Rahona-Lopez & Perez-Esparrells, 2013).

## 2.1. Vertical mismatching in wage- and self-employment

Mismatching thus is a very general concept that can be specified when a distinction is made between vertical and horizontal mismatching. This research chose to focus on vertical mismatching, meaning that we only look at whether or not the level of education matches the profession and do not look at the skills needed for that profession. What remains unclear is why the distinction in types of employment is interesting when it comes to mismatching. As mentioned, Bender & Roche (2013) suggest that when it comes to mismatching the distinction between self-employment and wage-employment should be taken into account. One reason being that literature thus far has neglected to make a distinction in what types of employment mismatch occur and how it differs.

In making this distinction, it first raises the question why educational mismatch might occur in self-employment and why it occurs more or less in self-employment than it does in wage-employment. On the one hand, self-employment might be a way to find an educational match, especially if a matched job is not available in wage-employment. Therefore it can be argued that mismatching occurs less for the self-employed than for the wage-employed. However on the other hand, if workers do have troubles obtaining a wage-employed job in their educational field this may cause them to go into self-employment and work in a different field and therefore it could be argued that mismatching occurs more in self-employment.

This is confirmed by the argument of Lazear (2005), who found that the self-employed are 'jacks of all trades' that have a wide range of interests and due to that it is more likely that they work in a field that is different as to their education and educational level. In addition to this, research also shows that the self-employed in the United States have higher levels of education than the wage-employed. The same study shows that the larger the group of over-educated people within a certain group the higher the percentage of over-educated people in that group (Hipple, 2010). These studies therefore raise the idea that self-employed people are more likely to be both over- and undereducated.

The opposite is true for wage-employed people, this group is of such a size that finding a job on a certain educational level were the offer is high might be difficult and therefore more and more people might find themselves in a profession that requires a lower educational level and are therefore over-educated. However, some professional fields require an expertise that not many people have and therefore people in those profession might find themselves in higher positions than their original educational level, because there is a lack of people that have the expertise and the level of education that is normal for such a position. These groups of people in these profession are then more likely to be under-educated (Groot et al., 2000).

Looking at these theories on the difference in effect of over- and under-education on self-employed and wage-employed people we notice that there are opposite expectations possible with regards to the effects of vertical mismatching. "Since self-employment is often seen as a driver of economic growth and particularly in employment growth the study of how mismatch interacts with self-employment enriches our understanding of educational mismatching" (Bender & Roche, 2013, p. 85). This quote from Bender and Roche shows that little is known on the difference in educational mismatching between wage-employed and self-employed people. This makes this research so interesting, innovative and an addition to the already existing body of knowledge. This research therefore seeks to find differences between self-employment and wage-employment when it comes to the effect of vertical mismatching. In the following section hypotheses will be formulated, these will be substantiated with theory.

## 2.2. Hypotheses

**Hypothesis 1**

Vertical mismatching can have an effect on many things, most studies however focus on the effect on income. The general idea most studies use is that when people are over-educated, and thus work on a lower level than their educational level, their income is generally lower. On the other hand, when people are under-educated, and thus work on a higher level than their education level, their income is generally higher. In both of these cases matched people and their income are used as a baseline. The theory behind this is explained in a study by Groot et al. (2000), which states that the reason for the relatively lower income is that the jobs over-educated people have can just as easily be done by someone with a lower level of education and less skills meaning that the over-educated person is overqualified. In addition, the reason for the relatively higher income for under-educated people is that the job they are doing generally requires a certain set of skills and education that is higher than the person doing the job acquired. Salaries are fixed for job positions because job positions come with certain responsibilities, tasks and require a certain education and expertise. Salaries do not increase just because the one doing the job is over- or underqualified.

The effect mismatching has on income, has been established by various researchers. The striking thing is that most studies only look at over-education of which the general effect is negative (Borghans & Grip, 2000; Groot et al., 2000; Korpi & Tåhlin, 2009). Because these studies focus on over-education, of which a consequence is a relatively lower income than when matched, they generally state that mismatching has a negative effect on income. But, as mentioned in the previous paragraph this is not necessarily the case because under-education is ought to have a positive effect on income.

Baumann and Brändle (2012), suggest to make a distinction between under- and over-education whilst testing the relationship between vertical mismatching and income. This because these two seem to have opposite effects and if you just distinct between matched and mismatched the results of your research are

not reliable because there are different effects between over and under-educated. They state that results such as that from the studies of Groot et al. (2000) and Borghans & Grip (2000) might indicate that mismatching has a negative effect on income just because the category of mismatched people in their studies incorporated more over-educated respondents than under-educated respondents and that this caused their study to wrongly indicate that there is a general negative effect of mismatching on income.

Looking at the theory on vertical mismatching and how other studies interpreted this theory and with the incorporation of the suggestion of Baumann and Brändle (2012) to split educational matching into under-education, over-education and matched hypothesis 1a and 1b are formulated:

Hypothesis 1: People who are (a) over-educated have relatively lower incomes and (b) people who are under-educated have relatively higher incomes, than people whose education matches their occupation.

**Hypothesis 2**

Another thing mismatching is thought to have an effect on is job satisfaction. In addition to the article by Bender & Roche (2013), which focuses on the effects of both income and job satisfaction on vertical mismatching, other studies also focus on the effect of job satisfaction on mismatching (Allen & Van der Velden, 2001; Badillo Amador, López Nicolás, & Vila Lladosa, 2008; Johnson & Johnson, 2000; Vieira, 2005). Johnson and Johnson (2000) stated that over-education has a negative effect on job satisfaction and under-education has a positive effect on job satisfaction. The theory behind this is that over-educated people know that they work beneath their educational level and because they know that they could potentially have a better job they are less satisfied with their current job. Under-educated people know that their job is above their educational level and due to this they know that they would generally have a lower job and therefore they are more satisfied with their job.

Just like the effect on income, this theory was tested by researchers. The effect of mismatching on job satisfaction is found negative in most studies (Belfield & Harris, 2002; Bender & Heywood, 2006; Moshavi & Terborg, 2002). As said a distinction can be made between over- and under-education, in which over-education is found to have a negative effect on job satisfaction and under-education a positive effect. People that are over-educated know that they have a job position that is lower than what they are educated for with less responsibilities and tasks that are not challenging them enough. Just like Johnson and Johnson (2000), Bender & Heywood (2006) see this as the main reason that over-educated people are less satisfied with their job than matched people. Again, just as with the effect on income the opposite is presumed true for under-educated people, they are happier with their job because they know that they are actually educated for a lower job position. In order to specifically test this theory for both over- and under-education theory 2 is formulated:

Hypothesis 2: People who are (a) over-educated have a relatively lower job satisfaction and (b) people who are under-educated have a relatively higher job satisfaction, than people whose education matches their occupation.

**Hypothesis 3**

Now that we have discussed some theories on vertical mismatching in general and established some hypotheses on this matter we have come to the point where we discuss the differences (if any) between wage-employed and self-employed when it comes to mismatching. As mentioned literature has thus far not really payed that much attention to whether or not mismatching differs amongst these two types of employment, which is one of the reasons why this research does focus on this.

Studies confirm that self-employed people generally are ‘jacks of all trades’ they have a wide range of interests and skills and they are therefore more likely to work in a field that is different as to their education and educational level (Lazear, 2005; Panjaitan-Drioadisuryo & Cloud, 1999). The study results from Hipple (2010) also mentioned before contributes to this as well, this study shows that the larger the group of over-educated people within a certain group the higher the percentage of over-educated people in that group.

In contrast, other studies show that wage-employed people are people that do not easily change professions. Once they work in a certain profession it is very likely that they will continue working in that profession. Naturally, they do change positions within that profession which could give rise to under-education and even over-education, but other than self-employed people they do not change professions as easily (Di Pietro & Urwin, 2006). Changes in positions with a profession could give rise to under- or over-education but not as much as changing profession does. In addition, a study showed that wage-employed people are people that like permanent employment and fixed patterns more than self-employed people do and are therefore less likely to change both their position as their profession (Mavromaras, McGuiness, O'Leary, Sloane, & Fok, 2010).

Looking at the arguments and results from both studies on self-employment and wage-employed they raise the idea that self-employed people are more likely to be both over- and under-educated than wage-employed people are. On the basis of this hypotheses 3a and 3b were formulated:

Hypothesis 3: People who are self-employed are (a) more likely to be over-educated and (b) more likely to be under-educated, than people who are wage-employed.

**Hypothesis 4**

As mentioned, it is very interesting to specifically look at the effects of mismatching for the self-employed because it has not been extensively studied yet and those that have studied the effects of mismatching on the self-employed (Baumann & Brändle, 2012; Bender & Roche, 2013) concluded their research with possibilities of differences but were not convinced that there were. Therefore this research extensively tests this difference, meaning that hypotheses 1 and 2 are posed again but with the addition of the distinction between self-employment and wage-employment, they form hypotheses 4 and 5.

In extending the previous hypotheses, hypothesis 4a states that the negative effect of over-education on income is larger for people that are in wage-employment. This effect is presumed to be larger because within self-employment there are not as many levels of income as there are in wage-employment and whether the income of self-employed people increases mostly depends on the economic market and not their job position. Self-employed people decide their own rate and next to this are dependent on the demand of their product or service they offer (market forces), whereas wage-employed are dependent on agreements with their employer and on whether or not there are higher positions available in their professional field. Whether self-employed people are over-educated their rate and demand and thus income does not change, whereas when wage-employed people are over-educated they find themselves in a position that is beneath their educational level and this thus comes with a lower income level.

The negative effect of over-education on job satisfaction is also presumed larger for wage-employed people compared to self-employed people. Hypothesis 4b thus states that over-educated people that are in wage-employment are less satisfied with their job than over-educated people in self-employment. This is in accordance with Baumann and Brändle (2012) their study, they stated that self-employed people most of the time specifically choose to go into self-employment and are therefore more satisfied with a job on a lower educational level than wage-employed people are. A self-employed person for example chooses to start a business whilst he is academically educated but a wage-employed academically educated person that works in the field he is educated in does less often / not choose to have a job on the elementary level of that profession. However, if he does work on the elementary level of that profession he does not have the option to work in a higher position ((Baumann & Brändle, 2012). On the basis of this hypotheses 4a and 4b were formulated:

Hypothesis 4: The negative effect of over-education on (a) income and (b) job satisfaction, is smaller for people in self-employment than for people in wage-employment.

**Hypothesis 5**

The same goes for the positive effect of under-education on income, of this is assumed that the positive effect of under-education on income is larger for wage-employment than for self-employment, this forms

hypothesis 5a. Again because self-employed people are under-educated they do not change their rate and this has no effect on the demand of their product or service and therefore this effect their income less than it does for a wage-employed person. Wage-employees that are under-educated find themselves in a higher position than what is normal for their educational level, this usually comes with more responsibilities and requires additional knowledge and skills and therefore the wage is higher (Hamilton, 2000).

On the other hand, hypothesis 5b states that the positive effect on job satisfaction is larger for wage-employment than self-employment. Since self-employed people mostly decide that they want to go into self-employment because of their interest, ambition and passion and not because they can do a job for which they are not educated and do not possess the skills. They are not presumed to look at their job the same way wage-employed people do, they do not see their self-employment as a step up and themselves as under-education per definition. Wage-employed people do look at their position within a profession and under-educated wage-employed people notice that looking at their educational level they have achieved more than what is normal for that educational level and are therefore more satisfied with their job. This is why the positive effect on job satisfaction is presumed to be larger for wage-employed people than it is for self-employed people (Baumann & Brändle, 2012). On the basis of this hypotheses 5a and 5b were formulated:

Hypothesis 5: The positive effect of under-education on (a) income and (b) job satisfaction, is smaller for people in self-employment than for people in wage-employment.

## 2.3. Analytical Framework

These hypotheses were translated into an analytical framework (figure 1), this framework is presented on the next page. In this framework the main relationship that is represented is the relationship between vertical mismatching and income and the relationship between vertical mismatching and job satisfaction. As explained, this research distinguishes between under- and over-education within vertical mismatching. These two relationships represent hypotheses 1 and 2 and are accompanied with a 1 in the analytical framework.

In addition to this, we expect there to be a relationship between type of employment and vertical mismatching. We expect vertical mismatching to occur more or less depending on the type of employment, meaning that we think that whether someone is wage-employed or self-employed determines whether someone is likely to be matched, over-educated and under-educated. This relationship represents hypothesis 3 and is accompanied with a 2 in the analytical framework.

We expect there to be a difference in the first two relationships between self-employed and wage-employed people. Therefore type of employment is added into the framework with an arrow toward the relationships between vertical mismatching and income/job satisfaction, indicating that type of employment has an effect on these relationships. This is called an interaction effect, meaning that once the value for type of employment changes the relationship between vertical mismatching and income/job satisfaction changes as well. This interaction effect represent hypotheses 4 and 5 and is accompanied with a 3 in the analytical framework.

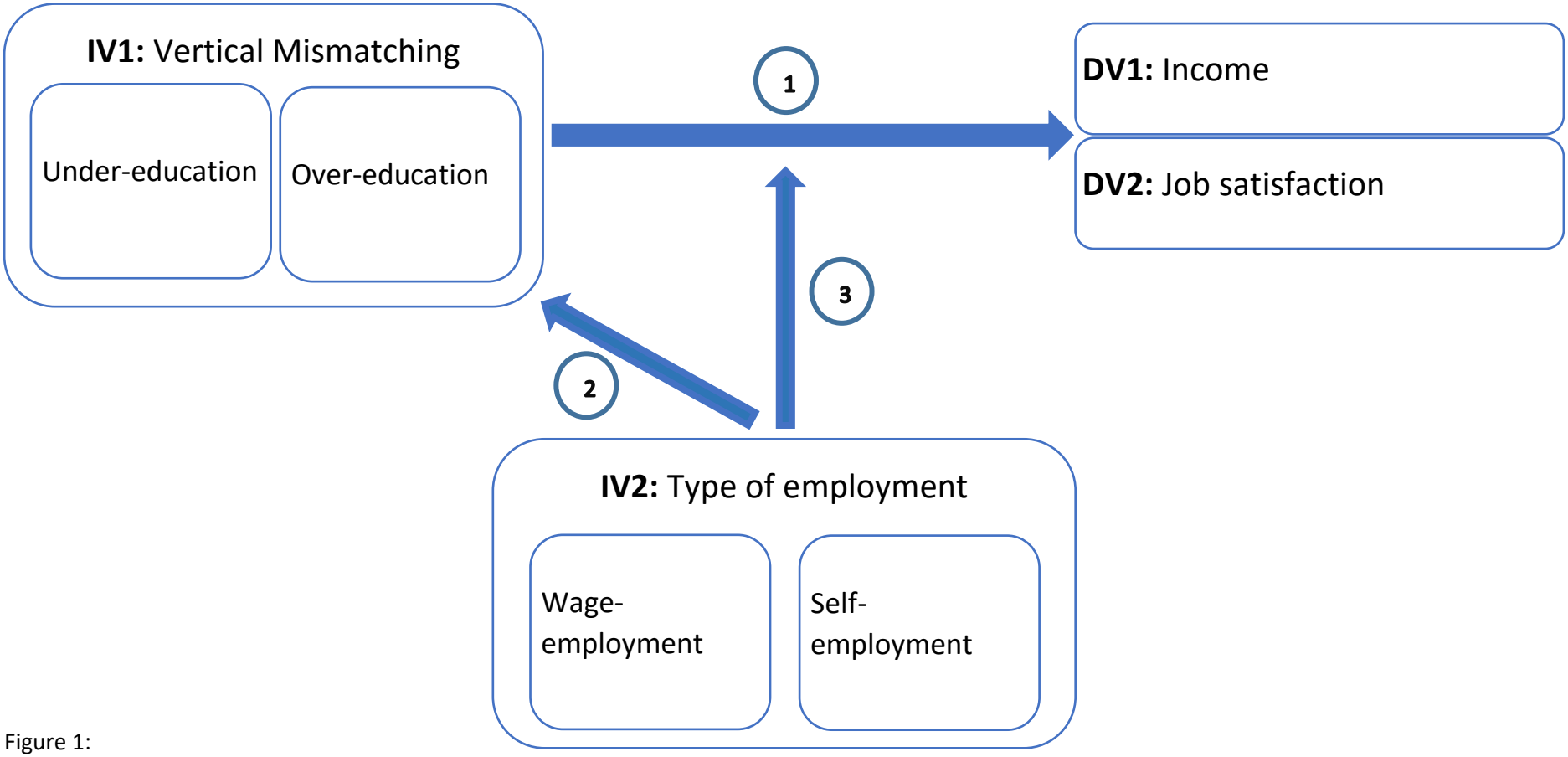


Figure 1:
Analytical Framework

# 3. Data and Operationalization

## 3.1. Dataset and sampling

This research uses secondary data, more specific an existing dataset called Arbeidsaanbodpanel 2010 (hereafter: Labour Supply Panel 2010), which contains quantitative data. The Labour Supply Panel focuses on the supply of labour to the labour market, and tries to map a lot of different aspects of the supply of labour over a period of time. We chose to use the dataset from one year and not consecutive years which means this is a cross sectional study. We chose to not use longitudinal or panel data because we want to measure the effects of vertical mismatching at one point in time. If we would have chosen to use longitudinal or panel data our results could have been devoted to time instead of vertical mismatching.

Important themes in the reoccurring panel are labour mobility, opinions on jobs, current jobs and the behaviour of people that search for jobs. This research uses the Labour Supply Panel that was conducted in 2010, this is the latest Labour Supply Panel that was conducted. The target population of this dataset is the Dutch (potential) labour force, and pupils and students aged between 16 and 66. The panel its questions are in Dutch and the dataset is completely in Dutch as well. The relevant variables in the dataset will be decoded into English variables so that the variables and its values are in English and can be analysed in English as well. The dataset was retrieved through DANS (Data Archiving and Networked Services), an online archiving system.

The cases used for this research will be people selected from the Labour Supply Panel 2010. Individuals of which can be determined whether they are matched or mismatched, wage-employed or self-employed, how satisfied they are with their job, and their income will be selected from the dataset of the panel and used in this research. As mentioned in the previous paragraph the dataset only contains Dutch individuals in the age of 16 until 66, the (potential) labour force, and pupils and students. This research eliminated the students from the dataset because whilst it is possible that they have a (part-time) job they are not done studying yet so it cannot be properly decided whether they are matched or mismatched. Also, the jobs that most students do are beneath their educational and skill level and because of that they are almost per definition over-educated. This could change the results from our analyses and therefore pupils and students are removed from our dataset.

Since this research uses an existing dataset and all its data we look at the sampling technique of the panel. The sampling technique used for the Labour Supply Panel is stratified sampling, with the use of stratified sampling 39 strata are defined. In this case some of the strata for example are: age, source of income and where someone lives. On the basis of an estimated response rates and the size of the population in these 39 strata a complementary sample is drawn. This means that if a group is highly underrepresented in the original sample they are overrepresented in the complementary sample.

This specific panel was chosen because it is a rather recent panel and a very detailed one as well. Some of the questions posed in this survey provide the answers we need in order to do this research. This panel uses detailed measurements to observe education and profession and therefore this panel is particularly suitable to analyse vertical mismatching. The questions of the panel that will be used and how these will be operationalized will be explained in the following paragraphs.

## 3.2. Operationalization

The variables will be operationalized with the use of the questions posed in the Labour Supply Panel 2010. The answers to these questions will determine the values of the variables which will be used in the analysis chapter. The variables that are part of our analytical framework are: vertical mismatching, type of employment, income and job satisfaction. In addition to these variables some control variables will be added. The control variable that are used in this research are: age, gender, type of contract and

work sector. The operationalization of these above mentioned variables has as a goal to attach a value to the variable with which then analyses can be run.

### 3.2.1. Vertical Mismatching

The operationalization of the variable vertical mismatching has as a goal to determine whether a person is over-educated, under-educated or matched. This will be determined with the use of questions from the Labour Supply Panel 2010. These questions translated into English are as follows: What is the highest degree or level of school you have completed? What is your current profession or position? What does your current job involve on a day-to-day basis and do you have any managerial responsibilities?

By combining the last two questions a new variable was constructed called: Level of current profession, with value labels: elementary, low, moderate, high and scientific. The people of the Labour Supply Panel constructed this variable with the use of the SBC-2010 code. This code is a classification of professions on the basis of level and skills necessary for a certain profession. By combining this variable with the variable that derives from the first question (highest degree or level of school) we will then determine, in a rather objective way, whether someone is over-educated, under-educated or matched. This is displayed in table 1 and then computed into the variable vertical mismatching, with the values: matched, over-educated and under-educated.

Table 1:
Operationalization Vertical Mismatching

| | | **LEVEL OF EDUCATION** | | | | |
|---|---|---|---|---|---|---|
| | | **Primary school** | **Lower education** | **Middle education** | **Higher education** | **Scientific education** |
| **LEVEL OF PROFESSION** | **Elementary** | Matched | Over-educated | Over-educated | Over-educated | Over-educated |
| | **Low** | Under-educated | Matched | Over-educated | Over-educated | Over-educated |
| | **Moderate** | Under-educated | Under-educated | Matched | Over-educated | Over-educated |
| | **High** | Under-educated | Under-educated | Under-educated | Matched | Over-educated |
| | **Scientific** | Under-educated | Under-educated | Under-educated | Under-educated | Matched |

In order to use the vertical mismatching on our analyses we decoded the categorical variable into dummies. Since the variable has three values three dummies were made as well. The dummy variable of matched has a value of 0 for under- and over-educated and a value of 1 for matched. The dummy variable of over-educated has a value of 0 for under-educated and matched and a value of 1 for over-educated. The dummy variable of under-educated has a value of 0 for over-educated and matched and a value of 1 for under-educated. Our research focuses on differences between over- and under-educated and matched people and therefore the dummy of matched is left out of the analyses, which makes it the reference category.

### 3.2.2. Type of employment

Type of employment, will be operationalized with the use of the following question from the Labour Supply Panel. The question is: How are you employed at the moment? The six answer possibilities are: at the government, in a company or organization, as director of a company, self-employed with employees, self-employed without employees, employee in the self-employed business of husband/wife or partner. We translated the variable that followed from this question into English and

categorized the values into self-employed and wage-employed. The values at the government, in a company or organization and as a director of a company were categorized as wage-employment and self-employed with employees, self-employed without employees and employee in the self-employed business of husband/wife or partner were categorized as self-employment.

Type of employment also needed to be decoded into dummies in order to use it in the analyses. The dummy variable of self-employed has a value of 0 for wage-employed and a value of 1 for self-employed. The dummy variable of wage-employed has a value of 0 for self-employed and a value of 1 for wage-employed. Since we want to find a distinction between self-employed and wage-employed the dummy variable of wage-employed was left out of the analyses, which makes it the reference category.

### 3.2.3. Income

Income, will be operationalized with the use of the following question: How much is your net wage? This is an open question in which the people can fill in an amount and then tick any of the following boxes: per hour, per week, per four weeks, per month, per year. It is hard to analyse a variable and its value when the values do not have the same meaning. Therefore, we decoded the answer to this question into net income per month. Now all values mean the same thing, net income per month, and we can run analyses with this variable.

### 3.2.4. Job satisfaction

Job satisfaction, will be operationalized with the use of the following question: How satisfied are you with your job? The answer possibilities are: very satisfied, satisfied, not very satisfied, not satisfied at all. This variable was decoded into English as well as these value labels which stayed the same as they originally were. This variable then measures job satisfaction on a scale of one to four, one being very satisfied and four being not satisfied at all. In the analyses job satisfaction will be referred to as job dissatisfaction since to higher the number on the scale the more dissatisfied a person is. By doing this we prevent misunderstandings about the direction of a coefficient.

### 3.2.5. Control variables

The most prominent potential threat to this research is omitted variable bias. It is possible that income and job satisfaction might be higher or lower because of something else than under- or over-education. It is possible that another variable or other variables have an influence on the relationship and therefore it is possible that we misinterpret the strength of a relationship or think a relationship exists that does not. The threat of the omitted variable bias will be minimalized by having a sound operationalization and introducing control variables into the research.

The control variables will be operationalized with the use of the questions from the Labour Supply Panel 2010 as well. Age will be operationalized with the use of question: What is your date of birth? The answer to this question is then decoded into how many years of age a person is and this value is used in our analysis. Gender will be operationalized with the use of question: What is your gender? The answer possibilities are either male or female. Type of contract is operationalized with the use of question: Are you employed full-time or part-time? Lastly work sector will be operationalized with the use of question: At what kind of organisation or company are you currently employed? The answers to this question were then decoded into ten categories with the use of SBI-2008 code. This code is a hierarchical categorization of economic activities. We recoded these ten categories into three categories: Primary or secondary sector, tertiary sector and quaternary sector.

All of these control variables were translated into English. In order to use them in our analyses we need to make dummies of the categorical control variables as well. For gender this means two dummy variables, male that has a value of 0 for female and a value of 1 for male, and female which has a value of 0 for male and a value of 1 for male. Only the dummy variable female was used in the analyses,

because the number of males in the dataset was higher than the number of females we use male as a reference.

For type of contract the same was done, one dummy fulltime which has a value of 0 for part-time and a value of 1 for fulltime and one dummy part-time which has a value of 0 for fulltime and a value of 1 for part-time. Because the amount of respondents that work fulltime is higher than the amount of respondents that work part-time we use fulltime as a reference and use the dummy of part-time. For work sector three dummies were created, one for primary or secondary sector, one for tertiary sector and one for quaternary sector. Because the amount of respondents that work in the tertiary sector is considerably higher than the amount of respondents that work in the primary or secondary and quaternary sector we use the tertiary sector as a reference.

Of all of these variables some descriptive statistics can be found in table 2. As this research focuses on the differences in these variables between wage-employed and self-employed this descriptive statistics table is split up between wage-employed and self-employed.

Table 2:
Descriptive statistics by type of employment (N=2979)

| | Wage-employed | | | | Self-employed | | | |
|---|---|---|---|---|---|---|---|---|
| | *n* | | *%* | | *n* | | *%* | |
| **Sample size** | 2317 | | | | 562 | | | |
| % of total sample | | | 80% | | | | 20% | |
| **Gender** | | | | | | | | |
| Female | 1157 | | 49% | | 292 | | 52% | |
| Male | 1160 | | 51% | | 270 | | 48% | |
| **Type of contract** | | | | | | | | |
| Full-time | 1231 | | 53% | | 359 | | 64% | |
| Part-time | 1086 | | 47% | | 203 | | 36% | |
| **Sector** | | | | | | | | |
| Primary or Secondary sector | 385 | | 17% | | 95 | | 17% | |
| Tertiary sector | 764 | | 33% | | 283 | | 50% | |
| Quaternary sector | 1168 | | 50% | | 184 | | 33% | |
| **Mismatching** | | | | | | | | |
| Matched | 1574 | | 68% | | 292 | | 52% | |
| Over-educated | 387 | | 17% | | 168 | | 30% | |
| Under-educated | 356 | | 15% | | 102 | | 18% | |
| **Job satisfaction** | | | | | | | | |
| Very satisfied | 820 | | 35% | | 210 | | 37% | |
| Satisfied | 1306 | | 56% | | 298 | | 53% | |
| Not very satisfied | 171 | | 7% | | 43 | | 8% | |
| Not satisfied at all | 20 | | 1% | | 11 | | 2% | |
| | *Mean* | *S.d.* | *Min.* | *Max .* | *Mean* | *S.d.* | *Min.* | *Max.* |
| **Age** | 46 | 11 | 16 | 66 | 38 | 15 | 16 | 66 |
| **Income per month** | €1730 | €807 | €50 | €7100 | €1800 | €1408 | €88 | €15.167 |

# 4. Analysis

This research will use statistical inference to test the hypotheses and draw conclusions, this research will use some bivariate statistical test to draw some general conclusions and uses multivariate regression analysis in particular. This chapter therefore starts by describing some bivariate statistical tests that we run which are preparatory to the multivariate regression analyses. In this way we can first take a look at the bivariate relationships before building somewhat larger multivariate models. Throughout these tests assumptions will be taken into account to make sure the proper tests are used and that we interpret the results correctly. After we have analysed and discussed all the multivariate regression models the results from those will be interpreted with regard to the hypotheses, and we will then either reject or accept the hypotheses.

## 4.1. Bivariate statistical tests

Let us first look at the relationship of vertical mismatching on income and job satisfaction, our main relationship between the independent and our two dependent variables. The test that was used is the One-Way ANOVA test. The One-Way ANOVA tests whether the means amongst the groups of vertical mismatching significantly differ from one another. We use the One-Way ANOVA test in particular because there are more than three values of vertical mismatching. The results of the One-Way ANOVA can be found in Table 3.

The outcome of this test shows that the means of income and job satisfaction amongst matched, under-educated and over-educated people do differ from each other, but does not say what exactly differs. With a statistical significance of .000 we reject the null hypotheses that the mean income and job satisfaction amongst matched, under-educated and over-educated people do not differ from each other. Because the dependent variables seem to be non-normally distributed (Annex 1) the non-parametric equivalent of the One-Way ANOVA, the Kruskal-Wallis test, was also run. The Kruskal-Wallis test has the same statistical outcome as the One-Way ANOVA and therefore we assume that the One-Way ANOVA results are correct.

Table 3:
One-Way ANOVA of Vertical Mismatching on Income and Job satisfaction (N=2979)

| | | Descriptive Statistics | | Test Statistics | | |
|---|---|---|---|---|---|---|
| | Vertical Mismatching | N | Mean | Degrees of Freedom | F | Significance |
| Net income in euros per month | Match | 1866 | 1800 | | | |
| | Undereducated | 458 | 1915 | | | |
| | Overeducated | 555 | 1414 | | | |
| | Total | 2879 | 1744 | 2878 | 9,203 | .000 |
| Job satisfaction | Match | 1866 | 1.73 | | | |
| | Undereducated | 458 | 1.66 | | | |
| | Overeducated | 555 | 1.83 | | | |
| | Total | 2879 | 1.74 | 2878 | 45,001 | .000 |

We want to test whether there are differences between types of employment on income and job satisfaction. We did not hypothesize a direct relationship between type of employment and income and job satisfaction because we expect that type of employment has an effect on the relationship between vertical mismatching and income and job satisfaction. However it is possible that this relationship exists and if it does we want to know that it does. This because it could explain significant results in our interaction model but also because we are interested in any relationships between our variables.

For this reason an Independent samples T-Test was done between types of employment and our two dependent variables. The results of the Independent samples T-Test can be found in Table 4. Because, as mentioned earlier, the dependent variables seem to be non-normally distributed (Annex 1) the non-parametric equivalent of the Independent samples T-Test, the Mann-Whitney U test, was also run. The Mann-Whitney U test has the same statistical outcome as the Independent samples T-test and therefore we assume that the Independent samples T-test results are correct. Looking at the outcome of this test we see that for both variables the outcome is not significant, higher than .05, the value is too high for there to be a relationship and therefore we can say that there is no direct effect of type of employment on Income and job satisfaction.

Table 4:
Independent samples T-Test of Vertical Mismatching on Income and Job satisfaction (N=2979)

| | | Descriptive statistics | | Test Statistics | | |
|---|---|---|---|---|---|---|
| | Job satisfaction | N | Mean | T | Degrees of Freedom | Significance |
| Net income in euros per month | Wage-employed | 2317 | 1730 | | | |
| | Self-employed | 562 | 1800 | | | |
| | Total | 2879 | | -1,564 | 2877 | .118 |
| Job satisfaction | Wage-employed | 2317 | 1.74 | | | |
| | Self-employed | 562 | 1.74 | | | |
| | Total | 2879 | | -,161 | 2877 | .256 |

Lastly, we want to test whether there are differences between types of employment and vertical mismatching. This is the direct relationship between type of employment and vertical mismatching, where we expect the type of employment to have an effect on vertical mismatching. In other words, how likely it is that a person is matched or under- or over-educated is different for wage-employed people than it is for self-employed people.

For this reason a cross tabulation was made with vertical mismatching and types of employment. Along with this cross tabulation we ran a Chi-Square and Cramer's V. The Chi-Square tests whether the output in the table is statistically significantly different from what we would expect the frequencies to be. The Cramer's V tests the association between the variables in the cross tabulation.

The results of the cross tabulation can be found in Table 5. Looking at the outcome of the cross tabulation we see that both the Chi-Square and the Cramer's V report that the outcome is significant, with a significance of .000. So our cross tabulation is statistically significantly different from what we would expect and there is an association between the variables in the cross tabulation of .145. Now, in our table we see that self-employed people have a lower percentage on matched and higher percentages on under- and over-educated compared to wage-employed people. When comparing

these percentages to the outcomes from Chi-Square and Cramer's V we see that the cross tabulation indicates that self-employed people are more likely to be both under- and over-educated.

Table 5:
Independent samples T-Test of Vertical Mismatching on Income and Job satisfaction (N=2979)

| | | Type of employment | | | Chi-Square | | Cramer's V | |
|---|---|---|---|---|---|---|---|---|
| | | Wage-employed | Self-employed | Total | Value | Asymp. Sig. | Value | Approx. Sig |
| Vertical mismatching | Match | 1574<br>67.9% | 292<br>52% | 1866 | | | | |
| | Under-educated | 356<br>15.4% | 102<br>18.1% | 458 | | | | |
| | Over-educated | 387<br>16.7% | 168<br>29.9% | 555 | | | | |
| Total | | 2317 | 562 | 2879 | 60.837 | .000 | .145 | .000 |

## 4.2. Multivariate statistical tests

We will now run some multivariate regression models to test our hypotheses. Since a lot of the variables are categorical variables we use the dummies of these variables in these models. We made dummy variables for the following categorical variables: vertical mismatching, type of employment, gender, type of contract and work sector. To test the difference between over- and under-educated relative to matched we include the dummies of under-education and over-education in our models. This makes matched the reference category, and we can interpret the results of the variables on matched.

The first two multivariate regressions we ran consist of three models in which the dependent variable is either income or job dissatisfaction. The first model tests hypotheses 1 and 2, the second model additionally includes self-employed and the third model tests the interaction effect from hypotheses 4 and 5. All our multivariate regression models control for the control variables: age, gender, type of contract and work sector. The multivariate regression on income can be found in table 6 and the one on job dissatisfaction can be found in table 7.

In addition to this we ran model 2 two times more. In these multivariate regressions the dependent variables were also income or job dissatisfaction but once the regression included wage-employed people only and once the regression included self-employed people only. These two multivariate regressions are used to test hypotheses 4 and 5 as well and the results can be found in table 8. We will now analyse and discuss these multivariate regressions models and its outcomes systematically.

### 4.2.1. Effects of educational mismatching on income

The first multiple regression analysis was conducted to examine the relationship between income and various potential predictors. The multiple regression model with all predictors and income as the outcome variable can be found in Table 5. Model 1 only contains the independent variables of vertical mismatching. In model 1 we see that only over-educated has significant (negative) regression coefficient on income. This is a negative regression coefficient, indicating that people that are over-educated are expected to have a lower income than matched people, after controlling for the other variables in model 1. Meaning that over-educated people, on average, earn €233,72 less than matched people do, with a standard error of €38,94.

In model 2 type of employment was added into the regression model. Self-employed only has a significant positive regression coefficient on income, indicating that those that are self-employed tend to have a higher income, after controlling for the other variables in model 2. Meaning that self-employed people, on average, earn €109,11 more than wage-employed people do, with a standard error of €39,15.

In model 3 the two variables that represent the interaction effect were added into the regression model. Interaction terms were created by multiplying the mismatch-dummies (i.e. under- and over-education) with the self-employment dummy. Looking at model 3, we see that as for the interaction effects only under-educated-x-self-employed has a significant regression coefficient on income. This is a negative regression coefficient, indicating that self-employed under-educated people tend to have a lower income than self-employed matched people. This means that self-employed under-educated people earn €186,60 less (on average) than self-employed matched people, with a standard error of €102,55. In addition this also says that this outcome of the under-educated self-employed significantly differs from the outcome of the under-educated wage-employed, which is an insignificant outcome.

Due to the fact that the regression coefficient on under-educated on income in model 3 is not significant we conclude that for wage-employed under-educated people there is no significant difference in income compared to wage-employed matched people. There however does seem to be a difference between over-educated wage-employed people and matched wage-employed people, in model 3. The over-educated coefficient is negative indicating that over-educated wage-employed people earn €215,14 less (on average) than matched wage-employed people, with a standard error of €45,32. Since the coefficient for over-educated self-employed is insignificant, and thus stating that over-educated self-employed does not significantly differ from over-educated wage-employed, we can presume that this effect is also present for the self-employed. These results will be compared to those from table 8 later on. In Annex 2 the regression coefficients of the control variables are discussed.

Table 6:
Results from multivariate regression analysis on Income (N=2979)

| | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|
| | Multiple regression coefficients | | | | | |
| Variables | b | SE | b | SE | b | SE |
| Matched | Ref | Ref | Ref | Ref | Ref | Ref |
| Under-educated | -15.015 | 41.674 | -22.647 | 41.715 | 14.572 | 46.818 |
| Over-educated | -233.711*** | 38.937 | -246.704*** | 39.170 | -215.136*** | 45.323 |
| Wage-employed | | | Ref | Ref | Ref | Ref |
| Self-employed | | | 109.106* | 39.145 | 178.115*** | 51.197 |
| Under-educated x Self- employed | | | | | -186.603* | 102.554 |
| Over-educated x Self-employed | | | | | -139.960 | 89.400 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Control variables | | | | | | |
| Age | 9.060*** | 1.293 | 9.784*** | 1.317 | 9.626*** | 1.321 |
| Gender | | | | | | |
| Male | Ref | Ref | Ref | Ref | Ref | Ref |
| Female | -397.694*** | 38.641 | -403.627*** | 38.654 | -402.499*** | 38.677 |
| Type of contract | | | | | | |
| Full-time | Ref | Ref | Ref | Ref | Ref | Ref |
| Part-time | -763.033*** | 38.368 | -756.027*** | 38.405 | -755.649*** | 38.393 |
| Work sector | | | | | | |
| Primary or Secondary | -142.168** | 44.787 | -137.932** | 44.760** | -136.545** | 44.746 |
| Tertiary | Ref | Ref | Ref | Ref | Ref | Ref |
| Quaternary | 22.095 | 34.391 | 32.342 | 34.547 | 30.432 | 34.548 |
| $\mathbf{R^2}$ | $R^2$= .309 | | $R^2$= .311 | | $R^2$= .312 | |

* Significant at the 0.1 level (2-tailed)
** Significant at the 0.05 level (2-tailed)
*** Significant at the 0.001 level (2-tailed)
Notes: All categorical variables were recoded into dummy variables. Of every set of dummy variables one was left out of the regression. These variables are: male, fulltime, tertiary sector, matched and wage-employed.

Now that we have run the regression model on the dependent variable income, we need to check some assumptions for multiple regression in order to make sure that our results are valid. There was checked for linearity (Annex 3), multicollinearity (Annex 4), homoscedasticity (Annex 5), independence of errors (Annex 3) and whether or not the errors are normally distributed (Annex 6). All of these assumptions were more or less met and therefore we assume that our regression models are correct. The specifications of these assumptions can be found in the annexes mentioned.

### 4.2.2. Effects of educational mismatching on job dissatisfaction

Let us now look at the multiple regression models for the dependent variable job dissatisfaction. A multiple regression analysis was conducted to examine the relationship between job dissatisfaction and various potential predictors. The multiple regression model with all predictors and job dissatisfaction as the outcome variable can be found in Table 6.

As can be seen in Table 6, model 1 only contains the independent variables of vertical mismatching. In model 1 we see that both under-educated and over-educated have significant regression coefficients on job dissatisfaction. The regression coefficient of under-educated on job dissatisfaction is negative, indicating that people that are under-educated are more satisfied with their job than matched people. Meaning that under-educated people, on average, are .066 less dissatisfied than matched people, with a standard error of .033. Remember that job dissatisfaction is rated from 1 to 4, 1 one being extremely satisfied and 4 being not satisfied at all. This means that the lower the score the satisfied a person is.

The regression coefficient of over-educated on job dissatisfaction is positive, indicating that people that are over-educated are less satisfied with their job than matched people. Meaning that over-educated people, on average, are .091 more dissatisfied than matched people, with a standard error of .031. In model 2 type of employment was added into the regression model, the regression coefficients of self-employed were not significant.

In model 3 the two interaction terms were added into the regression model. We see that none of the interaction effects are significant and therefore conclude that the effect of mismatching in dissatisfaction does not differ between wage- and self-employed. We also see that over-educated has a significant positive coefficient. This indicates that wage-employed over-educated people are less satisfied with their job than wage-employed matched people, this will be further discussed in table 8 were the groups are split. In Annex 7 the regression coefficients of the control variables are discussed.

Table 7:
Results from multivariate regression analysis on Job dissatisfaction (N=2979)

| | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|
| | Multiple regression coefficients | | | | | |
| Variables | b | SE | b | SE | b | SE |
| Matched | Ref | Ref | Ref | Ref | Ref | Ref |
| Under-educated | -.066** | .033 | -.065* | .033 | -.062 | .037 |
| Over-educated | .091** | .031 | .093** | .031 | .085* | .036 |
| Wage-employed | | | Ref | Ref | Ref | Ref |
| Self-employed | | | -.019 | .031 | -.024 | .041 |
| Under-educated x Self-employed | | | | | -.012 | .082 |
| Over-educated x Self-employed | | | | | .029 | .072 |
| Control variables | | | | | | |
| Age | .000 | .001 | .000 | .001 | .000 | .001 |
| Gender | | | | | | |
| Male | Ref | Ref | Ref | Ref | Ref | Ref |
| Female | -.029 | .031 | -.028 | .031 | -.027 | .031 |
| Type of contract | | | | | | |
| Full-time | Ref | Ref | Ref | Ref | Ref | Ref |
| Part-time | .052* | .031 | .051* | .031 | .051* | .031 |
| Work sector | | | | | | |
| Primary or Secondary | -.052 | .036 | -.053 | .036 | -.053 | .036 |
| Tertiary | Ref | Ref | Ref | Ref | Ref | Ref |
| Quaternary | -.090*** | .027 | -.092*** | .028 | -.092*** | .028 |
| $\mathbf{R^2}$ | $R^2$= .011 | | $R^2$= .011 | | $R^2$= .011 | |

* Significant at the 0.1 level (2-tailed)
** Significant at the 0.05 level (2-tailed)
*** Significant at the 0.001 level (2-tailed)
Notes: All categorical variables were recoded into dummy variables. Of every set of dummy variables one was left out of the regression. These variables are: male, fulltime, tertiary sector, matched and wage-employed.

Now that we have run the regression model one the dependent variable Job dissatisfaction, we need to check some assumptions for multiple regression in order to make sure that our results are valid. There was checked for linearity (Annex 8), multicollinearity (Annex 4), homoscedasticity (Annex 9), independence of errors (Annex 8) and whether or not the errors are normally distributed (Annex 10). All of these assumptions were more or less met and therefore we assume that our regression models are correct. The specifications of these assumptions can be found in the annexes mentioned.

## 4.3. Effects of vertical mismatching split up by wage- and self-employed

When looking at the models in tables 5 and 6 for both income and job dissatisfaction we notice that the interaction effects seem to be non-existent and/or not significant enough. To test the interaction effect again we have run the second multiple regression model separately for wage-employed and self-employed on both income and job dissatisfaction, the results can be found in table 8. In this way we can see the actual regression coefficients for both wage-employed and self-employed and look at the differences between the two.

In table 8 we see that there are some differences when compared to the interaction effects in table 5 and 6. When we look at the effect of under-education on income we see that both the regression coefficients are insignificant and therefore we can say that there is no difference in effect on income between under-educated wage- and self-employed people. Both groups their income seem to be uninfluenced by whether they are matched or under-educated.

The effect of over-education on income is a different story, for both wage-employed and self-employed the coefficients are significant, meaning that we can establish a difference between those two groups. We see that the negative effect of over-education on income is larger for self-employed than it is for wage-employed, indicating that wage-employed over-educated people earn €228,72 less (on average) than wage-employed matched people, with a standard error of €36,60 and that self-employed over-educated people earn €288,12 less (on average) than self-employed matched people, with a standard error of €121,74. We see that the effect is larger on self-employed people but the standard error for the self-employed is of such a size that whether or not we can say that this difference is significant is doubtful. In addition, we did not find this effect when we specifically tested the interaction of types of employment (table 6) on the effect of over-education on income. Therefore we state that both groups show a significant negative effect when it comes to the effect of over-education on income but they do not significantly differ from one another.

However, when looking at the effect of under-education on job dissatisfaction we see that for wage-employed the coefficient is significant and for self-employed it is not. Noticing that apparently mismatching does have an effect on the job dissatisfaction of wage-employed people but not on the job dissatisfaction of the self-employed. We also see, that there is a significant negative coefficient of wage-employed under-educated people on job dissatisfaction. Indicating that wage-employed under-educated people, on average, seem to be .064 less dissatisfied with their job than wage-employed matched people, with a standard error of .037.

The same goes for the effect of over-education on job dissatisfaction, although one coefficient is insignificant, we do see that there is a significant positive effect of over-education on wage-employed. Meaning that wage-employed over-educated people, on average, seem to be .087 more dissatisfied. Therefore, wage-employed over-educated seem to be less satisfied with their job than wage-employed matched people are, with a standard error of .036. In Annex 16 the regression coefficients of the control variables are discussed.

Table 8: Results from multivariate regression analysis on Income and Job dissatisfaction split for Wage- and Self-employed (N=2979)

| | Income | | | | Job dissatisfaction | | | |
|---|---|---|---|---|---|---|---|---|
| | Wage-employed | | Self-employed | | Wage-employed | | Self-employed | |
| | Multiple regression coefficients | | | | Multiple regression coefficients | | | |
| | b | SE | b | SE | b | SE | b | SE |
| Model 1: | | | | | | | | |
| Matched | Ref | Ref | Ref | Ref | Ref | Ref | Ref | Ref |
| Under-educated | 24.498 | 37.805 | -220.236 | 141.274 | -.064* | .037 | -.067 | .079 |
| Over-educated | -228.722*** | 36.604 | -288.121** | 121.738 | .087** | .036 | .092 | .068 |
| Control variables | | | | | | | | |
| Age | 10.110*** | 1.273 | 12.903*** | 3.835 | .000 | .001 | -.003 | .002 |
| Gender | | | | | | | | |
| Male | Ref | Ref | Ref | Ref | Ref | Ref | Ref | Ref |
| Female | -422.207*** | 36.255 | -424.652*** | 117.604 | -.017 | .035 | -.045 | .065 |
| Type of contract | | | | | | | | |
| Full-time | Ref | Ref | Ref | Ref | Ref | Ref | Ref | Ref |
| Part-time | -626.313*** | 35.553 | -1270.10*** | 125.335 | .032 | .035 | .130* | .070 |
| Work sector | | | | | | | | |
| Primary or Secondary | -113.178** | 40.824 | -162.865** | 148.569 | -.049 | .040 | -.061 | .083 |
| Tertiary | Ref | Ref | Ref | Ref | Ref | Ref | Ref | Ref |
| Quaternary | 26.683 | 31.030 | 4.511 | 121.466 | -.088** | .030 | -.102 | .068 |
| $\mathbf{R^2}$ | $R^2$= .374 | | $R^2$= .263 | | $R^2$= .009 | | $R^2$= .024 | |

* Significant at the 0.1 level (2-tailed)
** Significant at the 0.05 level (2-tailed)
*** Significant at the 0.001 level (2-tailed)
Notes: All categorical variables were recoded into dummy variables. Of every set of dummy variables one was left out of the regression which makes it the reference category. These reference variables are: matched, male, fulltime, tertiary sector, matched and wage-employed.

Now that we have run the regression models split for wage- and self-employed, let us go back to the assumptions again. The same assumptions were checked as before, for both income and job dissatisfaction and there were no changes in the outcomes all assumptions were more or less met. These cannot be found in separate annexes because they were so similar to the already existing assumption checks in the annexes.

## 4.4. Results

The hypotheses posed in the theory chapter are assessed systematically with the output and results from the tables above. We draw conclusions form these tables and on the basis of this either reject or accept the hypotheses and/or accept alternate hypotheses.

**Hypothesis 1**

Hypothesis 1: People who are (a) over-educated have lower incomes and (b) people who are under-educated have higher incomes, than people whose education matches their occupation. Looking at our results we accept hypothesis 1a and reject hypothesis 1b. In table 5 we see that over-educated people earn significantly less than matched people do (on average €246,70 less) and therefore we accept hypothesis 1a. In the same table we do not find significant results for under-education on income and therefore we do not accept this hypothesis, we reject hypothesis 1b.

**Hypothesis 2**

Hypothesis 2: People who are (a) over-educated have a lower job satisfaction and (b) people who are under-educated have a higher job satisfaction, than people whose education matches their occupation. Looking at our results we accept both hypothesis 2a and 2b. In table 6 we see that over-educated people have a significant lower job satisfaction than matched people do (on average .093) lower) and therefore we accept hypothesis 2a. In the same table we see that under-educated people have a significant higher job satisfaction than matched people do (on average .065 higher) and therefore we accept hypothesis 2b. The results from the tables need to be read conversely, the tables show the job dissatisfaction whereas here we discuss job satisfaction.

**Hypothesis 3**

Hypothesis 3: People who are self-employed are (a) more likely to be over-educated and (b) more likely to be under-educated, than people who are wage-employed. Looking at our results we, with reservations, accept both hypothesis 3a and 3b. In table 5 the outcomes indicate that people that are self-employed are more likely to be over-educated than wage-employed people, and therefore we accept hypothesis 3a. It also indicates that people that are self-employed are more likely to be under-educated than wage-employed people, and therefore we accept hypothesis 3b. In the table we see that the percentages on over- and under-educated are both higher for self-employed people and the outcomes from Chi-Square and Cramer's V back this up. Therefore we see no reason to not accept these hypotheses.

**Hypothesis 4**

Hypothesis 4: The negative effect of over-education on (a) income and (b) job satisfaction, is smaller for people in self-employment than for people in wage-employment. Looking at our results we reject both hypothesis 4a and 4b. In table 6 we see that the negative effect of over-education on income for over-educated wage-employed people does not statistically significantly differ from over-educated self-employed people, therefore we reject hypothesis 4a. Table 8 supports this, although over-educated shows a significant negative effect on income for both wage- and self-employed their coefficients do not differ enough for there to be a difference between the two groups.

In table 6 we see that, when over-education is included in the model as an interaction variable on job satisfaction the coefficients are not significant. Therefore we reject hypothesis 4b. In table 8 we see the reason for this, none of the variables of vertical mismatching on job satisfaction are significant for self-employed causing the interaction to be insignificant. There however is a negative effect of over-education on job satisfaction for the wage-employed, this supports our hypothesis that this effect is larger for the wage-employed. The results from the again tables need to be read conversely, the tables show the job dissatisfaction whereas here we discuss job satisfaction. Nonetheless our hypothesis did expect a negative effect (although less large) on job satisfaction for the self-employed and therefore we still reject hypothesis 4b.

**Hypothesis 5**

Hypothesis 5: The positive effect of under-education on (a) income and (b) job satisfaction, is smaller for people in self-employment than for people in wage-employment. Looking at our results we reject both hypothesis 5a and 5b. In table 5 we see that there is a negative effect on income for our

interaction effect of under-educated x self-employed, this means that the two groups (wage- and self-employed) statistically significantly differ from each other. In table 8 however, we see that for both groups the effect on income is not statistically significant just like in model 1 and 2 in table 5. We therefore can conclude that the outcomes of the group statistically significantly differ from each other but there effect of under-education on income to be found in our models, therefore we reject hypothesis 5a.

Looking at the relationship of under-education on job satisfaction in table 7 we see that, when under-education is included in the model as an interaction variable on job satisfaction the coefficients are not significant. Therefore we reject hypothesis 5b. In table 8 we see the reason for this, none of the variables of vertical mismatching on job satisfaction are significant for self-employed causing the interaction to be insignificant. There however is a positive effect of under-education on job satisfaction for the wage-employed, this supports our hypothesis that this effect is larger for the wage-employed. The results from the again tables need to be read conversely, the tables show the job dissatisfaction whereas here we discuss job satisfaction. Nonetheless our hypothesis also expected a positive effect (although less large) on job satisfaction for the self-employed, which is not the case, and therefore we still reject hypothesis 5b.

Table 9:
Overview of accepted and rejected hypotheses

| **Hypotheses** | **Rejected / Accepted** |
|---|---|
| Hypothesis 1a: People who are over-educated have lower incomes than people whose education matches their occupation | Accepted |
| Hypothesis 1b: People who are under-educated have high higher incomes, than people whose education matches their occupation | Rejected |
| Hypothesis 2: People who are (a) over-educated have a lower job satisfaction and (b) people who are under-educated have a higher job satisfaction, than people whose education matches their occupation | Accepted |
| Hypothesis 3: People who are self-employed are (a) more likely to be over-educated and (b) more likely to be under-educated, than people who are wage-employed | Accepted |
| Hypothesis 4a: The negative effect of over-education on income, is smaller for people in self-employment than for people in wage-employment | Rejected |
| Hypothesis 4b: The negative effect of over-education on job satisfaction, is smaller for people in self-employment than for people in wage-employment | Rejected |
| Hypothesis 5a: The positive effect of under-education on income, is smaller for people in self-employment than for people in wage-employment | Rejected |
| Hypothesis 5b: The positive effect of under-education on job satisfaction, is smaller for people in self-employment than for people in wage-employment | Rejected |

# 5. Conclusion

Now that we have rejected or confirmed our hypotheses we can draw conclusions by analysing the outcomes. With these conclusions an answer to the research question can be formulated. The research question that was posed at the beginning of this study is: To what extent does the effect of vertical mismatching on income and job satisfaction differ between people in wage-employment and self-employment?

Based on theories and findings of other studies hypotheses were formulated. We then operationalized the variables that were included in the analytical framework in addition to some control variables. Dummies of the categorical variables were created in order to do multivariate regression analyses. We then started off by running some bivariate models before our multivariate models. The most important conclusion that can be drawn from the bivariate models is that the means of both income and job satisfaction significantly differ from each other when looking at our three vertical mismatching groups (matched, over-educated and under-educated). This set the basis for our multiple regression analyses and indicated that there are differences in effects on income and job satisfaction between these three groups.

Looking at our multivariate regression models we see that the results on income are similar to what other studies have showed. The results on under-educated were not significant and therefore we cannot compare these results to other studies but the results on over-educated confirm that over-educated people have a lower income (on average) than matched people. This validates our theory that wages are fixed for types of jobs and therefore the income of an over-educated person is lower than that of a matched person. We also assume that the same goes for under-educated people, as previous studies showed, even though our research did not show effects on this aspect. The reason for this is that the theory goes both ways and therefore we expect other studies to find results that concur with this theory.

The same occurred with our results on job satisfaction, our results are what we expected. Our results showed that over-educated has a negative effect on job satisfaction and under-educated has a positive effect on job satisfaction. This validates that job satisfaction enjoys the same effects of vertical mismatching as income does. Meaning that our theory that people are aware of their mismatch status, thus knowing that their job is below or above their educational level, and that this effects their satisfaction. In taking a closer look at other studies on job satisfaction there can be noticed that often the results with regard to educational mismatch on job satisfaction are (partly) insignificant (Allen & Van der Velden, 2001; Vieira, 2005), these studies mostly use smaller sample sizes than this research. We do notice that job satisfaction in a lot of studies is split up in types of satisfaction, for example: overall job satisfaction, satisfaction with job tasks, satisfaction with job hours and satisfaction with job benefits. Our research does no such thing and just test the overall job satisfaction but still our results are similar to findings from studies that do elaborate on types of job satisfaction.

The focus of our research is on the potential differences between wage-employed and self-employed when it comes to vertical mismatching. We argued that mismatching occurs more in self-employment than it does in wage-employment, this was confirmed in our cross tabulation. Both over- and under-education seems to occur more in self-employment, this supports our theory that self-employed people are “jacks of all trades” and are more often not employed in the field or position they studied for when compared to wage-employed. There is no reason for us to doubt this outcome because

besides that it supports our theory and results it also confirms results from other studies (Alba-Ramirez & Blázquez, 2003; Bender & Roche, 2013).

Our research question focuses on the first two effects of vertical mismatching. Looking at our results we see that there seem to be no differences between wage- and self-employed when it comes to the effects of vertical mismatching on income. From the results for the over-educated group we conclude that the negative effect of over-education is present for both wage-employed and self-employed but it is not necessarily larger for either one of these two groups. This is not what we had anticipated, we had thought that the effect was larger for the wage-employed because self-employed people are not as bound to wages and level of professions as wage-employed people since they determine the price of their product or service. A possible reason for this might be that self-employed are more likely to be over-educated to begin with and therefore this negative effect is just as present within this group as it is in the wage-employed group.

With regards to job satisfaction we notice that there is one difference between the wage- and self-employed when it comes to the effects of vertical mismatching on job satisfaction. None of our analyses show significant differences between the two groups in effect on job satisfaction, but one difference seems to lie in over- and under-education not having any effect on the job satisfaction of self-employed people. Our analysis clearly shows significant effects on job satisfaction for wage-employed people and insignificant effects for self-employed people. This indicates that whilst vertical mismatching has an effect on the job satisfaction of wage-employed people it does not affect the job satisfaction of self-employed people.

Looking back on the literature we have discussed, the literature could also have been interpreted this way. We expected the effect of vertical mismatching for the self-employed on job satisfaction to be smaller than for the wage-employed but the literature could have also been interpreted as these effects not being present for the self-employed. We know that self-employed most of the time specifically choose to go into self-employment because of a passion or interest and are therefore unlikely to be less satisfied with a job just because it is on a lower educational level. In addition, self-employed are also unlikely to be more satisfied with their job just because it is on a higher educational level, they do not necessarily look at jobs as being on a certain educational level, they choose to go into self-employment because of passion or interest (Baumann & Brändle, 2012).

Now referring back to our main research question: To what extent does the effect of vertical mismatching on income and job satisfaction differ between people in wage-employment and self-employment? We can say that the effect on income is unlikely to differ between people in wage-employment and self-employment. In the theory chapter was explained that previous research did not devote much time and effort to possible difference between the two types of employment. There were no indications that there might be differences present within these two groups on the effect of vertical mismatching on income.

Most importantly, there can be said that a difference between the groups when it comes to job satisfaction is quite likely. Results from our analyses indicate that whilst vertical mismatching has an effect on job satisfaction for the wage-employed, there is no effect of vertical mismatching on job satisfaction for the self-employed. As we have established, wage-employed people differ from self-employed people in what they search for in a job and this indicates that there could be differences between the groups with regards to job satisfaction. Self-employed are less aware of the fact that they are mismatched and are happy with their job because they chose to go into self-employment instead of wage-employment. In addition, wage-employed people are constantly reminded of the fact that

they have been mismatched or not and are constantly comparing themselves to others which makes them less satisfied (Schwartz, 2004).

To conclude, this research gives rise to a difference between wage-employed and self-employed people when it comes to the effect of vertical mismatching on job satisfaction. We can answer our main research questions in two parts. First, the effect of vertical mismatching on income is not considerably different for self-employed people as it is for wage-employed people. Secondly and lastly, the effect of vertical mismatching on job satisfaction is considerably different for self-employed people than for wage-employed people. Wage-employed people experience a higher or lower job satisfaction depending on whether they are matched, over- or under-educated whilst self-employed people do not experience a higher or lower job satisfaction depending on their vertical mismatching status. The main theory behind this as described in our theoretical framework is summarized below, in a quote by Niklas Zennström.

> *"If you want to be an entrepreneur, it's not a job, it's a lifestyle. It defines you. Forget about all the pleasures of wage-employment because it is hard. But it's hugely rewarding as you're fulfilling something for yourself."* – Niklas Zennström

# 6. Recommendations

This chapter will present some recommendations for follow-up research on this matter. First of all, if investigating mismatching with regards to job satisfaction, as noted, it could be recommended to split job satisfaction by different types or categories of job satisfaction. Looking at this research we expect that the splitting up could result in more specific results on the effect of vertical mismatching on job satisfaction. Our research uses a more general operationalization of job satisfaction and when specified into sub-categories this could lead to more profound insights on the effects of vertical mismatching on job satisfaction.

Also, this research uses a sample of 2979 people that represents the Netherlands, we do not necessarily recommend to use a larger sample size but to use a large sample of self-employed people. As this could lead to more specific results with regard to differences between the groups as well as group specific results. It might be interesting to use a sample derived from several countries in order to rule out that the results are only applicable to one country. In including more countries there can be controlled for different educational systems, a different distribution of work sectors and more or less self-employment. Different countries have different educational systems and this might be a cause for more or less mismatching in a country. Whilst in one country a lot of people work in the primary or secondary sector in another country most people work in the tertiary sector, these differences might affect the amount of mismatched people or the amount of wage- / self-employed people. Lastly, in some countries the amount of people in and wanting to go into self-employment are higher than in others. These countries might have an environment in which it is stimulated to go into self-employment whilst in other countries people go into self-employment because that is the only way they can work on or above their educational level.

Another interesting option is to use full panel datasets instead of data from one moment in time. This way the effects of vertical mismatching can be observed over a period of time, which gives a view on whether or not mismatched people stay mismatched, change professions or make other decisions in life than matched people do. Lastly, it might be interesting to look at the effects of mismatching on other outcomes, for example the effects of mismatching on the personal life of someone or differences in mismatching amongst different professions and positions. Does an over-educated person in a certain profession has a similar personal life than a matched person in a profession and what do they do different over a period of time? These sort of questions can be looked at when studying panel data.

The results of the differences in vertical mismatching between wage- and self-employed were found by running bivariate statistical tests. In order to improve testing this hypothesis we would recommend to do a logistic regression. This research did not suffice in providing a logistic regression to test this hypothesis. Another issue that could possibly be improved is the operationalization of vertical mismatching. This research for example uses five levels of profession and five levels of education, this could be extended to for instance 10 levels of profession and levels of education. When extending these one could also extend the values for vertical mismatching, for example making a distinction between severe and moderately over- or under-educated.

Lastly, referring back to the introduction, in which this research stressed the societal relevance of this research. The extent to which mismatching effects someone his personal life is an important incentive to study mismatching. This research once again fuels a discussion about researching mismatching, and the lack thereof. The extent to which mismatching affects someone his personal life is very important to investigate, since this could have immense consequences for education and could add to already existing body of knowledge on this matter. It is therefore our recommendation to further investigate mismatching and its consequences.

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# Annexes

## Annex 1: Test of normality for income

This Shapiro-Wilk test of normality of the variable Net income has as an outcome that it is seems like the variable is not normally distributed. The significance outcome shows that the variable is statistically significantly different from a normal distribution, because the significance is lower than .05, and therefore we reject the null hypothesis that Net income is normally distributed. This however can be due to outliers so it might still be globally normally distributed.

Table 10:
The Shapiro –Wilk test of normality of continuous dependent variables

| | Statistic | Degrees of freedom | Significance |
|---|---|---|---|
| Net income (in euros per month) | .845 | 2879 | .000 |

## Annex 2: Results of the control variables in the multivariate regression analysis on Income

Looking at the regression coefficients from the multivariate regression analysis on income we notice that except for Quaternary all other variables have significant coefficients in all models. Now since model 3 includes the interaction variables we use the results from the next largest model, model 2, to describe the results.

We see that age has a significant positive regression coefficient on income indicating that the older a person becomes the higher his or her income is. Meaning that, per year a person gets older his or her income increases with €9,78 a month, with a standard error of €1,32. Now for gender we see that female has a significant negative regression coefficient on income, indicating that a female earns significantly less than a male. This means that a female, on average, earns €403,63 less a month than a male does, with a standard error of €38,65.

Then when we look at full-time/part-time we see that part-time has a significant negative regression coefficient on income, indicating that someone that works part-time tends to have a lower income than someone who works full-time. Meaning that, on average, someone that works part-time earns €756,03 less a month than someone that works full-time, with a standard error of €38,41. Then for work sector we more or less see the same result, primary and secondary sector has a significant negative regression coefficient on income. Indicating that someone that works in the primary or secondary sector tends to earn less than someone that works in the tertiary sector, meaning that, on average, someone that works in the primary or secondary sector earns €137,93 less a month than someone that works in the tertiary sector, with a standard error of €44,76.

Table 11:
Results for the control variables from the multivariate regression analysis on Income (N=2979)

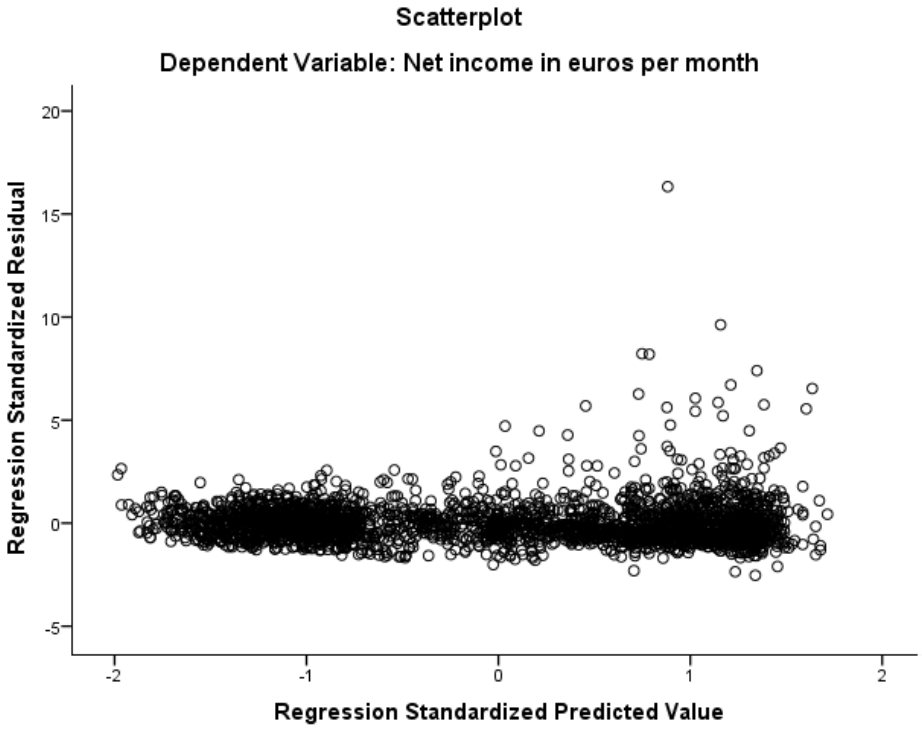
| | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|
| | Multiple regression coefficients | | | | | |
| Variables | b | SE | b | SE | b | SE |
| Control variables | | | | | | |
| Age | 9.060*** | 1.293 | 9.784*** | 1.317 | 9.626*** | 1.321 |
| Gender | | | | | | |
| Male | Ref | Ref | Ref | Ref | Ref | Ref |

| | | | | | | |
|---|---|---|---|---|---|---|
| Female | -397.694*** | 38.641 | -403.627*** | 38.654 | -402.499*** | 38.677 |
| Type of contract | | | | | | |
| Full-time | Ref | Ref | Ref | Ref | Ref | Ref |
| Part-time | -763.033*** | 38.368 | -756.027*** | 38.405 | -755.649*** | 38.393 |
| Work sector | | | | | | |
| Primary and Secondary | -142.168** | 44.787 | -137.932** | 44.760** | -136.545** | 44.746 |
| Tertiary | Ref | Ref | Ref | Ref | Ref | Ref |
| Quaternary | 22.095 | 34.391 | 32.342 | 34.547 | 30.432 | 34.548 |

* Significant at the 0.1 level (2-tailed)
** Significant at the 0.05 level (2-tailed)
*** Significant at the 0.001 level (2-tailed)
Notes: All categorical variables were recoded into dummy variables. Of every set of dummy variables one was left out of the regression which makes it the reference. These reference variables are: male, fulltime, tertiary sector.

## Annex 3: Test of linearity and independence of errors for income

This scatterplot of the variable Net income has as an outcome that the assumption of linearity is likely to be met. We see that the residuals are mostly scattered around zero, it looks like the residuals are randomly distributed along the plot, and therefore we accept the null hypothesis that there is linearity. Also there seems to be no runs of successive residuals and therefore we assume that successive residuals are independent and we accept the null hypothesis that there is independence of errors. On the right hand side we see that it is not totally randomly and evenly distributed along zero so we should be careful in stating that the assumption of linearity is met.




Graph 1:
Scatterplot of Income (ZPRED-ZRESID)

## Annex 4: Test for multicollinearity for Income and Job satisfaction

Looking at table 12 we see that none of the tolerance scores are lower than .20 meaning that there is no issue of multicollinearity. However, multicollinearity has a high chance of being a serious problem in interaction regression models because the interaction variables are constructed of two variables that are also individually present in the regression model, we therefore did not include model 3 in the model. We see that the VIF scores sometimes close to reach 2 which is seen as a bit high, so we should be careful in accepting this assumption in particular because we are testing an interaction effect.

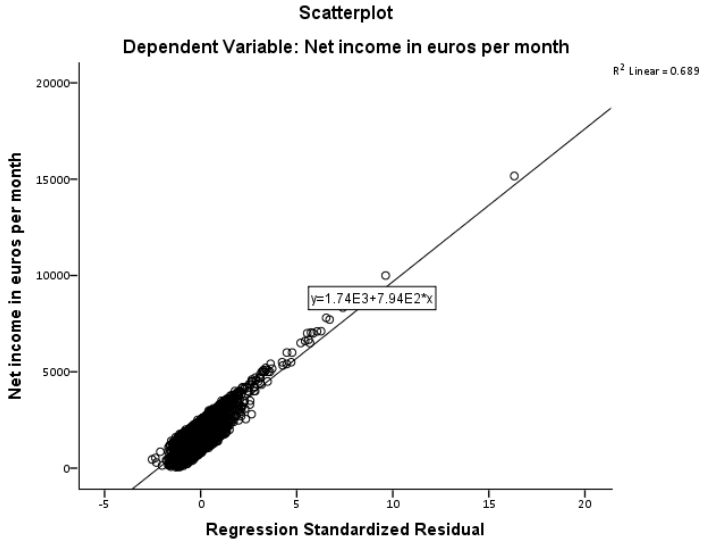
Table 12:
Collinearity statistics from multivariate regression analysis on Income and Job satisfaction (N=2979)

| | Model 1 | | Model 2 | |
|---|---|---|---|---|
| | Collinearity statistics | | | |
| Variables | Tolerance | VIF | Tolerance | VIF |
| Matched | Ref | Ref | Ref | Ref |
| Under-educated | .944 | 1.060 | .940 | 1.064 |
| Over-educated | .929 | 1.076 | .916 | 1.092 |
| Wage-employed | | | Ref | Ref |
| Self-employed | | | .909 | 1.101 |
| Under-educated x Self- employed | | | | |
| Over-educated x Self-employed | | | | |
| Control variables | | | | |
| Age | .902 | 1.109 | .867 | 1.154 |
| Gender | | | | |
| Male | Ref | Ref | Ref | Ref |
| Female | .587 | 1.703 | .586 | 1.708 |
| Type of contract | | | | |
| Full-time | Ref | Ref | Ref | Ref |
| Part-time | .602 | 1.660 | .600 | 1.668 |
| Work sector | | | | |
| Primary and Secondary | .787 | 1.271 | .786 | 1.273 |
| Tertiary | Ref | Ref | Ref | Ref |
| Quaternary | .744 | 1.344 | .736 | 1.359 |

Notes: All categorical variables were recoded into dummy variables. Of every set of dummy variables one was left out of the regression which makes it the reference category. These reference variables are: male, fulltime, tertiary sector, matched and wage-employed.

## Annex 5: Test for homoscedasticity for Income

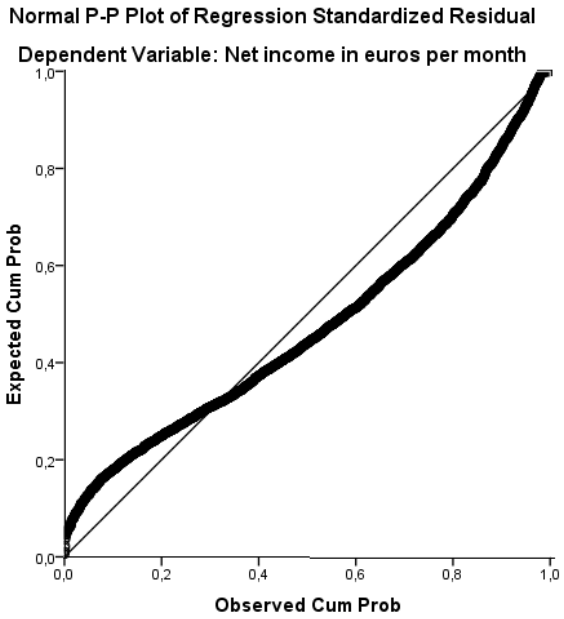
This scatterplot of the variable Net income has as an outcome that the assumption of homoscedasticity is likely met. We see that the residuals are closely located to the line and that the distance from the line does not chance along the line, and therefore we accept the null hypothesis that there is homoscedasticity.




Graph 2:
Scatterplot of Income (DEPENDNT-ZRESID)

## Annex 6: Test for normally distributed errors for Income

This normal probability plot of the variable Net income has as an outcome that the assumption of normally distributed errors is close to being met. We see that the residuals resemble a line and are tolerable closely located to the line. In Annex 1, however, we saw that income is not really normally distributed and therefore we need to be careful in assuming a normal distribution of errors.




Graph 3:
Normal probability plot of Income

## Annex 7: Results of the control variables in the multivariate regression analysis on Job satisfaction

Looking at the regression coefficients from the multivariate regression analysis on job satisfaction we notice that only part-time and quaternary have significant coefficients in all models. Now since model 3 includes the interaction variables we use the results from the next largest model, model 2, to describe the results.

Then when we look at full-time/part-time we see that part-time has a significant positive regression coefficient on job dissatisfaction, indicating that someone that works part-time tends to have a lower job satisfaction than someone who works full-time. Meaning that, on average, someone that works part-time is .051 less satisfied with his or her job than someone that works full-time, with a standard error of .031. Then for work sector we see the opposite result, quaternary sector has a significant negative regression coefficient on job dissatisfaction. Indicating that someone that works in the quaternary sector tends to have a higher job satisfaction than someone that works in the tertiary sector, meaning that, on average, someone that works in the quaternary sector is .092 more satisfied with his or her job than someone that works in the tertiary sector, with a standard error of .028.

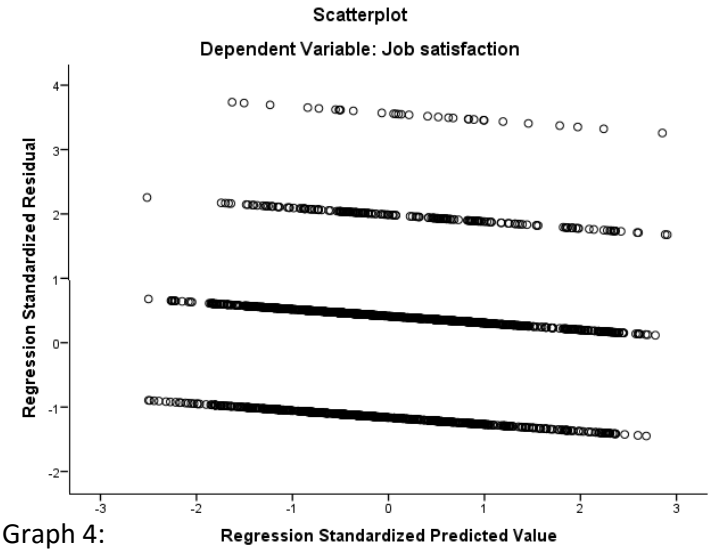
Table 13:
Results for the control variables from the multivariate regression analysis on Job dissatisfaction (N=2979)

| | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|
| | Multiple regression coefficients | | | | | |
| Variables | b | SE | b | SE | b | SE |
| Control variables | | | | | | |
| Age | .000 | .001 | .000 | .001 | .000 | .001 |
| Gender | | | | | | |
| Male | Ref | Ref | Ref | Ref | Ref | Ref |
| Female | -.029 | .031 | -.028 | .031 | -.027 | .031 |
| Type of contract | | | | | | |
| Full-time | Ref | Ref | Ref | Ref | Ref | Ref |
| Part-time | .052* | .031 | .051* | .031 | .051* | .031 |
| Work sector | | | | | | |
| Primary and Secondary | -.052 | .036 | -.053 | .036 | -.053 | .036 |
| Tertiary | Ref | Ref | Ref | Ref | Ref | Ref |
| Quaternary | -.090*** | .027 | -.092*** | .028 | -.092*** | .028 |

* Significant at the 0.1 level (2-tailed)
** Significant at the 0.05 level (2-tailed)
*** Significant at the 0.001 level (2-tailed)
Notes: All categorical variables were recoded into dummy variables. Of every set of dummy variables one was left out of the regression which makes it the reference category. These reference variables are: male, fulltime, tertiary sector.

## Annex 8: Test of linearity and independent errors Job satisfaction

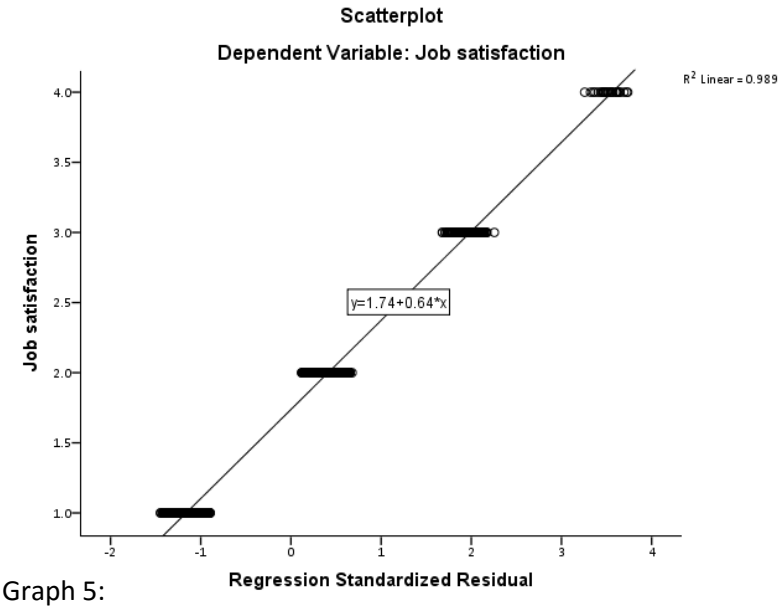
This scatterplot of the variable Job satisfaction has as an outcome that the assumption of linearity is likely to be met. We see that the residuals are scattered around four places, this is because the variable Job satisfaction has four values. It looks like the residuals are randomly distributed along the four lines, and therefore we accept the null hypothesis that there is linearity. Also there seems to be no runs of successive residuals and therefore we assume that successive residuals are independent and we accept the null hypothesis that there is independence of errors. We however need to be careful with this assumption because it is not a continuous variable and testing for these assumptions might deviate for a non-continuous variable.




Graph 4:
Scatterplot of Job satisfaction (ZPRED-ZRESID)

## Annex 9: Test for homoscedasticity for Job satisfaction

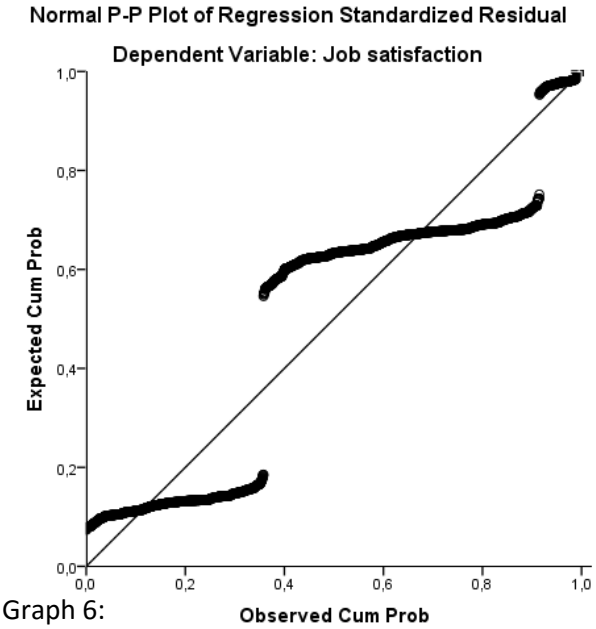
This scatterplot of the variable Job satisfaction has as an outcome that the assumption of homoscedasticity is met. We see that the residuals are scattered around four places, this is because the variable Job satisfaction has four values. We see that the residuals are mostly closely located to the line and that the distance between the line and the residuals do not change that much along the line, and therefore we accept the null hypothesis that there is homoscedasticity. We however, again need to be careful in accepting these assumptions.




Graph 5:
Scatterplot of Job satisfaction (DEPENDNT-ZRESID)

## Annex 10: Test for normally distributed errors for Job satisfaction

This normal probability plot of the variable Job satisfaction has as an outcome that the assumption of normally distributed errors is not likely to be met. Since Job satisfaction is a ratio variable so we do not see one line but we see several. We see that the residuals resemble lines and are not that closely located to the line. So therefore we need to be careful in assuming a normal distribution of errors.




Graph 6:
Normal probability plot of Job satisfaction

## Annex 11: Results of the control variables in the multivariate regression analysis split by type of employment on Income and Job dissatisfaction

Looking at the regression coefficients from the multivariate regression analysis on Income and job satisfaction we notice that all coefficients on income, except quaternary, are significant and only two coefficients on job satisfaction are significant. We will now first discuss the coefficients on income before discussing the coefficients on job satisfaction.

Looking at the coefficients on income of the wage-employed, we see that age has a significant positive regression coefficients on income, indicating that the older a person becomes the higher his or her income is. Meaning that, per year a wage-employed person gets older his or her income increases with €10,11 a month, with a standard error of €1,27. Looking at the same coefficient but now for the self-employed we see that the effect is even higher, per year a self-employed person gets older his or her income increases with €12,90 a month, with a standard error of €3,84.

Now for the coefficients of gender of the wage-employed, we see that female has a significant negative regression coefficients on income, indicating that a wage-employed female earns significantly less than a wage-employed male. This means that a female, on average, earns €422,21 less a month than a male does, with a standard error of €36,26. Looking at the same coefficient but now for the self-employed we see that the effect is a bit higher, self-employed females, on average, earns €424,65 less a month than a self-employed male does, with a standard error of €117,60.

Then when we look at full-time/part-time we see that part-time has a significant negative regression coefficient on income for both wage-employed and self-employed, but this effect is higher for the self-employed. Meaning that, on average, a wage-employed person that works part-time earns €626,313 less a month than someone that works full-time, with a standard error of €35,55. Whilst, on average,

a self-employed person that works part-time earns €1270,10 less a month than someone that works full-time, with a standard error of €125,34.

Then for work sector we more or less see the same result, primary and secondary sector has a significant negative regression coefficient on income for both wage-employed and self-employed people, but this effect is higher for the self-employed. Indicating that someone that works in the primary or secondary sector tends to earn less than someone that works in the tertiary sector. Meaning that, on average, a wage-employed person that works in the primary or secondary sector earns €113,18 less a month than a wage-employed person that works in the tertiary sector, with a standard error of €40,82. Whilst, on average, a self-employed person that works part-time earns €162,87 less a month than someone that works full-time, with a standard error of €148,57.

Looking at the coefficients on job satisfaction we notice that we cannot compare the two groups, because there is not one of the control variables that has significant coefficients. We can however say, when looking at quaternary sector for the wage employed, that quaternary has a significant negative regression coefficient on job dissatisfaction, indicating that someone that works in the quaternary tends to have a higher job satisfaction than someone who works in the tertiary sector. Meaning that, on average, someone that works in the quaternary sector is .088 more satisfied with his or her job than someone that works in the tertiary sector, with a standard error of .030. In addition we see that for the self-employed part-time has a significant positive regression coefficient on job dissatisfaction. Meaning that, on average, someone that works part-time is less satisfied with his or her job than someone that works full-time, with a standard error of .070.

Table 14:
Results for the control variables from the multivariate regression analysis on Income and Job satisfaction split for Wage- and Self-employed (N=2979)

| | Income | | | | Job dissatisfaction | | | |
|---|---|---|---|---|---|---|---|---|
| | Wage-employed | | Self-employed | | Wage-employed | | Self-employed | |
| | Multiple regression coefficients | | | | Multiple regression coefficients | | | |
| | b | SE | b | SE | b | SE | b | SE |
| Control variables | | | | | | | | |
| Age | 10.110*** | 1.273 | 12.903*** | 3.835 | .000 | .001 | -.003 | .002 |
| Gender | | | | | | | | |
| Male | Ref | Ref | Ref | Ref | Ref | Ref | Ref | Ref |
| Female | -422.207*** | 36.255 | -424.652*** | 117.604 | -.017 | .035 | -.045 | .065 |
| Type of contract | | | | | | | | |
| Full-time | Ref | Ref | Ref | Ref | Ref | Ref | Ref | Ref |
| Part-time | -626.313*** | 35.553 | -1270.107*** | 125.335 | .032 | .035 | .130* | .070 |
| Work sector | | | | | | | | |
| Primary and Secondary | -113.178** | 40.824 | -162.865** | 148.569 | -.049 | .040 | -.061 | .083 |
| Tertiary | Ref | Ref | Ref | Ref | Ref | Ref | Ref | Ref |
| Quaternary | 26.683 | 31.030 | 4.511 | 121.466 | -.088** | .030 | -.102 | .068 |

* Significant at the 0.1 level (2-tailed)
** Significant at the 0.05 level (2-tailed)
*** Significant at the 0.001 level (2-tailed)