Graduating in a recession, just a scratch, or a lifelong scar?

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Abstract

Starting at the labor market under bad economic circumstances may cause difficulties when looking for the right job. Do these negative effects persist in the long run? This study researches the long-term effects on wage of graduating in a recession in the Netherlands. A mincer model is used to analyze data from the labor supply panel. The results show an initial negative effect on wage of graduating in a recession. The long-term effect depends on the definition of a recession and is not present in every scenario.

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Introduction

In 2008 the biggest recession since World War II started.[1] Companies went bankrupt, employees were laid off and the prices of shares dropped to a minimum. Every company, big or small, had a hard time continuing their business. In order to make sure income and expenses maintained at least break-even, difficult decisions had to be made. To reduce the expenses, many employees were fired. Furthermore, fewer new employees were hired. As a result, the unemployment rate went up ever since the crisis began.[2]

Due to the lack of job openings it is hard for graduates to find a job, or at least a suitable one. This is a clear short-term consequence of the economic meltdown. But what happens in the long run with these graduates? Are they still affected by the crisis, even after 10 years of work experience? Or do they move up when the economy recovers and will they earn as much as they would have, if they graduated in a good economic environment? In other words: *What are the long-term effects on wage of graduating in a recession in the Netherlands?*

In order to research this question the labor supply panel is used. This dataset contains information about the Dutch labor force. For this research question the years of experience, gender, country of birth, working sector and education level are of interest. Furthermore the unemployment rate is used to define a recession.

Three models are created to analyze the long term effects of graduating in a recession. The first model will measure the initial effect on wage, the second and third will analyze the effect over a longer period. After running a linear regression, the results can be analyzed.

In this research an initial negative effect of graduating in a recession is found. However, the effect is not persistent in all analyzed situations.

[1] http://www.huffingtonpost.com/2011/08/09/ecb-head-jean-claude-tric_n_921884.html
[2] http://statline.cbs.nl/Statweb/publication/?DM=SLNL&PA=82309NED&D1=19-20&D2=a&D3=0&D4=0&D5=4%2c9%2c14%2c19%2c24%2c29%2c34%2c39%2c44%2c49%2c54%2cl&VW=T

Literature review

Maybe it is due to the recent economic meltdown that the interest in the effects of graduating during a recession on a workers career has grown. The short-term effects seem to be quite clear. It is not hard to imagine that a graduate has difficulties finding a suiting job in bad economic times, if he even finds a job. Research confirms these effects and finds that a recession has influence on the quality of matches between graduates and employers (Bowlus, 1995). In her study Bowlus measures the match quality with job tenure. Her theory is that good matches will last, so a short tenure indicates a bad match. Studying the National Longitudinal Survey of Youth she finds that in a recession, defined as an increase in the unemployment rate, job tenures decline. When controlling for wage the found effect declines, but she finds that the labor market adjusts to the economic conditions by lowering the starting wages. However, the long-term effects have caught the attention of researchers and a growing literature exists of the persistent consequences of graduating in a recession.

Kahn (2010) explores the effect of graduating from college in bad economic times for white males in the United States of America. She finds an initial decrease in wage of 6 to 7% for a 1% increase in the unemployment rate. These negative wage effects are persistent and last up to 20 years after entering the labor market. According to her research the wage loss is still 2,5% after 15 years. Although less substantial, Oreopoulos et al. (2012) also find negative long-term career effects among male college graduates in Canada. Compared to Kahn, the initial wage loss found is higher, namely 9%. This effect, however, is not as persistent as described above and fades after 10 years. The effects are larger for individuals without any working experience and for graduates from majors that have a negative career prospective. Beside wages Oreopoulos et al. also look at firm quality, where a firm with a large amount of employees and high average earnings is a high quality firm. They find that workers that graduate in a recession have a hard time finding a job at good employers.

Research on the long-term consequences of economic conditions at labor market entry does not only focus on North-America, but is also conducted on the European labor market. Based on an analysis of Norwegian data, Raaum and Røed (2006) find that the unemployment rate is higher for adults that have dealt with unemployment during their younger years. Stevens (2007) studies the effects for West-Germany and finds a small, but persistent negative effect on earnings. Remarkable is the fact that Stevens finds an increase in the effects over time, in contrary to other studies where the effect of entering the labor market in bad economic conditions is declining after several years.

Unemployment rates and income are not the only factors that are reviewed when looking at the long-term career effects. Liu et al. (2012) focus on skill mismatches between employers and graduates. They define a skill mismatch as a discrepancy between the field of study of the graduate and the industry where the job is found. Analyzing Norwegian data they find that the probability of a skill mismatch rises with 30% during a recession. The effects of the skill mismatch on a workers career decrease, but remain persistent over time.

The mentioned studies all find persistent negative effects of bad economic conditions when entering the labor market. However, Gaini et al. (2012) find opposing results when studying the French labor market. After analyzing French Labour Force Surveys they find no negative long-term effects of graduating in a recession. Gaini et al. tested for unemployment rates, wage, the hours worked and the proportion of managers and concluded that the negative short-term effects of a recession are quickly overcome by the graduates.

Thus the results might differ per country, which is also addressed by some researchers. Genda et al. (2010) conduct research for the USA and Japan and find differences between these countries. A persistent negative effect on wages and employment is found for Japanese men, while the effect for American employees appears to be temporary. Genda et al. focus on less-educated men, which explains the difference in the results found compared to Kahn, who focused on workers graduated from college. Genda et al. assign the difference between Japanese and American workers to two characteristics of the Japanese labor market. Firstly it is prohibited in Japan to lay off adult employees and secondly Japan has a high-school based hiring system, which can be problematic for graduates who encounter unemployment directly after finishing school. These papers show that it might be relevant to look at the structure of the labor market and the education system, when analyzing the long-term effects of graduating in a recession.

Most of the papers covered look at the effects of entry labor market conditions on men or do not make any distinction between men and women. Liu and Chen (2014) did distinguish female and male workers and found different results for both demographic groups. The persistent negative effect on female employees appears to be more substantial than on male workers. Liu and Chen give the gender discrimination at the Asian labor market as explanation. Kondo (2007) also compared the long-term effects on male and female workers. She found, in contradiction to the results of Liu and Chen, a weaker effect on women. Kondo thinks that due to the lower participation rate of women at the labor market, the negative effects are not as strong as on men. Apart from gender differences, Kondo also explores the effects on diverse racial groups. She compares African American employees with Caucasian

workers. Based on this examination she concludes that the initial effects are more substantial for African Americans, but the negative effects turn out to be more persistent for white employees. Kondo argues that the skill level might play an important role in these results. Caucasian employees from the dataset will generally be higher skilled, where African American employees are on average less skilled. If you take that into account, racial differences might not be the explaining factor. Nevertheless does Kondo give racial discrimination as a possible driving factor behind the differences between the effects on both groups.

Beside the geographical labor market, gender and race, we have seen that skill level is possibly relevant for the long-term effects on graduating in a recession. Brunner and Kuhn (2010) for example, focus on medium- and low-skilled workers. Studying the Austrian labor market they find a persistent negative effect on careers. They find an 6,5% decrease in income for every 1% increase in the unemployment rate. This effect appears to be stronger for so-called blue collar workers in comparison to white collar workers. A possible explanation for this phenomenon is that white-collar workers have the opportunity to extend their graduation to avoid bad entry conditions. However, this has not been researched by Brunner and Kuhn. Persistent negative effects have recently been discovered for Belgium as well by Cockx and Ghirelli (2015). They distinguish high- and low-skilled workers and connect that to the difference in the rigidity of the labor market for both groups. They analyze both wages and hours worked per year. For the lower educated employees, the poor economic entry conditions mainly effect the amount of hours worked per year. Graduating in a recession as a high educated worker affects the wage, instead of the employment. Both effects have negative consequences for the earnings of employees in Belgium, but in a different way. The earlier mentioned study of Genda et al. (2010) also focused on low-skilled workers and found different outcomes for the USA than Kahn who studied high educated graduates. The level of education thus has influence on the long-term consequences of poor entry conditions.

Lastly the field of study of the graduate may have impact on the consequences of the recession. Oyer (2006) for example focuses on the long-term effects for academic economists specifically. He finds that a high ranking of the initial institute where the economist works will result in a higher ranking of later employers in their career. This high placement has consequences for the productivity, for example the amount of publications, of the economist as well. He also conducts research on the careers of MBAs and finds that the initial job has significant influence on a workers lifetime earnings (Oyer, The Making of an Investment Banker: Stock Market Shocks, Career Choice, and Lifetime Income, 2008). To see if the field

of study matters for the impact of a recession, Altonji et al. (2014) distinguish different college majors when researching the effects of graduating in a recession. The results show a larger negative effect for lower-earning major relative to an average major. On the other hand are graduates from a high-earning major less effected by economic depressions. To explain these differences Altonji et al. look at the quality of the initial job match and at the differences between the reaction of the labor demand to business cycles.

Mechanisms

Although most of the studies find lasting negative career effects of graduating in a recession, the authors are not consentient about the mechanisms behind these effects. Some economic theories argue that graduates should be able to overcome an adverse economic shock. Gaini et al. (2012) do not find persistent negative effects and explain this partly with a signaling theory. If a worker faces unemployment during poor economic conditions, then employers will evaluate that less as negativity than unemployment during an economic boom. This will help employees that graduate during a recession in the hiring process, to overcome the 'gap' at their resume. The results of the research conducted by Biewen and Steffes (2010) confirm this theory. By calculating the chance on unemployment when taking the economic situation in the previous period into account, they find a stigma effect. A worker will face fewer problems with his unemployment after a slow economic period. Kroft et al. (2013) demonstrate that stigma effects are weaker in a poor labor market. Employers will make less use of the information that a worker has been unemployed during a recession.

Kahn (2010) states that job changing theory predicts that graduates in a recession should be able to catch up with their luckier counterparts by switching into another, better job. Mincer (1986) found that by changing jobs a workers wage improves, especially with young employees that switch. Employees that started in a low paying job will have a larger incentive to search for better employment than graduates that entry in a tight labor market. Neal (1999) explored job mobility among young men and found that workers who change their jobs not only change their firm, but also change industry and occupation. According to Neal this shows that job changes are used to find a better career, beside a better employer. Topel & Ward (1992) researched mobility among young employees and found that job changes are beneficial for wages. The first ten year of a workers career account for 66% of the total increase in wage. Of the wage increase in these ten years, approximately 33% is caused by job changes.

Contract theory can also provide reasons why bad labor market entry conditions do not have to have a lasting impact on wages. Imagine a worker that graduated in a recession. Due to the high labor supply and low demand he had to settle for a low income. After a few years the economy is booming again and the labor demand goes up. If the firm wants to prevent this worker from leaving, they should offer him a raise. Otherwise, other firms will offer him a better job and the worker will switch. In that way, bad entry conditions will not have long-term consequences. Beaudry and DiNardo (1991) find that wages are determined by the best labor market circumstances of a workers career, instead of the entry conditions, which confirms this theory.

Based on these theories, graduating in a recession should not have a long-term impact on a workers career. Other theories contradict this and predict lasting negative outcomes of bad entry conditions. Oreopoulos et al. (2012) state that job changing theory does not apply if search friction increase with age. Looking for a new job takes time, especially when you take into account that information is not complete. These costs get higher when workers get older, which means that the benefits of switching jobs are likely to be absent later in a workers career. Some workers will stop searching too early, so they will never overcome the lag in their career.

Apart from the job changing theory, the contract theory has opponents as well. If you sign a contract in flourishing economic times, you will probably negotiate a high wage. On the other hand under bad conditions you will have to accept a lower wage. Beaudry and DiNardo (1991) discovered that wages will not be lowered during the tenure of the contract due to bad conditions. This is positive for graduates in a boom, since their wage will remain high. However, if renegotiation is not perfect, the unlucky graduates will not be able to increase their wage. If that is the case, lasting negative effects will occur.

The third theory that predicts long-term negative outcomes of graduating in a recession has to do with human capital accumulation. Graduates that start working in a slack labor market will be assigned tasks that require fewer skills (Brunner & Kuhn, 2010). These jobs might not offer the same opportunities for training and learning skills as the high quality jobs. Since research points out that human capital accumulation has positive effects on a workers career, this might have lasting impact (Liu & Chen, 2014). Genda et al. (2010) argue that due to lack of human capital accrual, a cohort becomes less productive. An employer will evaluate the productivity of a worker when promoting him or giving him a raise. The results of Kwon et al. (2010) confirm this and state that workers that started in a recession are

promoted slower than their luckier counterparts. However, they conclude that this is not fully explainable by the differences in productivity.

These theories are based on the research of Gibbons and Waldman (2006) on task-specific human capital. In earlier studies researchers focused on general human capital or human capital that is specific for a firm. Task-specific human capital is connected to the tasks that a job requires. When you execute these tasks at a different firm, the task-specific human capital will still be relevant. Imagine a worker that started under unfavorable circumstances and is overqualified for the job he finds. Due to learning by doing he will accumulate task-specific human capital. When the economy improves and the worker moves into a better suiting job, the task-specific human capital will become redundant. In contrary to his luckier counterparts, he did not gain the right task-specific human capital, which means he will lag behind.

Liu et al. (2012) have similar ideas about the driving mechanisms behind the persistent effects of graduating in a recession, focusing on skill mismatches. According to the researches, there is a skill mismatch when the skills provided by the graduates do not match with de skills demanded by the firms. They find that the chance of a mismatch is larger for employees graduated in a recession. Once mismatched early in their career, employees will be more sensitive to economic fluctuations over time.

We have seen that the geographical labor market, gender, race, skill level and field of study can be relevant for the long-term effects of graduating in a recession. These effects are possibly explained by search costs, the lack of renegotiation possibilities, human capital accumulation and skill mismatches.

Data

In this chapter I will describe the dataset used to conduct my research. I will discuss how the data was collected, what the used sample looks like and how I constructed my final dataset. Furthermore I will describe the key variables that I used in my analysis.

The source

To conduct the research I used the labor supply panel[3]. This dataset is the result of a survey sent out from 1985-2012. On behalf of the OSA Institute for Labor Studies households were interviewed biennially from 1986.[4] Since 2010 is The Netherlands Institute for Social Research in charge.[5] Important themes in this dataset are job tenure, labor market mobility, search behavior and opinions about labor. I obtained the dataset from Data Archiving and Networking Services (DANS), which is an institute that provides datasets especially for research. DANS is founded by the Royal Netherlands Academy of Arts and Sciences in collaboration with the Dutch Organization for Scientific Research.[6] The survey started to collect information about employed and unemployed Dutch citizens. They focus on the potential labor force, so only people between 16 and 66 are interviewed. Striving for a sample that is representative for the Dutch population, both men and women from all over the Netherlands are selected to participate in the survey. Until 2004 oral interviews were used, thereafter the information has been collected through a questionnaire, which can be filled out online as well.

Every year approximately 4500-5000 people are interviewed. Since it is a longitudinal dataset, the goal is to follow a household as long as possible. Inevitably the dataset has to deal with people leaving the sample. In order to maintain the quality of the panel, a new sample is added every observation year. This new sample is around 25% of the total of observations. I combined the datasets from 1985 until 2012 into one large dataset. This results in a dataset with 69496 observations. The observations where information about income, hours worked, year of graduation, education level or the job sector is missing are dropped, since this is essential information for my research question. It was not possible to distinguish the participants that refused to answer from the participants without an income. As a consequence participants without a job are not included in this research. Earnings lower than 500 and higher than 10000 euros per month are dropped, since these are quite exceptional

[3] The original Dutch name is Arbeidsaanbodpanel.
[4] OSA stands for Organisatie voor Strategisch Arbeidsmarktonderzoek.
[5] Sociaal en Cultureel Planbureau is the Dutch name for this institute.
[6] In Dutch these organisations are called the KNAW and NWO respectively.

observations. These so-called outliers may influence the outcome of the research. Furthermore the few people with an age lower than 16 or higher than 65 are removed from the dataset, since they do not belong to the potential labor force. Since I have no information about the unemployment rate before 1950, I dropped the observations that are graduated in 1949 or earlier. This results in a dataset with 23230 observations in total.

Variables

The original dataset includes almost 1500 variables, which are inevitably not all relevant for my research. I made a selection from the dataset based on the literature review. I will describe my key-variables below.

The unemployment rate plays an important role when measuring the effect of graduating in a recession on wage. I retrieved the unemployment rates from the Statline database of Statistics Netherlands.[7] The unemployment rates are available from 1950, which is why I dropped the participants that graduated before this year, as I mentioned before. The unemployment rate is measured as the percentage of unemployed people of the labor force. I matched the unemployment rates with the year of graduation of the participant. For example, the unemployment rate in 1967 was 2.2%. As the year of graduation was available in the original dataset I could add the number '2.2%' to every participant that graduated in 1967. This is done for every occurring year. The variable is called 'Unemployment Rate'.

Moreover a dummy for graduating in a recession is created, since that is directly related to the research question. In line with previous literature, the unemployment rate is used as an indicator for the economic conditions. The mutation of the unemployment rate in percentage points is calculated and matched to the year of graduation. Thereafter a dummy is created, where the value 1 equals graduating in a recession. In the first situation a recession is defined as an increase of more than 0.5 percentage point of the unemployment rate in the year of graduation. So if a participant graduated in 1999 and the unemployment rate is for example 0.7 percentage point higher than in 1998, this participant graduated in a recession. In the second situation a recession is defined as an increase of more than 1 percentage point. Finally an increase of more than 1.5 percentage point specifies a recession in situation three.
The name of this variable is 'Recession', combined with the change in percentage point. So Recession 0.5 stands for situation 1. Figure 1 shows the unemployment rate and the mutation

[7] The Dutch name is Centraal Bureau voor de Statistiek.

over time. It is difficult to define a recession in a right way. Normally economists look at the GDP when determining if we are in a recession. The labor market however does not react immediately to economic downturns. To take this lag into account, I used the unemployment rate to define a recession.

As I want to research the long-term effects of graduating in a recession on wage, income is naturally the dependent variable. The variable I used here is 'net monthly income'. I adjusted the data to 2012 with the consumer price index, to take inflation into account. Since the distribution of this variable is not normal, but right skewed, I use the logarithm of the variable. This variable is called 'Wage'.

There are different variables that possibly influence the dependent variable, called independent variables. First of all, gender is included as a control variable. As wages tend to differ across men and women, it is important to take gender into account. I created a dummy variable with the value one for female participants and zero for male participants. This variable has the label 'Gender'.

Previous literature also explored the difference in effects when looking at race. To take the ethnical background into account I included information about the land of birth. I created a dummy variable where the value one means that the participant was born in the Netherlands. If the dummy variable equals zero, the participant was born in a foreign country. This variable is labelled 'Country'.

The differences in the found effects between high-skilled and low-skilled workers have been pointed out by several researches. To examine this effect for the Netherlands a dummy for highest completed level of education is created. The participants can choose out of six options when filling out the survey, which are linked to the Dutch Standard Classification of Education (SOI) codes. In this system 1 stands for preschool education and 6 means a university degree. The lowest level present in the dataset is 2, which stands for lower school. This is therefore used as the reference category for the dummy. For every level a separate dummy variable is created. I refer to the set of 5 dummies with 'Education Level'.

To examine if the field of work matters for the effect on wage, a dummy for the sector of employment is included. There are 10 possible sectors, namely agriculture, industrial, construction industry, trade, logistics, business services, healthcare, other services, public sector and education. The largest category, healthcare, is used as the reference category. A separate dummy is included for each sector. The label of the group of 9 dummies is 'Sector'.

Additionally a variable for the potential working experience is included in the dataset. This variable is created by calculating the difference between the year the survey was conducted and the year of graduation. There is not enough information about the real working experience available to include this in the analysis. That is why the potential working experience is included as a variable, labelled ‘Experience’.

Descriptive statistics

An overview of the characteristics of the variables is given in table 1 in the appendix. It is clear that most participants of the survey are born in the Netherlands, considering the 0.96 average. The distribution of men and women is almost equal, as the average is 0.43. Furthermore it is clear that just a small percentage of the observations completed a university degree, since the average is only 0.09. Lastly we can see that most people did not graduate in a recession. In the first situation we see an average of 0.24. In situation two and three there is an average of 0.10 and 0.06 respectively.

Methodology

In this section the methodology used will be explained. The different models will be described. Furthermore the assumptions that are made will be discussed.

Model

To estimate the long-run effects of graduating in a recession on wage I start with a basic mincer equation. The variables as described above are included in the model.

$$Log\ (wage) = \alpha + \beta_1 Gender + \beta_2 Country + \beta_3 Education\ level + \beta_4 Sector + \beta_5 Experience + \beta_6 Recession + \in$$

With this model the difference in wage between graduating in a recession and graduating under good economic circumstances is measured. β6 will tell us what the percentage change in wage is, for a 1 percent increase or decrease of the unemployment rate. To measure the long-term effect an interaction variable is added to the model.

$$Log\ (wage) = \alpha + \beta_1 Gender + \beta_2 Country + \beta_3 Education\ level + \beta_4 Sector + \beta_5 Experience + \beta_6 Recession + \beta_7 Recession * Experience + \in$$

By including the interaction term it is not only possible to measure the initial effect of the recession, but also the influence of experience on this effect. The expectation is that the results will show an initial negative effect on wages, which means that β6 will be negative. Previous research showed that this negative effect decreases over time, which is the case if β7 is positive. A third model is made to explore if the effect of experience on the initial effect on wage increases or decreases over time.

$$Log\ (wage) = \alpha + \beta_1 Gender + \beta_2 Country + \beta_3 Education\ level + \beta_4 Sector + \beta_5 Experience + \beta_6 Recession + \beta_7 Recession * Experience + \beta_8 (Recession * Experience)^2 + \beta_9 Experience^2 + \in$$

The expectation is that the effect of experience decreases over time, so that means β9 is negative. If these hypotheses are true an employee will experience an initial negative effect on wage, which decreases over time due to his experience.

Assumptions

The hypotheses will be tested with the Ordinary Least Squares method (OLS). In order to use this method, five assumptions have to be met.

1. The equation is linear in its parameters. This means that the βx's in the model should be linear.
2. $E(U_i|X_i) = 0$

   This assumption is called the zero conditional mean. This means that the expectation of the error, given any of the independent variables, has to be equal to zero.
3. Random sample

   The observations have to be drawn randomly from the population.
4. $var(U_i|X_i) = \sigma^2$

   This means that the variance of the errors has to be constant. When this is the case, the variance is homoskedastic. If the variance of the errors is not constant, we speak of heteroskedasticity.
5. The independent variables should not be highly or perfectly correlated. If the correlation is too close to one, the problem of multicollinearity will arise.

Results

Testing the assumptions

Before the regression can be executed, the assumptions as described above have to be met. The first condition, that the equation has to be linear in its parameters, is satisfied by building a correct model according to the theory. All the parameters in the three models described under methodology are linear. By using the labor supply panel as my dataset I secured that I make use of a random sample. Figure 2 shows that assumption two, the zero conditional mean, will not cause any problems. The observations are scattered around the zero line, without a clear pattern. This figure also makes visible that variance of the errors is constant. The scatterplot shows homoscedasticity, which means that assumption four is met as well. The final assumption, that the variables should not be highly correlated, is checked by making a collinearity matrix. A correlation above 0.800 may indicate multicollinearity. Table 2 shows that the highest correlation found is -0.462, between secondary education first phase and secondary education second phase. Since there are no variables highly mutually correlated, multicollinearity will not be a problem here. This means that all the assumptions have been met and the ordinary least squares estimator will be the best linear unbiased estimator.

Testing the models

In this section the results of the estimation of the models discussed under methodology will be presented. I start with the simplest model, model 1. Every model is tested for three situations, each with a different definition of a recession.

Model 1

Table 3 shows the results of a linear regression of the first model in situation one. The most important result for my research question is the beta for recession. According to this result, employees that graduated in a recession earn 0.2% less on average than workers that graduated during a blooming economic period. However, this effect is not statistically significantly different from zero, implying that we cannot reject the hypothesis that the average effect of graduating in a recession is zero.

The outcome for gender is as expected, according to the results women earn on average 17.5% less than men. In this research the hours worked are not taken into account. Since more women than men work part-time, this might be an explanation for this difference. The betas for education show that wage increases with the education degree. For this category lower school is the reference category. Participants that finished the first phase of secondary school

earn on average 4.3% more compared to participants who only finished lower school. People who have a university degree have an income which is 30.1% higher.

If we look at the different sectors we see that employees earn more in all sectors than in the healthcare sector, which is the reference category here. Only employees in the agriculture sector have an income that is on average lower than workers in the healthcare sector, but this result is not statistically significant. The results for experience show a positive relation, which follows the expectation. Nevertheless, a larger beta was predicted. According to the results wages increase with 0.3% for every extra year of experience. You might expect a stronger effect, since working experience can be a valuable asset for an employer. The outcome might have to do with the fact that I used the potential years of experience, not the actual working experience. An unemployed period has not been accounted for in this regression.

When looking at situation two, where a recession is defined as an increase in wage of at least 1% when graduating, compared to the previous year, a clear change in the effect of graduating in a recession is observable. In this situation participants who graduated in a recession earn 1.1% less than participants who received their degree under good economic circumstances. This result is statistically significant. If we analyze the result of situation three we see the same result as for situation two. The results of situation two and three can be found in table 4 and 5 respectively.

Model 2

As explained under methodology an interaction term is added to this model. The results in table 6 show that the coefficient of the interaction term is positive. This is in line with previous literature and means that the initial negative effect of graduating in a recession decreases when an employer gains more experience. Although it is positive, it is a noticeably small value. A possible explanation is the small impact that experience has on wage.

In situation two, visible in table 7, is the interaction term not significant, which means that the coefficient that resulted from the regression has no explanatory value. When analyzing the third situation we see that both the variable ‘recession’ and the interaction term are significant. The coefficient of the interaction term is small, but positive. The positive effect is expected based on previous literature. If we look at the coefficient of recession we see that the value has tripled compared to model 1, while you would expect it to maintain the same.

Model 3

The results of the regression for model 3 are shown in table 9, 10 and 11. In situation one, the coefficient of the interaction term of recession and the squared experience shows us a very small negative coefficient. This means that the decrease of the initial negative effect is slowing down over the years. The negative effect was expected based on previous research, it is not a substantial effect.

In situation two we observe a small but positive coefficient for the second interaction term. This implicates that the increase in wage that is caused by experience, increases even more over the years. When looking at the coefficient of recession we observe again an increase compared to model 1. Table 11 shows the results for model 3 in the third situation. Here the results for the recession dummy and the both interaction terms are statistically significant. Equal to situation two, the second interaction term has a small, but positive coefficient. The first interaction term and the recession dummy do follow the expectations based on the literature.

Figure 3 and 4 show graphically how wage develops over time according to model three in situation two and three respectively. The lines show that the initial negative effect of graduating in a recession is fading after workers gain more experience.

Conclusion

Existing literature points out that graduating in a recession has a negative long-term effect on wage. I have discussed several mechanisms that deny this effects and several that have a possible explanation. The signaling theory, job changing theory and contract theory all reasoned that employees should be able to overcome an initial negative effect of graduating in a recession. However, these theories can be explained differently, causing an opposing outcome. Furthermore, Oreopoulos' theory about task-specific human capital seems to be the driving force behind the found effects. Many researchers developed a theory that is linked to the idea that people who graduate in a recession do not find a suiting job. Therefore they gain task-specific human capital which is not useable in the job they want to have. This makes that these employees lag behind their luckier counterparts.

To test if these effects are also observable in the Netherlands, three models were build. The first model measured the initial effect of graduating in a recession. The second and third model analyzed how this effect develops when experience increases. The labor supply panel was used to perform this research.

The results show an initial negative effect of graduating in a recession. However, if this effect is long-term depends on the definition of a recession. The results of the analysis of model 2 show us that the initial negative effect decreases when experience increases. When looking at situation 1 for model 3, a long-term negative effect is observable. The decrease in the initial negative effect slows down after some time. For situation 2 and 3 however, the decrease becomes stronger when experience increases. This difference makes it hard to draw an explicit conclusion. We can say that graduating in a recession results in a lower initial wage. The length of this negative effect depends on the definition of the recession.

Discussion

Despite the fact that I tried to do this research as accurate as possible, this research has some limitations. First of all I used panel data and turned them into cross-section data. This can be a problem, since I do not take individual fixed effects into account. The sample I used is large and the individual participants do not occur often in the sample, relatively speaking. Therefore, the cross-section approach will probably not cause any problems.

I do not include participants without a job in my research. This may influence the results, since unemployment can be a negative effect of graduating in a recession. This also accounts for the variable for experience. Since there was no data of the real experience, I used the potential years of working experience. It is likely that participants that graduated in a recession miss some years of working experience since they graduated. For further research I would recommend to search for data to solve this problem.

Furthermore there might be some problems with endogeneity. The sector where participants work might be endogenous. It is possible that some sectors encounter less disadvantage of bad economic times. There will be relatively more jobs available in those sectors during an economic meltdown, so more graduates will work in these sectors when graduating in a recession. The year of graduation might also be endogenous. When studying during a bad economic period, you might postpone the year of graduation. By waiting you might prevent a period of unemployment.

Lastly the definition of a recession is a limitation of this research. Differences occurred depending on the definition of a recession. According to the used definition, it is possible to graduate when there is a unemployment rate of 20%, but you are not identified as a recession graduate. If the unemployment rate was 19% in the previous year, the definition will qualify the year as a good year. Therefore I would recommend to test other definitions of a recession, to see if the effects deviate from the found effects in this research.

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Appendix

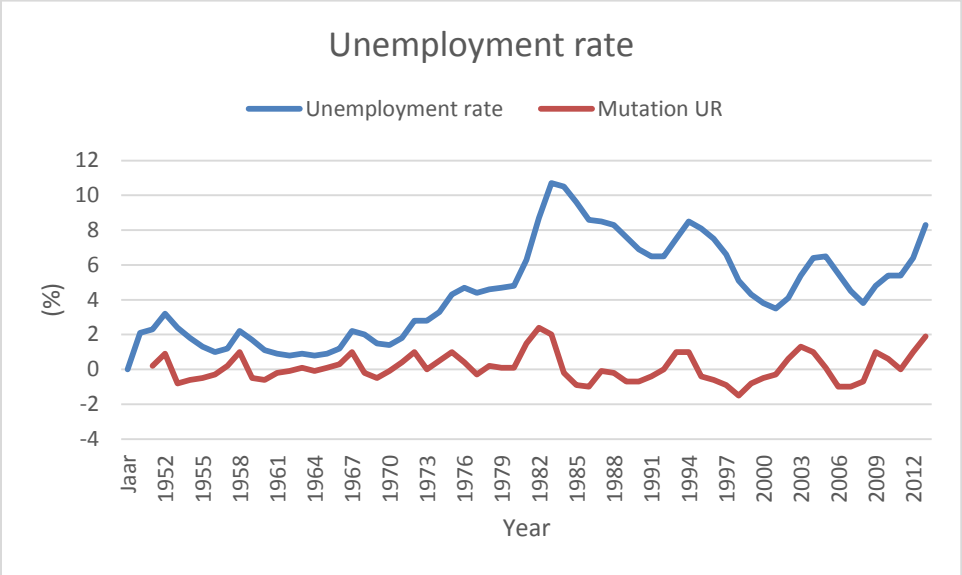

Figure 1

Descriptive Statistics

	N	Minimum	Maximum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
Wage	23230	500.0000000	9791.344668	1782.836694	5.194854513	791.7680889
UR	23230	.8	10.7	5.460	.0179	2.7311
Experience	23230	0	57	17.46	.079	12.031
Recession 0.5	23230	0	1	.24	.003	.428
Recession 1	23230	0	1	.10	.002	.293
Recession 1.5	23230	0	1	.06	.002	.232
Gender	23230	0	1	.43	.003	.495
Country	23227	0	1	.96	.001	.189
Secondary education, first phase	23230	0	1	.25	.003	.433
Secondary education, second phase	23230	0	1	.38	.003	.485
Higher education	23230	0	1	.25	.003	.435
University	23230	0	1	.09	.002	.289
Agriculture	23230	0	1	.01	.001	.095
Industrial sector	23230	0	1	.14	.002	.349
Construction industry	23230	0	1	.05	.001	.223
Trade sector	23230	0	1	.13	.002	.333
Logistics	23230	0	1	.06	.002	.241
Business services	23230	0	1	.16	.002	.362
Other services	23230	0	1	.05	.001	.223
Public sector	23230	0	1	.10	.002	.306
Education sector	23230	0	1	.11	.002	.312

Table 1

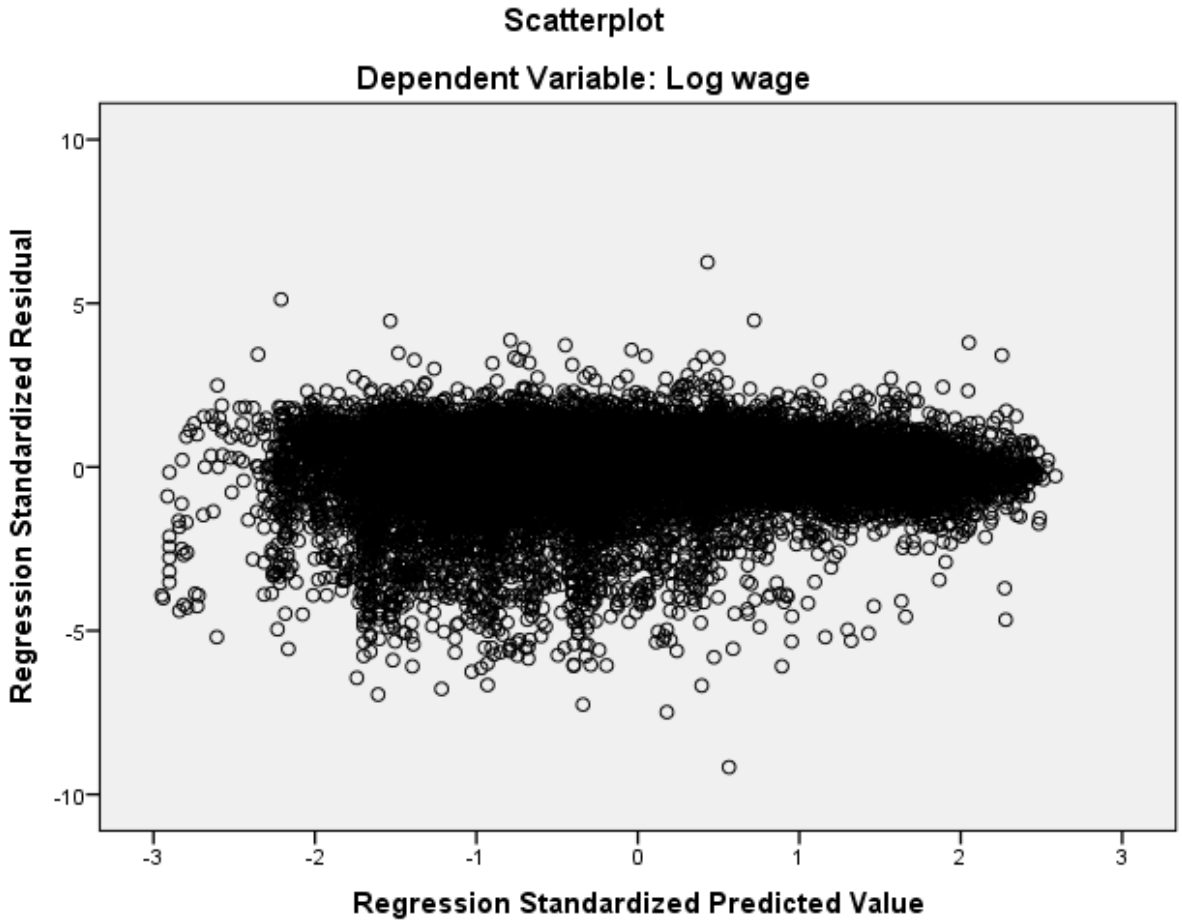
Scatterplot
Dependent Variable: Log wage
Regression Standardized Residual
10
5
0
-5
-10
-3
-2
-1
0
1
2
3
Regression Standardized Predicted Value

Figure 2

Correlations

		UR	Gender	Recession	Country	Secondary education, first phase	Secondary education, second phase	Higher education	University	Agriculture	Industrial	Construction industry	Trade	Logistics	Business services	Other services	Public sector	Education	Experience
UR	Pearson Correlation	1	.065**	.322**	.028**	-.226**	.134**	.083**	.095**	-.007	-.039**	-.036**	.009	-.035**	.040**	-.018**	-.003	-.018**	-.442**
Gender	Pearson Correlation	.065**	1	.012	-.019**	-.037**	.038**	.029**	-.023**	-.040**	-.210**	-.160**	.006	-.100**	-.034**	.026**	-.071**	.071**	-.053**
Recession	Pearson Correlation	.322**	.012	1	-.005	-.025**	.026**	.006	.001	.007	.001	-.018**	.009	-.021**	-.020**	.003	.009	-.008	-.044**
Country	Pearson Correlation	.028**	-.019**	-.005	1	.031**	.004	.004	-.033**	.001	-.012	.010	-.012	.006	.000	-.002	-.001	.017**	-.020**
Secondary education, first phase	Pearson Correlation	-.226**	-.037**	-.025**	.031**	1	-.462**	-.336**	-.184**	.016*	.105**	.079**	.098**	.077**	-.066**	.012	-.046**	-.148**	.245**
Secondary education, second phase	Pearson Correlation	.134**	.038**	.026**	.004	-.462**	1	-.442**	-.242**	.015*	.002	.026**	.081**	.006	.005	-.016*	-.017**	-.169**	-.084**
Higher education	Pearson Correlation	.083**	.029**	.006	.004	-.336**	-.442**	1	-.176**	-.037**	-.083**	-.084**	-.149**	-.080**	.022**	-.004	.032**	.278**	-.129**
University	Pearson Correlation	.095**	-.023**	.001	-.033**	-.184**	-.242**	-.176**	1	-.023**	-.066**	-.063**	-.097**	-.030**	.086**	.002	.082**	.132**	-.121**
Agriculture	Pearson Correlation	-.007	-.040**	.007	.001	.016*	.015*	-.037**	-.023**	1	-.039**	-.022**	-.039**	-.025**	-.041**	-.023**	-.032**	-.034**	.011
Industrial	Pearson Correlation	-.039**	-.210**	.001	-.012	.105**	.002	-.083**	-.066**	-.039**	1	-.091**	-.159**	-.102**	-.168**	-.096**	-.132**	-.137**	.054**
Construction industry	Pearson Correlation	-.036**	-.160**	-.018**	.010	.079**	.026**	-.084**	-.063**	-.022**	-.091**	1	-.092**	-.059**	-.097**	-.055**	-.076**	-.079**	.002
Trade	Pearson Correlation	.009	.006	.009	-.012	.098**	.081**	-.149**	-.097**	-.039**	-.159**	-.092**	1	-.102**	-.169**	-.096**	-.133**	-.137**	-.053**
Logistics	Pearson Correlation	-.035**	-.100**	-.021**	.006	.077**	.006	-.080**	-.030**	-.025**	-.102**	-.059**	-.102**	1	-.108**	-.062**	-.085**	-.088**	.052**
Business services	Pearson Correlation	.040**	-.034**	-.020**	.000	-.066**	.005	.022**	.086**	-.041**	-.168**	-.097**	-.169**	-.108**	1	-.102**	-.141**	-.146**	-.036**
Other services	Pearson Correlation	-.018**	.026**	.003	-.002	.012	-.016*	-.004	.002	-.023**	-.096**	-.055**	-.096**	-.062**	-.102**	1	-.080**	-.083**	.014*
Public sector	Pearson Correlation	-.003	-.071**	.009	-.001	-.046**	-.017**	.032**	.082**	-.032**	-.132**	-.076**	-.133**	-.085**	-.141**	-.080**	1	-.114**	.014*
Education	Pearson Correlation	-.018**	.071**	-.008	.017**	-.148**	-.169**	.278**	.132**	-.034**	-.137**	-.079**	-.137**	-.088**	-.146**	-.083**	-.114**	1	.012
Experience	Pearson Correlation	-.442**	-.053**	-.044**	-.020**	.245**	-.084**	-.129**	-.121**	.011	.054**	.002	-.053**	.052**	-.036**	.014*	.014*	.012	1

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table 2

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.054	.008		379.502	.000
	Recession 0.5	-.002	.002	-.004	-.808	.419
	Experience	.003	.000	.178	34.293	.000
	Gender	-.172	.002	-.449	-83.072	.000
	Country	.003	.005	.003	.711	.477
	Secondary education, first phase	.043	.006	.099	7.383	.000
	Secondary education, second phase	.119	.006	.303	20.194	.000
	Higher education	.222	.006	.509	36.370	.000
	University	.301	.007	.459	45.476	.000
	Agriculture	-.009	.010	-.004	-.856	.392
	Industrial sector	.062	.004	.113	17.456	.000
	Construction industry	.035	.005	.041	7.280	.000
	Trade sector	.007	.004	.012	1.892	.058
	Logistics	.056	.004	.071	12.484	.000
	Business services	.079	.003	.152	24.182	.000
	Other services	.019	.005	.022	4.108	.000
	Public sector	.079	.004	.127	21.346	.000
	Education sector	.025	.004	.042	6.880	.000

a. Dependent Variable: Wage

Table 3

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.055	.008		380.309	.000
	Recession 1	-.011	.003	-.017	-3.557	.000
	Experience	.003	.000	.178	34.300	.000
	Gender	-.172	.002	-.449	-83.097	.000
	Country	.003	.005	.003	.685	.493
	Secondary education, first phase	.044	.006	.100	7.448	.000
	Secondary education, second phase	.119	.006	.305	20.285	.000
	Higher education	.223	.006	.510	36.447	.000
	University	.301	.007	.460	45.546	.000
	Agriculture	-.008	.010	-.004	-.838	.402
	Industrial sector	.062	.004	.113	17.439	.000
	Construction industry	.035	.005	.041	7.214	.000
	Trade sector	.007	.004	.011	1.861	.063
	Logistics	.056	.004	.071	12.410	.000
	Business services	.079	.003	.151	24.088	.000
	Other services	.019	.005	.022	4.094	.000
	Public sector	.079	.004	.127	21.329	.000
	Education sector	.025	.004	.041	6.819	.000

a. Dependent Variable: Wage

Table 4

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.054	.008		380.352	.000
	Recession 1.5	-.011	.004	-.013	-2.703	.007
	Experience	.003	.000	.179	34.449	.000
	Gender	-.172	.002	-.449	-83.123	.000
	Country	.003	.005	.003	.703	.482
	Secondary education, first phase	.044	.006	.100	7.429	.000
	Secondary education, second phase	.119	.006	.304	20.252	.000
	Higher education	.222	.006	.509	36.413	.000
	University	.301	.007	.459	45.508	.000
	Agriculture	-.009	.010	-.004	-.856	.392
	Industrial sector	.062	.004	.113	17.437	.000
	Construction industry	.035	.005	.041	7.241	.000
	Trade sector	.007	.004	.012	1.869	.062
	Logistics	.056	.004	.071	12.436	.000
	Business services	.079	.003	.151	24.146	.000
	Other services	.019	.005	.022	4.106	.000
	Public sector	.079	.004	.127	21.317	.000
	Education sector	.025	.004	.041	6.836	.000

a. Dependent Variable: Wage

Table 5

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
2	(Constant)	3.052	.008		376.527	.000
	Recession 0.5	.005	.004	.012	1.484	.138
	Recession 0.5 * Experience	.000	.000	-.021	-2.425	.015
	Experience	.003	.000	.185	31.486	.000
	Gender	-.172	.002	-.449	-83.085	.000
	Country	.003	.005	.003	.711	.477
	Secondary education, first phase	.044	.006	.100	7.443	.000
	Secondary education, second phase	.119	.006	.304	20.271	.000
	Higher education	.223	.006	.510	36.428	.000
	University	.301	.007	.460	45.525	.000
	Agriculture	-.009	.010	-.004	-.855	.393
	Industrial sector	.062	.004	.114	17.484	.000
	Construction industry	.035	.005	.041	7.293	.000
	Trade sector	.007	.004	.012	1.927	.054
	Logistics	.056	.004	.071	12.517	.000
	Business services	.079	.003	.152	24.186	.000
	Other services	.019	.005	.022	4.112	.000
	Public sector	.079	.004	.127	21.372	.000
	Education sector	.025	.004	.042	6.879	.000

a. Dependent Variable: Wage

Table 6

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
2	(Constant)	3.055	.008		378.969	.000
	Recession 1	-.014	.006	-.021	-2.296	.022
	Recession 1 * Experience	.000	.000	.004	.473	.636
	Experience	.003	.000	.177	32.898	.000
	Gender	-.172	.002	-.449	-83.092	.000
	Country	.003	.005	.003	.679	.497
	Secondary education, first phase	.044	.006	.100	7.435	.000
	Secondary education, second phase	.119	.006	.304	20.232	.000
	Higher education	.222	.006	.510	36.361	.000
	University	.301	.007	.459	45.460	.000
	Agriculture	-.008	.010	-.004	-.837	.403
	Industrial sector	.062	.004	.113	17.444	.000
	Construction industry	.035	.005	.041	7.218	.000
	Trade sector	.007	.004	.011	1.863	.063
	Logistics	.056	.004	.071	12.415	.000
	Business services	.079	.003	.151	24.091	.000
	Other services	.019	.005	.022	4.103	.000
	Public sector	.079	.004	.127	21.333	.000
	Education sector	.025	.004	.041	6.828	.000

a. Dependent Variable: Wage

Table 7

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
2	(Constant)	3.056	.008		379.588	.000
	Recession 1.5	-.036	.009	-.044	-4.222	.000
	Recession 1.5 * Experience	.001	.000	.035	3.346	.001
	Experience	.003	.000	.175	33.018	.000
	Gender	-.172	.002	-.449	-83.149	.000
	Country	.003	.005	.003	.654	.513
	Secondary education, first phase	.043	.006	.099	7.356	.000
	Secondary education, second phase	.118	.006	.302	20.067	.000
	Higher education	.221	.006	.507	36.177	.000
	University	.300	.007	.457	45.233	.000
	Agriculture	-.008	.010	-.004	-.844	.399
	Industrial sector	.062	.004	.114	17.467	.000
	Construction industry	.035	.005	.041	7.256	.000
	Trade sector	.007	.004	.011	1.864	.062
	Logistics	.056	.004	.071	12.467	.000
	Business services	.079	.003	.151	24.177	.000
	Other services	.019	.005	.023	4.151	.000
	Public sector	.079	.004	.127	21.332	.000
	Education sector	.025	.004	.042	6.915	.000

a. Dependent Variable: Wage

Table 8

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
3	(Constant)	3.042	.008		371.418	.000
	Recession 0.5	.003	.005	.007	.620	.535
	Recession 0.5 * Experience	.000	.001	.023	.764	.445
	Recession 0.5 * Experience ^ 2	-3.030E-5	.000	-.044	-1.852	.064
	Experience	.005	.000	.326	17.213	.000
	Experience ^ 2	-5.709E-5	.000	-.147	-7.850	.000
	Gender	-.171	.002	-.446	-82.658	.000
	Country	.004	.005	.004	.777	.437
	Secondary education, first phase	.040	.006	.092	6.854	.000
	Secondary education, second phase	.114	.006	.290	19.257	.000
	Higher education	.217	.006	.497	35.421	.000
	University	.295	.007	.450	44.442	.000
	Agriculture	-.008	.010	-.004	-.785	.433
	Industrial sector	.062	.004	.114	17.542	.000
	Construction industry	.035	.005	.041	7.209	.000
	Trade sector	.007	.004	.012	1.898	.058
	Logistics	.056	.004	.072	12.599	.000
	Business services	.080	.003	.152	24.384	.000
	Other services	.020	.005	.023	4.323	.000
	Public sector	.079	.004	.128	21.459	.000
	Education sector	.026	.004	.042	6.992	.000

a. Dependent Variable: Wage

Table 9

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
3	(Constant)	3.045	.008		375.222	.000
	Recession 1	-.028	.010	-.044	-2.961	.003
	Recession 1 * Experience	.004	.002	.112	2.351	.019
	Recession 1 * Experience ^ 2	.000	.000	-.097	-2.591	.010
	Experience	.005	.000	.329	19.117	.000
	Experience ^ 2	-6.150E-5	.000	-.158	-9.256	.000
	Gender	-.171	.002	-.446	-82.660	.000
	Country	.004	.005	.004	.756	.450
	Secondary education, first phase	.040	.006	.092	6.877	.000
	Secondary education, second phase	.114	.006	.291	19.310	.000
	Higher education	.217	.006	.498	35.467	.000
	University	.296	.007	.451	44.491	.000
	Agriculture	-.007	.010	-.004	-.750	.453
	Industrial sector	.062	.004	.113	17.465	.000
	Construction industry	.034	.005	.040	7.092	.000
	Trade sector	.006	.004	.011	1.804	.071
	Logistics	.056	.004	.071	12.431	.000
	Business services	.079	.003	.152	24.270	.000
	Other services	.020	.005	.023	4.314	.000
	Public sector	.079	.004	.127	21.382	.000
	Education sector	.025	.004	.042	6.907	.000

a. Dependent Variable: Wage

Table 10

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
3	(Constant)	3.047	.008		376.174	.000
	Recession 1.5	-.073	.015	-.089	-4.892	.000
	Recession 1.5 * Experience	.008	.002	.210	3.638	.000
	Recession 1.5 * Experience ^ 2	.000	.000	-.144	-3.240	.001
	Experience	.005	.000	.320	18.936	.000
	Experience ^ 2	-5.947E-5	.000	-.153	-9.044	.000
	Gender	-.171	.002	-.446	-82.771	.000
	Country	.004	.005	.004	.732	.464
	Secondary education, first phase	.040	.006	.092	6.809	.000
	Secondary education, second phase	.113	.006	.288	19.132	.000
	Higher education	.216	.006	.495	35.257	.000
	University	.294	.007	.448	44.229	.000
	Agriculture	-.007	.010	-.004	-.748	.455
	Industrial sector	.062	.004	.113	17.499	.000
	Construction industry	.035	.005	.041	7.151	.000
	Trade sector	.006	.004	.011	1.779	.075
	Logistics	.056	.004	.071	12.473	.000
	Business services	.080	.003	.152	24.360	.000
	Other services	.020	.005	.024	4.370	.000
	Public sector	.079	.004	.127	21.383	.000
	Education sector	.026	.004	.042	7.007	.000

a. Dependent Variable: Wage

Table 11

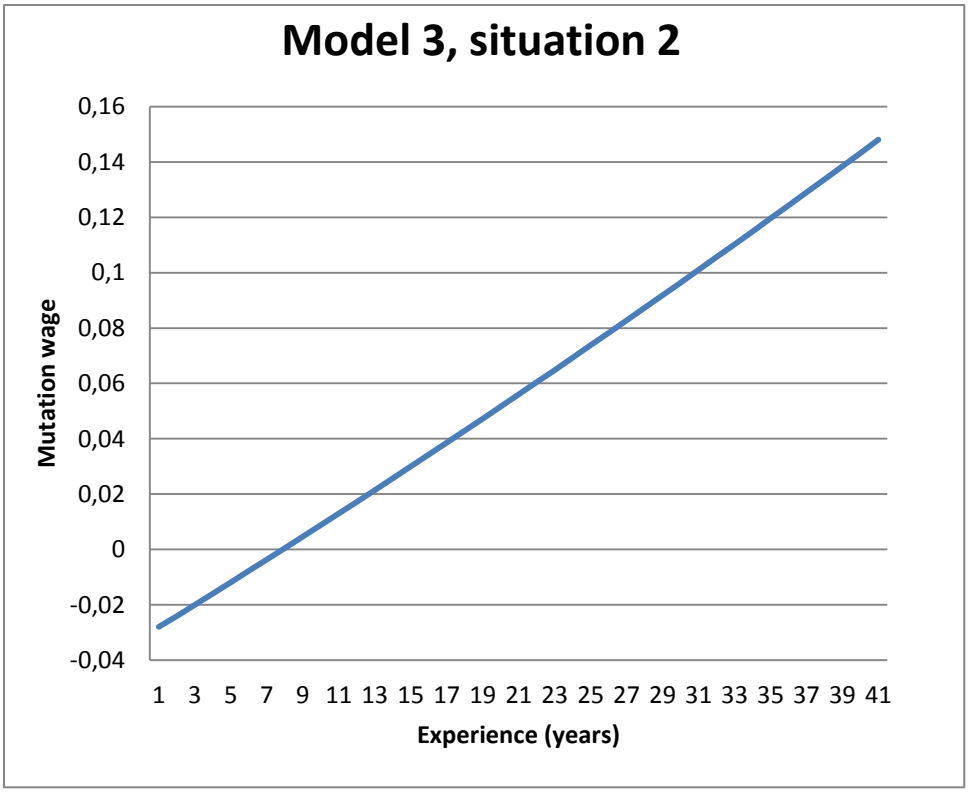

Figure 3

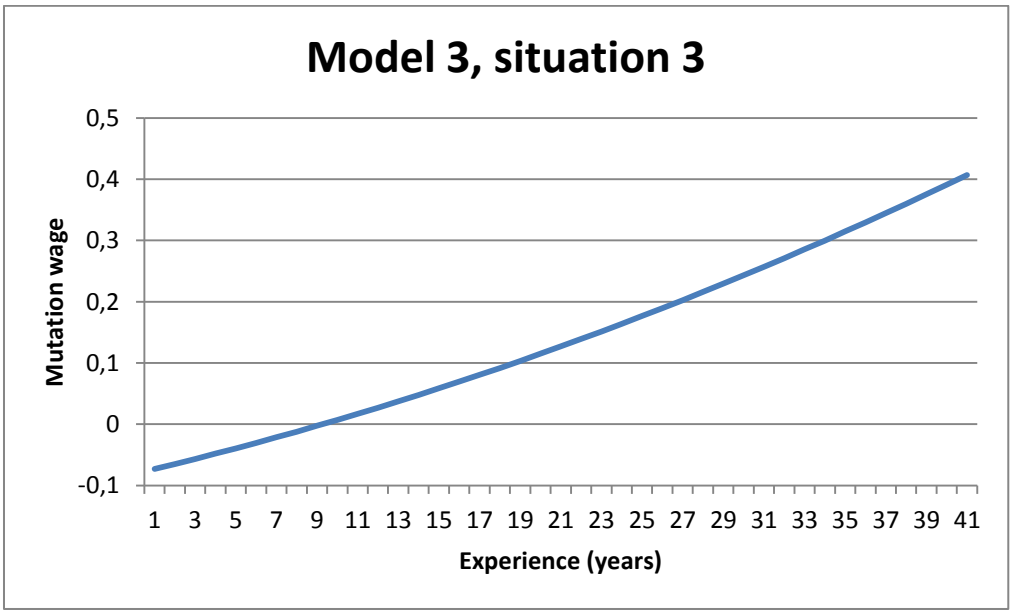

Figure 4