The effect of immigration on wages

Evidence from the European Union enlargements in the Netherlands

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Abstract

This paper uses a fixed-effects and a difference-in-difference model to estimate the effect of the inflow of migrants after the EU-enlargements in 2004 and 2007, on natives' wages. The fixed-effects estimates show that a large inflow of migrants from Central and Eastern European countries reduces native wages.

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Abbreviations

AMP	Labour Market Panel - Arbeidsmarktpanel
CEE	Central and Eastern European countries, both EU-10 and EU-2 countries
DD-model	Difference-in-difference model
EBB	Labour Force Survey - Enquete Beroepsbevolking
EU	European Union
EU- 7	EU-10 without Poland, Slovenia and Malta
EU- 9	EU-10 without Poland
EU-10	Countries that accessed the EU in 2004:Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia
EU-14	Belgium, France, Italy, Luxembourg, Germany, Denmark, Ireland, United Kingdom, Greece, Portugal, Spain, Finland, Austria and Sweden
FE-model	Fixed-effects model
GBA	Municipal Population Register - Gemeentelijke Basisadministratie
SSB	Social Statistics Database - Sociaal Statistisch Bestand

1 Introduction

Since 2004 the Netherlands have experienced an inflow of migrants from Central and Eastern European countries, CEE-migrants. In 2004 the EU enlarged with Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia, the EU-10, and in 2007 with Romania and Bulgaria, the EU-2 (see figure 1).

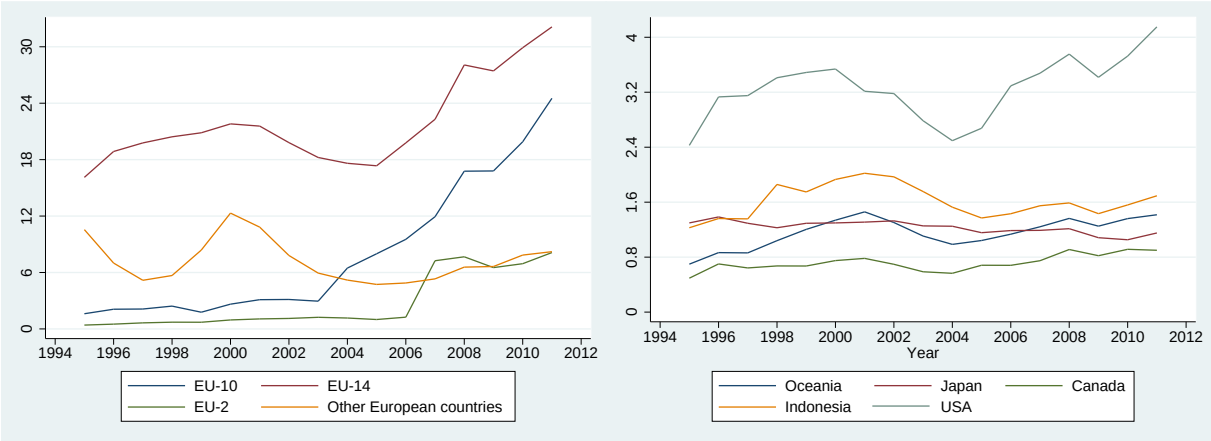
Source: Peel (2008)

Figure 1: Map of EU-15, EU-10 and EU-2 countries

Most migrants in the Netherlands from these Central and Eastern European countries come from Poland, Romania and Bulgaria (see figure 2 and 3).

Since the enlargements many research has been conducted concerning the problems surrounding CEE-migrants. Problems that are often mentioned are nuisance caused by the CEE-migrants, exploitation of the CEE-migrant and the displacement of native labourers ((Dagevos, 2011 and Kamp, 2011). This paper will focus on the displacement of native labourers by CEE-migrants. Research about the displacement of native labourers in the Netherlands has so far found little evidence to support this statement. This is in stark contrast with the prevailing view of natives, namely that CEE-migrants actually are displacing them (Ulenbelt et al., 2011). One explanation for these different views can be that most research has focussed on sectoral wages, while skill levels necessary for different jobs within a sector can differ. This paper attempts to find evidence for this explanation and focusses on whether CEE-migrants have an effect on natives' wages by focussing on

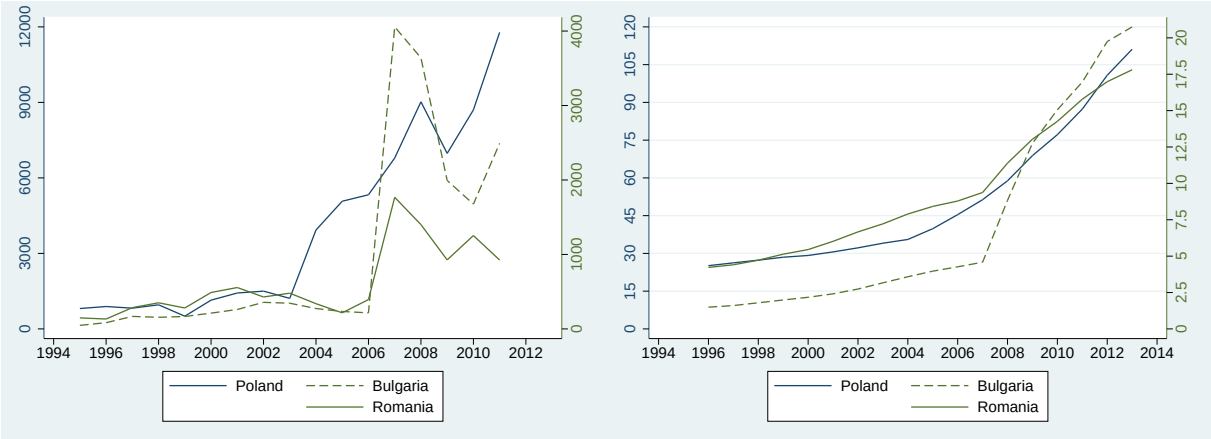
occupational groups which combines skill level and occupational direction. The question that will be researched is: *what is the effect of the increased migration due to the EU enlargements in 2004 and 2007 on wages in the Netherlands?*



(a) From Europe (b) From other western countries

Source: Statistics Netherlands (2013)

Figure 2: Yearly inflow of western immigrants to the Netherlands from 1995-2011 (in thousands)



(a) Yearly inflow (b) Yearly total

Source: Statistics Netherlands (2012)

Figure 3: Immigrants from Poland (left axis), Romania and Bulgaria (right axis), from 1995-2013 in thousands

In order to answer the research question two different models will be used, the fixed-effects model, FE-model, and a difference-in-difference model, DD-model, to find whether relative wages have changed between occupational groups who have and who have not experienced an inflow of CEE-migrants between 2002 and 2008. The FE-model has as an

advantage that the same individuals are used. The advantage of the DD-model is that there are more observations. This paper will not focus on indirect effects of migrants on natives' wages through, for example, changing consumption levels or welfare provisions. Although their effects are implicitly included in the empirical models, the focus is on wage changes due to changes in labour supply and demand.

This paper is organised as follows. In section 2 some background information is given about migration in the Netherlands. Section 3 provides a simple theoretical framework explaining the assumed mechanism behind the effect that migrants may have on wages. The fourth section explores previous empirical studies about difference-in-difference estimations regarding migration and wages. The two empirical strategies, fixed-effects and DD, are explained in section 5. In Section 6 the data used is presented, and in section 7 I explain how the treatment and control group are chosen and sample statistics are presented. Section 8 shows the estimation results and the final section discusses the results and concludes.

2 Migration in the Netherlands

Following a few years of high emigration levels in the aftermath of the second world war, the Netherlands started to experience positive net migration[1]. In the 1960s a shortage of low skilled labour arose. In order to solve this problem the Dutch government initiated a demand driven immigration policy, where guest workers from Morocco, Turkey and other Mediterranean sea countries were invited to work in the Netherlands (de Lange, 2007). 'This does not say, however, that natives would refuse to work in those jobs if the immigrants had never arrived and employers were forced to raise wages to fill the position' (Borjas, 2001, p.79).

This immigration policy assumed guestworkers to stay temporarily in the Netherlands. Therefore not much attention was given to integrate the guestworkers in the Dutch society. In 1967 the demand driven immigration policy was stopped because foreign low skilled workers were no longer needed to fulfill the vacancies.
However, not all labour migrants returned to their home country, and many, especially Maroccan and Turkish migrants, decided to stay in the Netherlands. This change lead to family reunification replacing labour migration. Family reunification was restricted when the Dutch government decided that these migrants could not get unrestricted access to the labour market (de Lange, 2007).

[1] net migration equals immigration minus emigration

Since then the Dutch government retained a strict policy to prevent low skilled workers from working in the Netherlands, even when a need for low skilled labour arose in the sectors horticulture, agriculture and construction in the late nineties and the first years of the twentieth century (de Lange, 2007). These low-skilled positions could potentially be filled with CEE-migrants, but the Dutch government preferred mobilizing the Dutch unemployed. Unfortunately, several reasons made the Dutch unemployed seem not interested or suitable for these jobs. First of all, many of the unemployed were prolonged unemployed or elderly. Secondly, the available social security created an incentive to remain unemployed rather than to work in low-skilled jobs. And finally, the good physical health required for the available jobs was a hurdle in mobilizing Dutch unemployed (de Lange, 2007).
Between 2003 and 2007 emigration levels surpassed immigration levels again. Immigration was lower because of lower economic growth, less asylumseekers and lower immigration by Turks and Moroccans. Higher emigration was also caused by lower economic growth, and possibly by high house prices and several cultural changes: a tougher political climate, negative stigmatization of immigrants and general displeasement about Dutch society (Sanderse et al., 2011).

In this period of low economic growth the EU enlarged twice, in 2004 and 2007. Initially the government had no intention to implement a transition phase and restrict the access of CEE-migrants to the Netherlands. The Ministry of Social Affairs and Employment (2002) promoted better labour mobility within the EU in 2002, and sees no need for limiting access to the EU-10, 'Tenzij er indicaties zijn dat arbeidsmigratie vanuit de nieuwe lidstaten de Nederlandse arbeidsmarkt zal verstoren.' (p.20)[2]. But the economic downturn in 2003 increased the fear of EU-10 migrants flooding the labour market and the Dutch government opted for a three-year transition phase (Engbersen et al., 2012). In 2004 the transition phase was implemented and only higher educated migrants, knowledge workers, gained free access to the Dutch labour market (Ministry of Social Affairs, 2004, p.14). The transition phase meant that EU-10 migrants needed a work permit until May 2007, and the EU-2 migrants until January 2014. Only CEE-migrants who were self-employed did not need a work permit and the amount of new self-employed CEE-migrants ten-folded from 442 in 2003 to 4221 in 2006 (de Boom et al., 2008, p.114). These are small numbers compared to the respectively 47.444 and 73.351 new Dutch self-employed, but it might be possible that CEE-self-employed work in a limited number of occupations and have an influence on the wages of Dutch self-employed working in this occupation. In

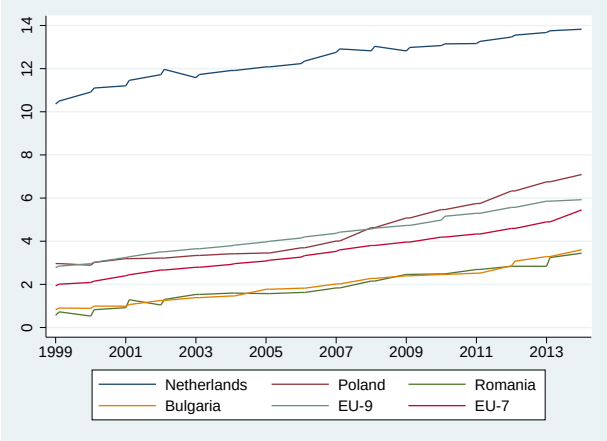
[2]Translation by author: 'Unless there are indications that labour migration from the new Member States will distort the Dutch labour market.'

addition, self-employed are allowed to set their own wage, and thus undercut Dutch minimum wages. This exception was extensively (ab)used by immigrants and employment agencies.
In contrast, the Minister of Social Affairs and Unemployement argued in 2007 that free labour mobility had to be implemented as soon as possible because of the upward economic trend accompanied by a tight labour market and lower unemployment compared to Germany and France. This policy change shows the close relation between labour migrants and economic conditions (Borjas, 2001).

The accession made it easier for CEE-labourers to work in the Netherlands, but this does not mean there were no CEE-migrants in the Netherlands before the enlargements. Before the accession there were already Poles with a Polish-German passport, illegal migrants and migrants who work here under specific sector agreements in the Netherlands (Engbersen et al., 2012; Dagevos, 2011 and CPB, 2006).
In 2006 working permits were given to EU-10 migrants without a labour market assessment, which means native Dutch did not need to be approached for the job first. And for some sectors, EU-10 migrants did not need a working permit anymore.
Economic conditions started to improve in 2007 and immigration increased and emigration decreased. As can be seen in figure 2, EU-14 migrants came to the Netherlands a few years later than the EU-10 migrants. An explanation could be that EU-14 migrants were drawn to the Netherlands by the increase in economic growth, whereas EU-10 migrants were drawn to the Netherlands because of structural differences in wealth.

One indicator for this structural difference in wealth is minimum wages. Minimum wages adjusted for purchasing parity in the Netherlands are at least three times larger than in Eastern Europe, exceptions are Slovenia and Malta (see figure 4). The wage difference does not completely explain the migration from CEE-countries. Many inhabitants of CEE-countries do not migrate to the Netherlands which indicates that other reasons such as history and culture also play a role. However the wage difference does mean that CEE-migrants are willing to work for a lower wage than the Dutch labourer and below the Dutch minimum wage. When employed, minimum wages can be avoided through illegal constructions, for example working part-time for the official wage rate, and work over time for a lower wage. For self-employed it is not illegal to work below the official minimum wage rate.

In 2008, the year where the empirical analyses will end, there were almost 77.000 EU-10 migrants and more than 20.000 migrants from the EU-2 registered at the ‘gemeentelijke



Source: Eurostat (2014)

Figure 4: Monthly European minimum wages (in hundreds) - Purchasing Power Standard

basisadministratie', GBA[3]. Persons registered at the GBA live at least 4 months in the Netherlands. The GBA excludes those who work in the Netherlands for a shorter period of time and those who are illegal. Estimates for Polish workers including the unregistered labourers appear to come closer to 150.000 (Dagevos, 2011, p.40-41)[4]. The majority of these migrants stay temporarily in the Netherlands as they often work seasonal and project based. Therefore I refer to these circular migrants or transnational commuters as CEE-migrants rather than CEE-immigrants (Engbersen et al., 2012). The number of migrants from Poland, Bulgaria and Romania registered in the GBA are shown in figure 3 on page 5.

3 Theoretical framework

This section will discuss the basic neoclassical model for wages and migrants to illustrate the direct effect of labour supply and demand on natives' wages. This model can help interpret and organize possible effects migrants can have on wages. It is by no means however a reflection of reality. The main aspect not taken into account is that wages do not change directly according to changes in supply and demand. Neoclassical economic theory[5] assumes perfectly functioning markets and wages are determined by supply and demand. The wage is equal to the marginal revenue, the revenue created by the last labourer added. If the supply of labour increases, wages decline and if the demand for labour increases, wages increase as well. The assumption here is that all labour is sub-

[3]Translation by author: municipal population register.

[4]Dagevos (2011) says that even though most studies estimate around 150.000 Polish labourers in the Netherlands, the methods leading to those estimates differed widely. It is therefore not unlikely that the estimates are off since they are vulnerable to small changes in the methods and models.

[5]The assumptions of the neoclassical model and its shortcomings are discussed in Stiglitz (2002)

stitutable. However, whether an increase in the labour supply decreases wages for the existing labourers depends on whether the additional labour supply complements or substitutes the existing labour supply. In this paper the increase in labour supply is caused by migrants, labour supply can also increase when more natives enter the work force. Eventhough this neo-classical view is called short sighted by Borjas (2001, p.67), I will use it as an illustrative tool.

When migrants have skills that are substitutes to natives' skills, natives' wages will decrease. When the skills of migrants are complements to the skills of natives, natives' wages will increase (Borjas, 2009). Skills are complements when the skills of migrants create more jobs or opportunities for the skills of natives. The effect migrants have on natives' wages also depends on the reason for migration. The effect of labour migrants differs from refugees, people who migrate to reunite with their family or students, because labour migrants compete directly with natives on the labour market. In this paper the reason for migration is the higher welfare, usually measured through income, in the host country compared to the home country. This makes labour migrants very sensitive to economic conditions, which can underestimate the effect of migrants on wages as I will show now.

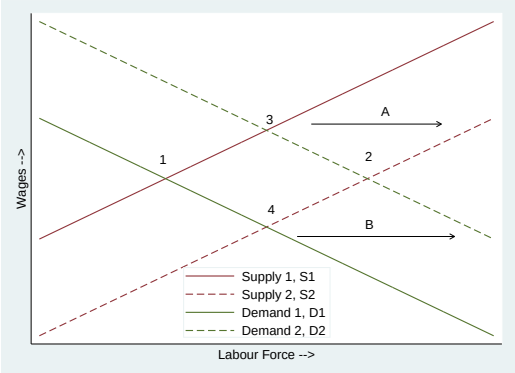
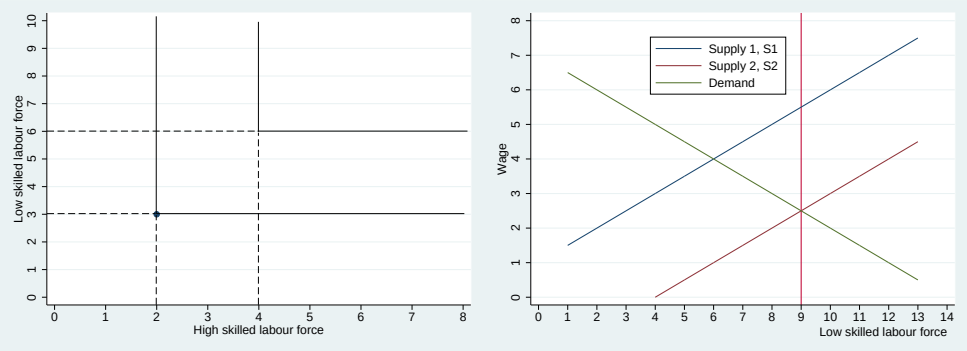


Figure 5: Wage response of low skilled natives to immigrants

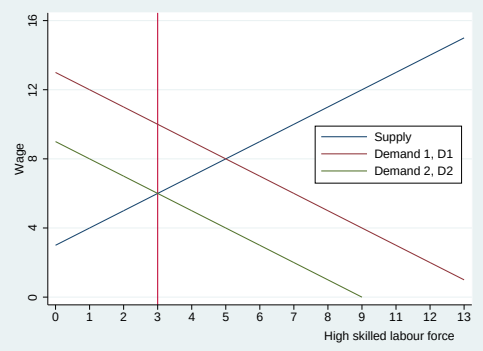
Figure 5 shows a graphic representation of migrants substituting natives, 'D' stands for labour demand and 'S' for labour supply, '1' represents the situation without migrants and '2' represents the situation with migrants. The shift from S1 to S2, arrow A, is caused by the inflow of labour migrants. When labour demand does not change, wages decrease from point 1 to point 4. However when labour demand does change, due to for example economic growth, it can be that it looks as if an increase in the labour force has not changed the wages (compare point 1 and 2). However, when staying at S1, but following arrow B from D1 to D2, we can see that in the absence of migration and with economic growth, wages would have increased from point 1 to 3, and thus migrant workers do sup-

press native wages.



(a) Complementarity of high & low skilled natives

(b) Response of low skilled native labour force



(c) Response of high skilled native labour force

Figure 6: Wage response of high and low skilled natives to immigrants

To show how this works, I take an extreme example where high and low skilled natives are perfect complements. This is illustrated in figure 6a. For the production of a certain good or service there are three low skilled labourers needed for every two high skilled labourers. An additional labourer for either skill level does not increase production if this ratio is not maintained. This assumption of complementarity is crucial for the effect migrants have on natives' wages.

Figure 6b shows an increase of low skilled labourers due to an inflow of migrants, illustrated by a shift in the labour supply curve from S1 to S2. This means there are now nine low skilled labourers who are paid a lower wage then when there were six low skilled labourers.

The increase in low skilled labourers leads to an increase in demand for high skilled labourers, illustrated by the shift in the demand curve, from D1 to D2 in figure 6c. This leads to a higher wage for high skilled workers, which is necessary to attract the high skilled workers who were voluntarily unemployed at the lower wage.

Hence under the assumption of low and high skilled workers being perfect complements,

an increase in low skilled labourers ceteris paribus, will lower the wage for the low skilled and increase the wage for the high skilled labourers.
However, one has to keep in mind that this assumption is very unrealistic and therefor wages of low and high skilled labourers will not diverge as much as in this example.

In the Netherlands, the sectors construction, agri- and horticulture experienced a tight labour market at the beginning of this century. To attract more labourers, companies have several options. They can improve labour conditions such as wages to attract the initial labour supply, cheaper foreign workers can be attracted to maintain lower wages, companies can move to cheap labour countries or file for bankruptcies when the other options are not feasible. As shown before the Dutch unemployed did not want to do low-skilled jobs, causing some companies to consider moving elsewhere, were it not for the EU-enlargements (Engbersen et al., 2012).

The total effect of the inflow of migrants on native workers will depend on the size and sign of many separate effects. Possible positive effects of an increase in low-skilled labour can be lower consumer prices and a better competitive position on the international market (CPB, 2006). Negative effects can be lower wages, higher unemployment and a higher pressure on the welfare state. There are of course also benefits for the migrants and their families such as higher wages and increase in knowledge.

In sum, with the inflow of low-skilled migrants, low-skilled labourers are never better off than before because they are always substitutes. Economic growth can hide the negative effect low-skilled migrants have on low-skilled natives. When migrants are attracted to a market because of their complementarity to high-skilled natives, wages of low-skilled labourers will remain the same in tight labour markets and decrease in slack labour markets. Hence a redistribution of wealth from low-skilled natives to high-skilled natives takes place.

4 Previous studies

In this section I will discuss empirical studies concerning migrants and wages. First I will discuss two studies related to the Netherlands, then I will discuss some studies which used natural experiments, I will conclude with a study from De New & Zimmermann (1994) which makes a distinction between low and higher skilled workers.

The most relevant study for this paper is conducted by Berkhout et al. (2011). They

studied the displacement effects of CEE-migrants on the number of jobs of Dutch employees in the Netherlands between 1999 and 2008 and use data from the 'Sociaal Statistisch Bestand', SSB[6]. This data includes both temporary and permanent migrants. Their focus was on the interaction of regions, sectors and time (in months). Education was not known, and therefore they could not control for this. The results of this study showed no net effect.

Zorlu & Hartog (2005) have conducted a study about the effect of immigration on wages in the Netherlands, Norway and the UK. The immigrant groups researched for the Netherlands were Western, Turks, Moroccans, Surinamese and Antilleans. Their main conclusions are that the effect of immigrants on natives wages are most likely very small. This could be explained by the minimum wages and collective wage agreements. Based on their findings Zorlu & Hartog (2005) suggest further research should be directed towards the effect of new migrants on employment rather than natives' wages and on wages of migrants already working in the host country.

Natural experiments can provide a solution for self-selection which occurs when labour migrants move there where jobs are. Card (1989); Hunt (1992) and Carrington & De Lima (1996) all studied with natural experiments how an inflow of migrants influenced wages or employment levels in the host countries for natives and other migrants.

Card (1989) studies the Mariel boatlift in 1980, when many Cuban immigrants arrived in Miami within a 6-month-period. In his research wage changes in Miami are compared with wage changes in other immigrant cities who did not experience the boatlift but of which the growth rate was similar to that of Miami[7]. Wage developments of Cuban migrant wages and of non-cuban wages of the fourth and the first skill quartile are compared over seven years from 1979 to 1985. Card (1989) does not find any results of Mariel immigrants depressing wages. However just like Zorlu & Hartog (2005), Card (1989) faces the problem of migrants deterring natives and other migrants from moving to Miami (Borjas, 2001). The absence of a significant result can also be due to the existence of low skilled industries in Miami, a history of a constant inflow of Cuban migrants, and the wide spread use of the Spanish language.

Hunt (1992) studies the impact of repatriants from Algeria to France in 1962, who have a similar skill level compared to natives, *'on unemployment of non-repatrients, on*

[6]Translation by author: Social Statistics Database.

[7]This is to make the common trend assumption more plausible. When the pre-treatment wage development of Miami and the other cities were similar, it is more plausible that wages in Miami, in absence of the Mariel boatlift, developed similar as the wages in the other cities

the wages of different occupations, on the labour force participation of non repatriants and on the migration decisions of other groups' (p.556), by comparing the conditions from 1962 with 1968. The repatriation was caused by the political situation in Algeria rather than in France and the repatriates chose regions in France with a warmer climate rather than with prosperous economic conditions. A further benefit of Hunt (1992) is the absence of selection bias, most persons from European origin needed to leave Algeria. The results did not indicate a change in wages or employment levels of French natives or migrants. Unemployment was mainly high amongst the repatriates and only internal migration was discouraged because of the repatriates, however foreign immigrants seemed to be attracted by the repatriates.

Carrington & De Lima (1996) use the inflow of approximately 600.000 repatriates, ten percent of the Portuguese labour force, from Angola and Mozambique to Portugal between 1974 to 1976, to study the influence of the repatriates on the Portuguese labour market. They compared Portugal with Spain and France and they compared regions within Portugal. Their results show that the decrease in employment levels after the return migration can also be explained by a European wide downturn due to the oil crises. However the authors find their results less reliable than those from Hunt (1992); Card (1989) because other events in Portugal could have caused the lower growth in the intra-national comparison as well.

De New & Zimmermann (1994) studied for West Germany whether foreign workers were subsitutes for low skilled and complements for high skilled native labourers and whether some industries were more affected by the inflow of immigrants. De New & Zimmermann (1994) conclude that immigrants had in general a negative effect on German wages, except for higher skilled workers with more than 20 years of experience. The overall negative effect can be explained by the similarity between the German immigrants and the Germans living in Germany. Also the permanent migration of guestworkers coincided with a slack labour market which could have contributed to a larger effect.

The results from the studies described above show a mixed effect. Carrington & De Lima (1996) and De New & Zimmermann (1994) find a negative effect of migrants on natives' wages. Whereas the other studies find no effect. The studies finding a negative effect mention that the migrant flow coincided with periods of lower economic growth, the oil crisis and a slack labour market respectively. The studies finding no effect did not explicitly mention whether there was economic growth or not. If there was economic growth, this might partly explain why their results showed no effect. This observation

illustrates how hard it is to separate the effects of economic conditions and migrant flows.

5 Data

The main data source for this research is the 'Arbeidsmarktpanel', AMP[8] , [9]. The AMP is composed of three sources: the 'Enquete BeroepsBevolking', EBB[10], the 'Gemeentelijke basisadministratie', GBA[11] and the 'Sociaal Statistisch Bestand', SSB[12]. The AMP contains in total over one million of individual observations spread over a time period from 1999-2009. From this data I derived the following variables for my empirical model, which will be explained in section 6.

The dependent variable is log hourly wage. 'Hourly wage' is calculated as yearly wage from jobs including income from foreign jobs and other labour divided by number of hours worked. An alternative measurement is to use 'Monthly wage' and 'Hours worked', but this has some drawbacks. Before 2005 the variable 'Monthly wage' is observed in December, and from 2006 in October. Because occupations in construction and agriculture are less productive in the winter, I considered yearly wages to be a better measure.
Yearly wages are measured from 1999 to 2009 and hours worked from 2000 to 2009. These time series have a discontinuity between 2005 and 2006. Before 2005 wages were measured through a survey where respondents were not randomly chosen, large companies were overrepresented and also yearly wages were known for more observations than hours worked. From 2006 onwards there were much more observations for which hours worked was known. In addition to a change in sampling strategy for hours worked there is also a change in the measurements of hours worked. To be able to conduct this study I will assume these changes affect all occupations equally.

The main independent variable is CEE_j. The variable I choose to define occupation, CEE_j, is 'occupational group'. This is a combination of skill level and occupational direction. A distinction will be made between occupations which experienced an inflow of migrants, and those that have not.

The control variables I will use in the DD-approach are age, age-squared, gender and education. I do not have data available for variables such as job conditions and private or

[8]Translation by author: Labour Market Panel.
[9]Compounded by Statistics Netherlands, commissioned by the Central Planning Bureau
[10]Translation by Author: Labour Force Survey.
[11]Translation by author: municipal population register.
[12]Translation by author: Social Statistics Database.

public employment. Other variables such as place of residence or being married I chose not to control for because of possible endogeneity with both the dependent and main independent variable. Education and occupation are measured by the EBB, this survey has been conducted in one year for each individual between 1999 and 2009, whereas wage is measured by the SSB and is often known for more or all years for each individual between 2000 and 2009. Hence I do not know for all wages the corresponding level of education or occupation.

6 Empirical strategy

To investigate the effect of CEE-migrants on natives' wages I will use two models. The first is a fixed-effects model, FE-model, the second is a difference-in-difference model, DD-model.

In the FE-model the subject of interest is individuals that are employed or self-employed in 2002, and for whom occupation is measured in 2002. Individuals are only included when they had a positive income in 2002 and in 2008. This is income from labour, but in 2008 also from social benefits or pensions.
In the DD-model the subject of interest is individuals that are employed or self-employed, and for which occupation and education is measured in the same year as wage. Individuals are only included when wage is positive. Employed and self-employed are social-economic categories and these present the main source of income for an individual. Other categories are based on different kinds of collected benefits.
For both models the treatment group consists of the individuals in occupations that experienced an increase in migrants, which I will refer to as 'migrant occupations', and the control group is the individuals in occupations that experienced no change in migrants, which I will refer to as 'native occupations'. Borjas (2001, p.81) defines: *'immigrant-intensive industries are those that employ a disproportionately large number of migrants'*. This means that immigrants are overrepresented compared to natives in an industry, here occupation.

Initially I wanted to select occupations for both groups by using the AMP and following Borjas (2001, 1999). He defines the fraction of immigrants per occupation as $\frac{M_j}{N_j}$ where M_j is the weighted number of western immigrants in occupation j and N_j is the weighted number of natives in occupation j. Because I want to know only the influence of migrants who came after 2004,I would want to calculate the relative increase of labourers in an occupation due to CEE-migrants as $\frac{M_{j,2008}}{M_{j,2008}+N_{j,2008}} - \frac{M_{j,2002}}{M_{j,2002}+N_{j,2002}}$. Unfortunately,

this approach was not feasible because CEE-migrants are not defined as a separate group of origin but are integrated with migrants from Western Europe, North America, Oceania, Indonesia and Japan under the heading 'western migrants'. This can lead to defining occupations as migrant occupations while in reality no CEE-migrants are working in this occupation. Secondly, EU-14 migrants also started to come to the Netherlands in 2005, one year after the EU-10 migrants, making it hard to distinguish between occupations with an inflow of CEE-migrants and with an inflow of EU-14 migrants (see figure 2, p.5). Lastly, the dataset contains only observations of people who stay in the Netherlands for at least four months. Migrants staying here less than 4 months, for example project-based, seasonal or illegal labourers, are excluded. Regressing natives' wages on the share of western migrants will then give an incomplete picture of the effect western migrants have on natives' wages. Because of these issues I will not use the AMP, Labour Market Panel to determine whether an occupational group experienced an increase in CEE-migrants, but I will use the results of other empirical studies concerned with CEE-migrants in the Netherlands (see section 7).

The treatment to which the treatment group is exposed are the EU-enlargements in 2004 and 2007. The before treatment moment, t_0, is 2002, and the after treatment moment, t_1, is 2008. I used one pre- and one post-treatment moment rather than using all available years, because Bertrand et al. (2004) have shown with Monte Carlo simulations that with a small number of states, here occupations, the use of one pre and post treatment moment reduces the change of a type I error, where a significant effect is found while there is no effect. I chose 2002 as the pre-treatment year because it might have been that EU-10 migrants anticipated to the enlargement in 2004 and therefore postponed migrating to the Netherlands from 2003 to 2004, when the enlargement would make access easier. Indeed, figure 3 shows fewer Poles came to the Netherlands in 2003, going against the upward trend from 1999 until 2008. For the after treatment moment I chose 2008 rather than an earlier year because wages need some time to develop due to contracts and collective wage agreements. Furthermore using 2008 for t_1 allowed me to include possible early wage changes due to the inflow of Bulgarians and Romanians and the abolition of the work permit for Polish workers, which both took place in 2007.

For the DD-model the main identifying assumption is that without an inflow of CEE-migrants, wages in the migrant occupations would have followed the same trend as the wages in native occupations did after the treatment. At least for the financial crisis we know with hindsight that migrant occupations, such as construction, got initially hit harder than native occupations, such as education and healthcare. Therefore I did not

choose 2009 for t_1, this is supported by the decrease in Polish migrants in the year 2009 (see figure 3). The plausibility of this assumption can be checked by comparing the pre-trend of wages, the wage developments of both migrant and native occupation wages prior to the 2004 enlargement, see section 7. In table 1 the set-up of the DD is presented, my main interest is the last cell, (D-C)-(B-A). This cell shows how much wages have changed because of the inflow of CEE-migrants.

Table 1: Difference-in-Difference model

	Control group, Native occupations	Treatment group, Migrant occupations	Occupational wage differences
t=0, 2002	A	C	C-A
t=1, 2008	B	D	D-B
Wage change	B-A	D-C	(D-C)-(B-A)

The regression for the fixed-effect estimation is:

$$ln(\text{Wage}_{N_{ijt}}) = \alpha_0 + \alpha_1(CEE_j * Year_t) + \alpha_2 Year_t + \phi_i + \varepsilon_{ijt} \quad (1)$$

The regression for the difference-in-difference estimation is:

$$ln(\text{Wage}_{N_{ijt}}) = \beta_0 + \beta_1 CEE_j + \beta_2 Year_t + \beta_3(CEE_j * Year_t) + \beta_4 X_{ijt} + \varepsilon_{ijt} \quad (2)$$

$\ln(Wage_{N_{ijt}})$	represents the percentage change of natives' wages.
CEE_j	is a dummy variable equal to one for migrant occupations and equal to zero for native occupations.
$Year_t$	is a dummy variable, equal to one if the year is 2002 and equal to zero if the year is 2008.
X_{ijt}	is a vector of control variables.
i	represents the individual.
j	represents the occupation.
t	represents the year.
ϕ_i	is the unobserved individual effect.
ε_{ijt}	represents the error term.

7 Identification of relevant occupational groups

As we saw in the previous section the AMP has some drawbacks when using it for determining native and migrant occupations. Therefore I will identify relevant occupational groups by using other empirical studies and have a quick glance at what the AMP can tell us about the inflow of Western migrants. I only considered elementary and lower

occupational groups as relevant, because Dagevos (2011, p.73) has found that these are the occupations where most recently migrated Poles work. To keep migrant and native occupations comparable, I only looked for native occupations at elementary and lower occupational groups.

It is possible to select native and migrant occupations based on other research, because in the regression only observations of natives will be included. CPB (2006), de Lange (2007); Engbersen et al. (2012), and Dagevos (2011) have identified several sectors in which CEE-migrants are working. The translation of these sectors into occupational groups is based on my judgement of whether I thought that sector would fit in an occupational group. This judgement is based on the names of the sectors and occupational groups, and a list of examples of occupations belonging to an occupational group provided by Statistics Netherlands. The reason for this subjective approach is because there is no information available linking sectors with occupational groups. In addition the classification of sectors can also differ per study. Table 2 shows the identification of native and migrant occupations based on the aforementioned literature, and the number of observations for the FE- and DD-model. Scientific evidence defining occupations where mainly natives work is scarce. Dagevos (2011, p.141) notes that *'Very few Poles are employed in the public administration, in education or in the health and welfare sector sectors where native Dutch workers are by contrast frequently employed'.* These sectors are characterised by the need for qualifications that migrants often lack, such as speaking the native language and having the right diploma (Roosblad, 2005, p.80). This is in line with Borjas (2001, p.78) who mentions that migrants work in different occupations and industries than natives.

In the AMP two occupations, in the category elementary/lower, can be found for which the total workforce increased with at least 5% between 2002 and 2008 due to western migrants. However, the number of migrants per year can vary a lot, and taking different years than 2002 and 2008 can change the relevancy of occupations. One reason for the absence of a clear observable increase in western migrants could be that CEE-migrants are under represented in the survey relative to other western migrants, this can especially be true considering the high estimates of temporary workers in the Netherlands. This leaves the possibility open that in some sectors the CEE-migrants have replaced the native workers. Another reason can be that CEE-migrants have replaced other western migrants instead of native workers. This implies that CEE-migrants might have an effect on other western immigrants' wages or employment. It can also be that the number of CEE-workers in the Netherlands is simply too small to have a real impact, hence there is

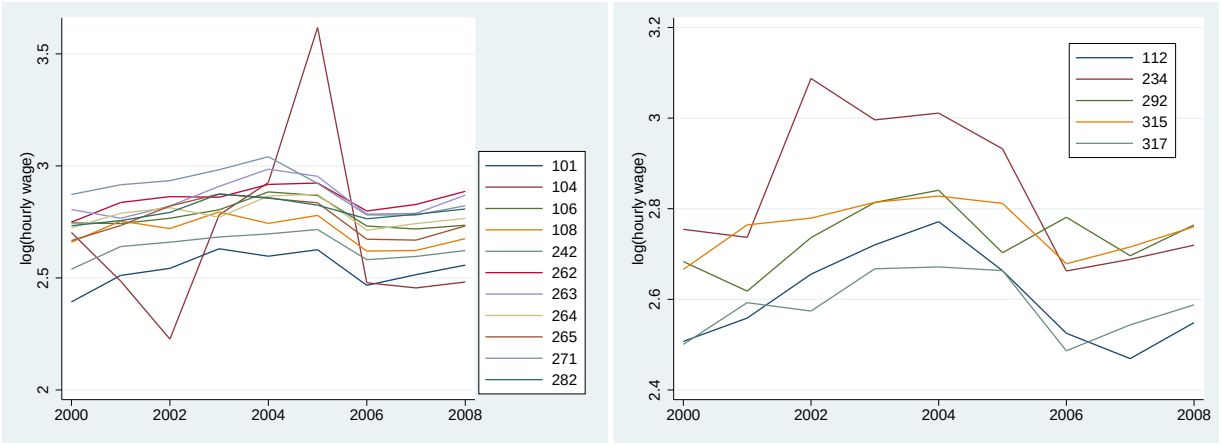
no substantive effect. Which of these reasons, or combination of reasons is true, is thus very important for the effect CEE-migrants have on native wages.

Table 2: Migrant and native occupations

Authors	Identified sectors	Occupational group		Number of observations FE-model	DD-model 2002	DD-model 2008
Migrant Occupation						
Agriculture	de Lange, 2007; Dagevos, 2011; Ulenbelt et al., 2011 and Engbersen et al., 2012	104	Elementary agricultural	3	4	15
		242	Lower agricultural	156	177	346
Construction	de Lange, 2007; Dagevos, 2011 and Ulenbelt et al., 2011	106	Elementary technical	148	180	368
		262	Lower engineering	191	230	670
		263	Lower road and hydraulic engineering	47	52	81
		264	Lower metallurgy	95	104	263
		265	Lower mechanical engineering	24	32	59
Industry & Production	Dagevos, 2011 and Engbersen et al., 2012	271	Lower processtechnical	78	94	212
Transport	Dagevos, 2011 and Engbersen et al., 2012	108	Transport, communication & traffic	208	236	459
		282	Lower general transport	440	513	1.119
Unskilled work	Engbersen et al., 2012	101	Elementary general	59	70	181
Native Occupation						
Public administration[a]	Dagevos, 2011	112	Elementary Economic, administrative & commercial	36	42	41
		315	Lower administrative	608	718	1027
		317	Lower sales	347	408	1.120
Education	Dagevos, 2011	234	Lower physical education	7	9	32
Health & welfare	Dagevos, 2011 and Roosblad, 2005	292	Lower (para)medical	119	127	82
Total				2.566	2.996	6.075

[a]No occupational groups for public administration at this skill level, therefore I chose other administrative occupations

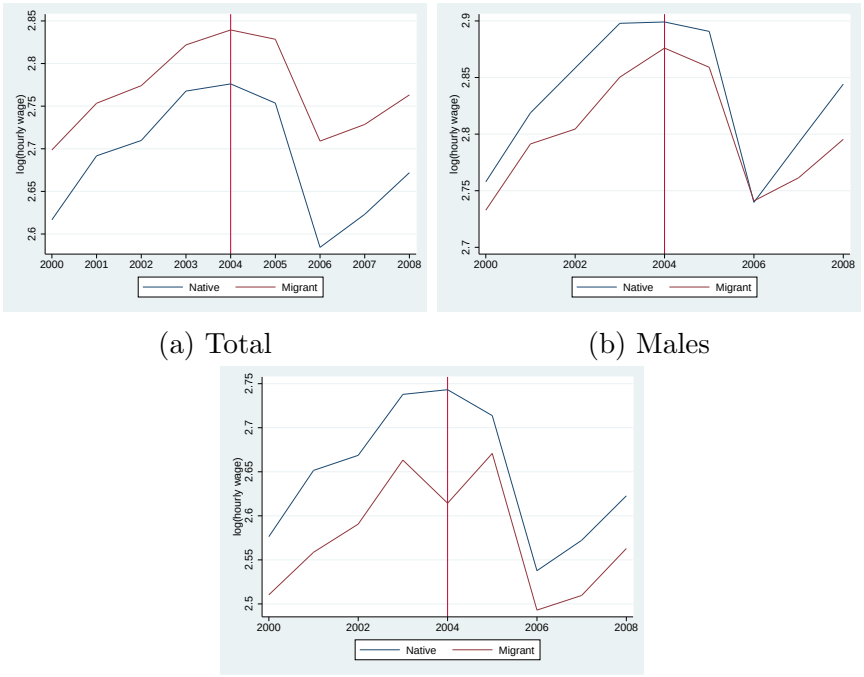
The wage developments of the occupational groups in the DD-model can be seen in figure 7. The drop in wage levels between 2005 and 2006 is due to a change in measurement. Most wages in both the migrant and native occupations seem to have decreased in this period. Only occupation 104, elementary agricultural, stands out, but due to the low number of observations for this occupation, no conclusions can be drawn from this observation.



(a) Migrant occupations (b) Native occupations

[a] See table 2 for the names matching the numbers of the occupational groups

Figure 7: Wage development of migrant and native occupations in the DD-model[a]



(a) Total (b) Males

(c) Females

Figure 8: Pre-trend wages, older than 25

Now that I have identified and selected occupations for the control and treatment group, the common trend assumption can be made plausible by looking at the pre-trend wages. Figure 8 shows the pre-trend of migrant and native occupation wages. The figures show that wages of native and occupational groups move in the same direction as well before as after the enlargement in 2004. Hence, based on the pre-trend wages, the common trend assumption is plausible. For the total observations, figure 8a, wages are lower in the migrant occupations, which is expected. This is not the case when we split

the total sample up in males (figure 8b) and females (figure 8c). The difference is because women earn less on average and are working mainly in native occupations, so for the average wage in native occupations, the wage of women weigh heavier, and vice versa for the migrant occupations.

Table 3: Summary statistics of the FE-model[a]

Sample	Persons older than 25 years					
	Male			Female		
Occupation	Native	Migrant	p	Native	Migrant	p
Observations	218	1254		899	195	
Average wage, 2002	2.85	2.80	*	2.67	2.59	***
Average wage, 2008	2.87	2.82	**	2.73	2.62	***
Average age, 2002	40.69	42.56	**	40.91	39.16	***
Education (%)			***			**
Primary	7.53	17.43		8.58	16.18	
Lower secundary	23.76	37.69		22.51	30.44	
General secundary	12.16	6.21		24.54	14.30	
Higher secundary & vocational	0.36	0.00		-	-	
Vocational level 2 and 3	18.31	25.54		15.96	19.63	
Vocational level 4	18.11	9.18		15.77	11.55	
Higher secundary	7.56	2.07		8.33	3.72	
Higher professional & University bachelor	9.30	0.98		3.36	3.25	
University master	1.08	0.57		0.59	0.92	
Unknown	1.83	0.34		0.36	0.00	
Social-economic category (%), 2008						
Unknown	0.00	0.29		0.21	0.00	
Employee	94.42	92.76		94.17	95.28	
Self-employed	0.00	0.09		0.75	0.54	
Occupational disability benefit	0.34	0.90		0.59	0.99	
Unemployment benefit	0.87	0.82		0.38	0.43	
Social assistance benefit	0.00	0.08		0.11	0.00	
Other benefit	1.27	0.83		0.38	1.70	
Retirement	2.85	3.95		2.44	0.60	
Scholar/Student	-	-		0.19	0.00	
Other	0.25	0.27		0.77	0.45	

[a] Robust standard errors are in parentheses. ***,**,* represent significance at the 1%, 5% and 10% respectively.

To gain a better understanding of the differences between the migrant and native occupations, tables 3 and 4 show the summary statistics for the variables used in the regressions of the FE- and DD-model. Social-economic category is included in the statistics for the FE-model because it can change over time per individual (see section 6). All observations were weighted to create a representative sample of the Dutch population. In the fixed-effects model social-economic category in 2008 is not significantly different between the native and migrant occupations. In the DD-model only education is significantly different between migrant and native occupations for males and to a lesser extent for females. The other variables age and wage do not differ significantly between migrant and native occupations. The differences in significance of the variables might be explained by the difference in number of observations. From the observed results in this section no inference can be made for the regressions because the relative changes over time are not taken into account.

Table 4: Summary statistics of the DD-model[a]

Sample	2002						2008					
	Male			Female			Male			Female		
Occupation	Native	Migrant	p	Native	Migrant	p	Native	Migrant	p	Native	Migrant	p
Observations	267	1463		1037	229		502	3244		1800	529	
Average wage	2.9	2.8		2.7	2.6		2.8	2.8		2.6	2.6	
Average age	42.0	43.7		41.7	40.3		43.7	44.5		44.6	45.5	
Education (%)			***			*			***			*
Primary	7.7	20.0		9.6	17.1		6.6	15.4		6.2	16.6	
Basic secundary	13.3	6.0		24.6	14.5		18.9	7.5		26.5	13.8	
Lower secundary	23.6	37.0		22.1	31.7		20.4	39.3		24.8	30.5	
Higher secundary & vocational	0.3	0.0		0.1	0.0		0.0	0.0		0.1	0.0	
Vocational level 2 & 3	18.6	24.3		17.3	18.3		14.7	19.2		15.4	17.8	
Vocational level 4	18.0	8.4		14.4	10.2		22.4	13.7		17.5	13.2	
Higher secundary	7.3	2.1		7.7	4.4		6.4	2.6		5.4	3.7	
Higher professional & university bachelor	8.6	1.1		3.3	3.2		7.8	1.5		3.1	3.0	
University master	1.2	0.7		0.6	0.8		1.2	0.3		0.8	1.1	
Unknown	1.5	0.4		0.3	0.0		1.7	0.5		0.3	0.3	

[a] Robust standard errors are in parentheses. ***,**,* represent significance at the 1%, 5% and 10% respectively.

8 Estimation results

In this section I will discuss the estimation results of the FE- and the DD-model, also the results of the sensitivity analysis will be presented.

For both models there are no missing values, only for the variable education in the DD-model do missing values enter as a separate category. People living of benefits or pensions in 2002 are excluded in the FE-model. Only labourers who had a job in 2002 and who thus might have been replaced by CEE-migrants in 2008 are interesting to observe in this research. Assuming welfare benefits are lower than wages then a shift from having a job in 2002 to being unemployed in 2008 can imply a replacement by migrants if this occurs more often in the migrant than in the native occupations. In the DD-model the individuals living of benefits or pensions in 2002 and 2008 are excluded, because I only want to look at the wage changes and not the changes in benefits. To exclude outliers positive wages are required in 2002 for the FE-model and in 2002 and 2008 for the DD-model. In addition persons younger than 26 are excluded from the analysis because younger persons are more likely to increase their education level, which makes the assumption that education level remains constant less plausible.

8.1 Fixed-effects model

The estimation results of the FE-model are presented in table 5. The interaction variable 'treatment x time' is expected to be negative when the inflow of migrants has led to lower wages for natives. The results in table 5 indicate an overall negative relation between the inflow of migrants and natives' wages. The interaction variable is significant at a 5% level for the total sample (1) and the sample aged 56-65 (7). The former can indicate that the inflow of migrants is indeed negatively correlated with natives' wages. The latter however might be better explained through lower pensions for migrant occupations than native occupations. In addition the number of individuals, idnr., is also low for this group.
The significance of the time variable varies. This might be partially explained by the break in the time series for wages between 2005 and 2006. The difference in significance levels of the time variable between men and women could be because of the skewed distribution of men and women over migrant and native occupations, where men are overrepresented in migrant occupations and women in native occupations.
The advantage of the FE-model is that the same individuals are observed in 2002 and 2008. This eliminates the need to control for individual characteristics. The downside of the FE-model are the fewer observations compared with the DD-model.

Table 5: Estimates of the FE-model[a]

Sample: Age	Older than 25			26 and 35	36 and 45	46 and 55	56 and 65
	Total	Men	Women	Total	Total	Total	Total
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Treatment x time	-0.034**	-0.005	-0.033	-0.015	-0.027	-0.031	-0.193**
	(0.017)	(0.024)	(0.036)	(0.038)	(0.027)	(0.023)	(0.088)
Time	0.054***	0.022	0.062***	0.103***	0.044*	0.023	0.008
	(0.013)	(0.021)	(0.015)	(0.024)	(0.023)	(0.019)	(0.050)
R-squared	0.013	0.004	0.020	0.062	0.010	0.003	0.095
Number of idnr[b]	2566	1472	1094	692	942	833	98

[a] Age, education and occupation are measured in 2002. Robust standard errors are in parentheses. ***,**,* represent significance at the 1%, 5% and 10% respectively.
[b] each idnr, identification number, is observed twice. Once in 2002 and once in 2008.

8.2 Difference-in-Difference model

The estimation results of the DD-model are presented in table 6. Again the interaction variable is expected to be negative when migrants have a negative effect on natives' wages. The results from the DD-model however show positive results, though not statistically significant at the 5% level.
The time variable has a negative coefficient, this is probably due to the break in time series and the increased number of observations in 2008 compared to 2002. Just as in the FE-model the difference in significance between men and women for the time variable might be explained by their unequal distribution over migrant and native occupations.

8.3 Sensitivity Analyses

For the sensitivity analyses the same regression is applied to different samples. The estimation results of the sensitivity analysis where t_1=2005 can be seen in table 7. Regressions (1) and (7) are the first regressions from table 5 and 6 respectively. The regressions named 'total' refer to Dutch natives.

In the appendix more sensitivity analyses can be found. I estimated the models for Dutch low-educated individuals, which means that according to the Dutch government they do not have an education which provides access to the labour market (Rijksoverheid, n.d.). Low-educated individuals are expected to face more competition from migrants (Dagevos, 2011). The models are also estimated for migrants already living in the Netherlands. Zorlu & Hartog (2005) argue that new migrants might have a larger effect on recently arrived migrants. Unfortunatly due to a lack of observations it was not possible to take a sample of recently arrived migrants and therefore the second sensitivity analyses is applied to large migrant groups living in the Netherlands, these include Suri-

Table 6: Estimates of the DD-model[a]

Sample: Age	Older than 25					
	Total		Men		Women	
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment x time	0.027*	0.034*	0.005	0.009	0.018	0.008
	(0.015)	(0.016)	(0.042)	(0.039)	(0.027)	(0.025)
Treatment	0.064	-0.058*	-0.054	-0.031	-0.078	-0.054
	(0.064)	(0.031)	(0.037)	(0.033)	(0.069)	(0.058)
Time	-0.038***	-0.055***	-0.014	-0.024	-0.046**	-0.060***
	(0.002)	(0.006)	(0.039)	(0.035)	(0.018)	(0.013)
Controls	no	yes	no	yes	no	yes
Observations	9071	9071	5476	5476	3595	3595
R-squared	0.016	0.132	0.004	0.074	0.012	0.059
Sample: age	26-35	36-45	46-55	56-65		
	Total	Total	Total	Total		
	(7)	(8)	(9)	(10)		
Treatment x time	0.083**	0.006	0.047	0.029		
	(0.038)	(0.028)	(0.031)	(0.036)		
Treatment	-0.027	-0.045	-0.092**	-0.080*		
	(0.052)	(0.032)	(0.033)	(0.044)		
Time	-0.059***	-0.030***	-0.068**	-0.118***		
	(0.016)	(0.006)	(0.024)	(0.029)		
Controls	yes	yes	yes	yes		
Observations	1950	2899	2983	1228		
R-squared	0.091	0.128	0.147	0.132		

[a] Robust standard errors are in parentheses. ***,**,* represent significance at the 1%, 5% and 10% respectively.

namese, Turks, Moroccans and Antilleans. Lastly I estimated all aforementioned models, with $t_1 = 2005$ instead of 2008. Borjas (2009) claims that wage changes are expected to be most visible directly after migration takes place and the effect spreads out over more individuals when more time has elapsed. Please note that for the Netherlands this is not necessarily true due to collective wage agreements and minimum wages. An advantage is that with $t_1 = 2005$ there is no break in the time series.

The sensitivity analysis of the FE-model shows similar results as the initial regressions. For the DD-model the coefficient of the time variable changes signs in regression (10) and (11). This could be ascribed to the break in the time series after 2005. The results of these regression per age group and for men and women can be found in Appendix 9. The FE-model indicates that CEE-migrants have repressed natives wages in migrant occupations between 2002 and 2008. But the DD-model seems to indicate the opposite. Because the FE-model compares the same individuals over time, and therefore personal characteristics do not need to be controlled for, the results of the FE-model are more reliable.
The estimates in the appendix for the DD-model give very mixed results. Most significant

Table 7: Sensitivity analysis of the FE- and DD-model[a]

Fixed-effects model						
Sample:	t_1=2008			t_1=2005		
Age older than 25	Total	Low education	Migrant	Total	Low education	Migrant
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment x Time	-0.034**	-0.039*	-0.050	-0.031*	-0.045**	-0.026
	(0.017)	(0.021)	(0.058)	(0.017)	(0.022)	(0.061)
Time	0.054***	0.046**	0.089*	0.064***	0.061***	0.064
	(0.013)	(0.019)	(0.051)	(0.012)	(0.019)	(0.054)
R-squared	0.013	0.008	0.036	0.024	0.019	0.030
Number of idnr.ḃ]	2566	1509	165	2320	1384	141
Difference-in-Difference model						
Sample:	t_1=2008			t_1=2005		
Age older than 25	Total	Low education	Migrant	Total	Low education	Migrant
	(7)	(8)	(9)	(10)	(11)	(12)
Treatment x Time	0.034*	0.029	0.087*	0.010	0.010	0.120*
	(0.016)	(0.027)	(0.042)	(0.017)	(0.019)	(0.056)
Treatment	-0.058*	-0.038	-0.125*	-0.043	-0.040	-0.088*
	(0.031)	(0.043)	(0.071)	(0.037)	(0.043)	(0.045)
Time	-0.055***	-0.053	-0.086***	0.024**	0.032**	-0.009
	(0.006)	(0.023)	(0.017)	(0.009)	(0.013)	(0.024)
Controls[c]	yes	yes	yes	yes	yes	yes
R-squared	0.132	0.111	0.116	0.088	0.086	0.152
Observations	9071	5392	652	6197	3765	443

[a] Robust standard errors are in parentheses. ***,**,* represent significance at the 1%, 5% and 10% respectively.
[b] Each idnr. is observed twice, once in 2002 and once in 2005 or 2008.
[c] Age, age-squared, education and gender.

results had a positive sign. The results for the FE-model show significant negative results. Especially interesting is that the negative effect on low-educated natives was higher in 2005 than in 2008. This is in line with Borjas (2009).

9 Discussion and conclusion

Now, the results found in the previous sections will be discussed and concluded. First I will discuss the problem of correlation between migrants and economic conditions, then I will discuss some limitations of the available data. Thirdly, the choices I made in deciding on the occupational group and the control variables will be discussed. Finally there will be a short conclusion and suggestions for further research.

One of the largest problems when researching the economic effects of migration is the correlation between the inflow of migrants and economic conditions, here of the occupation, in the host country. Because of the structural differences in economic conditions

between the CEE-countries and the Netherlands, the importance of this correlation is less than when countries with similar economic conditions would be researched. Nevertheless the problem remains and to limit the problem pre-trend wages were checked and the occupations in the control group had similar wage development before the accession in 2004 as the treatment group.
To disentangle the effects of economic conditions and the inflow of migrants was difficult in this research because occupation is only observed in one year, and no indicators, other than wage, are available for measuring economic development per occupation. In the DD-model wages were compared from the different occupations in 2002 and in 2008. Hence only the wage change of the occupation is known, and not the possible effect when individuals move to another occupation due to the inflow of CEE-migrants. In the FE-model however wages were compared from individuals in different occupations in 2002 with their wage in 2008, not knowing whether they have moved to another occupation due to migrants or economic conditions, but their wage change is known. Hence the FE-model takes into account the possibility that people can move away from occupations when there is an inflow in migrants or worsening economic conditions. When interpreting the results from the FE-model the true effect is less negative or positive when economic conditions have worsened between 2002 and 2008, and even more negative when economic conditions have improved.
To overcome the correlation issue Wooldridge (2007) suggest a difference-in-difference-in-difference method. Another DD-estimation would be added which compares wages in a migrant occupation between a region where the enlargement happened, and a region where the enlargement did not happen (Wooldridge, 2007). This approach might be feasible when besides data for the Netherlands, one would also have access to similar data for Germany, because Germany restricted access for the EU-10 until 2011, or for a country, similar to the Netherlands which did not have an inflow of CEE-migrants.

Unfortunately the data available was not perfectly suited for this research. Because country of origin was defined in very broad categories, it was not possible to identify migrants from CEE-countries, nor in which occupation they worked or when they arrived. Furthermore, years of unemployment was also defined in broad non-linear categories, which made it unsuitable as a dependent variable considering the ten-year time span of the dataset.
The break in the time series can have affected the results when wages in migrant occupations were affected differently than wages in native occupations. This was one of the reasons to look at 2005 as the post treatment moment.
Also, this paper uses data dating six years back. The combination of the tight labour

markets since the economic crisis in 2009, leading to a more negative effect, and the fact that borders have been open for more years, which can lead to a more neutral effect (Borjas, 2001), might generate different results because of the correlation between labour migrants and economic conditions.
However the data did provide many observations per occupation which is quite rare, and working with a dataset comprised of three elaborate and diverse datasets was also a huge privilege.

Another aspect that can influence the validity of the results are the choice for occupational group, as Borjas (2001) shows this can make a large difference, and results can be sensitive to this choice. Because of the data availability, it was hard to choose the migrant and native occupations. therefore, I chose not to experiment with different kinds of occupations for the treatment and control group.
I also decided not to correct for characteristics other than gender, education and age. Partly because of inadequate variables, but also because of possible self-selection of people with certain characteristics into a particular occupation. For example, it might be that people with children prefer a job with more security, despite the fact whether they are migrant or native. I included gender, education and age, because they are important factors in wage levels, people have little influence on gender and age and education levels tend not to change much once you become older.

Despite these limitations and concerns, this is one of the few studies that does not only look at the sector, but also at the different skill levels that exist within a sector. This research has shown there is an indication that the inflow of CEE-migrants has led to lower wages for Dutch labourers in the Netherlands in some occupations. The DD-model showed a positive effect but the sensitivity analyses showed mixed results in sign and significance, but still mostly positive effects. The FE-model on the contrary supported the theory that migrants have a negative effect on wages when they are substitutes to native workers. For the FE-model the sensitivity analyses also shows mixed results. Though the negative effect is much more prevalent. In addition the benefits of the FE-model make the results more reliable. The negative effect found should therefore not be ignored and be further investigated.

Future research should take into account the limitations discussed. In addition this research shows a focus on more recent data and the influence of the economic crisis is relevant. It would provide for a comparison of data analysed in a period of economic growth with a period of economic downturn. Also relevant is to analyse the effect on

employment levels, as suggested by (Zorlu & Hartog, 2005), and to make a clear distinction between occupations where temporary and permanent migrants work, because of their differences in education (Dagevos, 2011).

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Appendix

Sensitivity analyses: Regression estimates

Table 8: Estimates of the FE-model with low education[a]

Sample: Age	Older than 25			26-35	36-45	46-55	56-65
	Total	Men	Women	Total	Total	Total	Total
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Treatment x time	-0.039*	0.024	-0.059	0.016	-0.035	-0.050	-0.267**
	(0.021)	(0.031)	(0.039)	(0.048)	(0.039)	(0.030)	(0.114)
Time	0.046**	-0.016	0.058***	0.035	0.057	0.038	0.062
	(0.019)	(0.029)	(0.022)	(0.04)2	(0.037)	(0.025)	(0.054)
R-squared	0.008	0.001	0.018	0.016	0.019	0.007	0.110
Number of idnr.	1509	902	607	316	557	570	66

[a] Age and occupation are measured in 2002. Robust standard errors are in parentheses. ***,**,* represent significance at the 1%, 5% and 10% respectively.

Table 9: Estimates of the FE-model with migrants [a]

Sample: Age	Older than 25			26-35	36-45	46-55	56-65
	Total	Men	Women	Total	Total	Total	Total
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Treatment x time	-0.050	-0.080	0.093	-0.176	0.009	0.049	0.113
	(0.058)	(0.107)	(0.118)	(0.112)	(0.079)	(0.066)	(0.282)
Time	0.089*	0.097	0.086	0.234**	-0.009	-0.017	0.186
	(0.051)	(0.104)	(0.059)	(0.098)	(0.071)	(0.043)	(0.130)
R-squared	0.036	0.014	0.118	0.127	0.000	0.028	0.395
Number of idnr.	165	111	54	64	70	26	5

[a] Age, education and occupation are measured in 2002. Robust standard errors are in parentheses. ***,**,* represent significance at the 1%, 5% and 10% respectively.

Table 10: Estimates of the FE-model with t_1=2005[a]

Sample: Age	Older than 25			26-35	36-45	46-55	56-65
	Total	Men	Women	Total	Total	Total	Total
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Treatment x time	-0.031*	-0.019	-0.039	0.020	-0.042	-0.030	-0.205**
	(0.017)	(0.021)	(0.041)	(0.040)	(0.028)	(0.024)	(0.083)
Time	0.064***	0.052***	0.066***	0.093***	0..063***	0.030	0.108***
	(0.012)	(0.016)	(0.015)	(0.020)	(0.024)	(0.021)	(0.030)
R-squared	0.024	0.022	0.026	0.1	0.021	0.004	0.075
Number of idnr.	2320	1321	999	583	832	773	132

[a] Age, education and occupation are measured in 2002. Robust standard errors are in parentheses. ***,**,* represent significance at the 1%, 5% and 10% respectively.

Table 11: Estimates of the FE-model with t_1=2005 and low education[a]

Sample: Age	Older than 25			26-35	36-45	46-55	56-65
	Total	Men	Women	Total	Total	Total	Total
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Treatment x time	-0.045**	0.003	-0.087**	0.017	-0.055	-0.041	-0.305**
	(0.022)	(0.024)	(0.039)	(0.047)	(0.039)	(0.030)	(0.130)
Time	0.061***	0.017	0.070***	0.051	0.079**	0.039	0.144***
	(0.019)	(0.022)	(0.023)	(0.040)	(0.038)	(0.027)	(0.034)
R-squared	0.019	0.008	0.030	0.040	0.041	0.007	0.117
Number of idnr.	1384	826	558	263	495	530	96

[a] Age, education and occupation are measured in 2002. Robust standard errors are in parentheses. ***,**,* represent significance at the 1%, 5% and 10% respectively.

Table 12: Estimates of the FE-model with t_1=2005 and migrants[a]

Sample: Age	Older than 25			26-35	36-45	46-55	56-65
	Total	Men	Women	Total	Total	Total	Total
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Treatment x time	-0.026	0.042	0.028	-0.149	0.019	0.034	0.113
	(0.061)	(0.089)	(0.097)	(0.130)	(0.084)	(0.069)	(0.261)
Time	0.064	-0.016	0.079	0.185	-0.012	-0.001	0.186
	(0.054)	(0.085)	(0.063)	(0.119)	(0.076)	(0.045)	(0.120)
R-squared	0.030	0.010	0.090	0.102	0.001	0.025	0.395
Number of idnr.	141	91	50	51	57	25	8

[a] Age, education and occupation are measured in 2002. Robust standard errors are in parentheses. ***,**,* represent significance at the 1%, 5% and 10% respectively.

Table 13: Estimates of the DD-model with low education[a]

Sample:	Older than 25					
	Total		Men		Women	
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment x time	0.019	0.029	0.056***	0.053***	-0.015	-0.020
	(0.026)	(0.027)	(0.016)	(0.014)	(0.040)	(0.041)
Treatment	0.067	-0.038	-0.041	-0.018	-0.078	-0.043
	(0.074)	(0.043)	(0.053)	(0.044)	(0.074)	(0.061)
Time	-0.035	-0.053**	-0.069***	-0.071***	-0.029	-0.046
	(0.021)	(0.023)	(0.010)	(0.005)	(0.028)	(0.028)
Controls	no	yes	no	yes	no	yes
Observations	5392	5392	3316	3316	2076	2076
R-squared	0.017	0.111	0.002	0.054	0.017	0.067
Sample: Age	26-35	36-45	46-55	56-65		
	Total	Total	Total	Total		
	(7)	(8)	(9)	(10)		
Treatment x time	0.097*	-0.007	0.048	-0.004		
	(0.052)	(0.051)	(0.038)	(0.040)		
Treatment	-0.028	-0.005	-0.078*	-0.035		
	(0.068)	(0.037)	(0.041)	(0.058)		
Time	-0.087*	-0.007	-0.069*	-0.085**		
	(0.041)	(0.038)	(0.034)	(0.030)		
Controls	yes	yes	yes	yes		
Observations	923	1676	1948	839		
R-squared	0.104	0.085	0.116	0.110		

[a] Includes only observations with an education level that have no labour market qualification, excluding secondary education (Rijksoverheid, n.d.). Robust standard errors are in parentheses and clustered by occupational group. ***,**,* represent significance at the 1%, 5% and 10% respectively.

Table 14: Estimates of the DD-model with migrants[a]

Sample: Age	Older than 25					
	Total		Men		Women	
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment x time	0.099**	0.087*	-0.052	-0.008	0.165*	0.131
	(0.046)	(0.042)	(0.070)	(0.083)	(0.077)	(0.086)
Treatment	-0.004	-0.125*	0.114**	0.089**	-0.282**	-0.278**
	(0.062)	(0.071)	(0.041)	(0.038)	(0.102)	(0.115)
Time	-0.080***	-0.086***	0.062	-0.002	-0.116***	-0.098***
	(0.012)	(0.017)	(0.058)	(0.076)	(0.020)	(0.015)
Controls	no	yes	no	yes	no	yes
Observations	652	652	437	437	215	215
R-squared	0.015	0.116	0.007	0.059	0.098	0.140
Sample: Age	26-35	36-45	46-55	56-65		
	Total	Total	Total	Total		
	(7)	(8)	(9)	(10)		
Treatment x time	-0.020	0.133*	0.122	0.219		
	(0.068)	(0.070)	(0.076)	(0.190)		
Treatment	0.039	-0.173*	-0.290***	-0.078		
	(0.081)	(0.086)	(0.093)	(0.130)		
Time	-0.015	-0.147***	-0.066**	-0.132		
	(0.027)	(0.042)	(0.027)	(0.182)		
Controls	yes	yes	yes	yes		
Observations	212	251	144	45		
R-squared	0.126	0.100	0.258	0.425		

[a] Control variables include gender, age, age-squared and education. Robust standard errors are in parentheses. ***,**,* represent significance at the 1%, 5% and 10% respectively.

Table 15: Estimates of the DD-model with t_1=2005 [a]

Sample: Age	Older than 25					
	Total		Men		Women	
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment x time	0.001	0.010	0.021	0.011	0.018	0.013
	(0.020)	(0.017)	(0.026)	(0.036)	(0.049)	(0.047)
Treatment	0.064	-0.043	-0.054	-0.041	-0.078	-0.056
	(0.064)	(0.037)	(0.037)	(0.031)	(0.069)	(0.058)
Time	0.041**	0.024**	0.023	0.023	0.043***	0.031***
	(0.014)	(0.009)	(0.023)	(0.034)	(0.007)	(0.007)
Controls	no	yes	no	yes	no	yes
Observations	6197	6197	3549	3549	2648	2648
R-squared	0.011	0.088	0.006	0.078	0.008	0.033
Sample: Age	26-35	36-45	46-55	56-65		
	Total	Total	Total	Total		
	(7)	(8)	(9)	(10)		
Treatment x time	0.010	0.020	0.012	0.014		
	(0.034)	(0.029)	(0.036)	(0.026)		
Treatment	-0.015	-0.008	-0.100***	-0.075		
	(0.055)	(0.039)	(0.035)	(0.050)		
Time	0.028*	0.047**	0.021	0.034*		
	(0.013)	(0.011)	(0.024)	(0.018)		
Controls	yes	yes	yes	yes		
Observations	1421	2047	1986	741		
R-squared	0.044	0.093	0.089	0.070		

[a] Control variables include gender, age, age-squared and education. Robust standard errors are in parentheses. ***,**,* represent significance at the 1%, 5% and 10% respectively.

Table 16: Estimates of the DD-model with t_1=2005 and low education[a]

Sample: Age	Older than 25					
	Total		Men		Women	
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment x time	-0.002	0.010	0.007	0.004	0.007	0.001
	(0.023)	(0.019)	(0.038)	(0.039)	(0.058)	(0.055)
Treatment	0.065	-0.040	-0.042	-0.021	-0.079	-0.054
	(0.075)	(0.043)	(0.053)	(0.043)	(0.074)	(0.064)
Time	0.048**	0.032**	0.042	0.040	0.044***	0.034*
	(0.017)	(0.013)	(0.036)	(0.038)	(0.013)	(0.013)
Controls	no	yes	no	yes	no	yes
Observations	3765	3765	2228	2228	1537	1537
R-squared	0.013	0.086	0.009	0.065	0.011	0.032
Sample: Age	26-35	36-45	46-55	56-65		
	Total	Total	Total	Total		
	(7)	(8)	(9)	(10)		
Treatment x time	-0.045	0.046	0.023	0.011		
	(0.065)	(0.044)	(0.020)	(0.032)		
Treatment	-0.037	0.002	-0.078	-0.062		
	(0.070)	(0.040)	(0.045)	(0.070)		
Time	0.057	0.041	0.031	-0.029		
	(0.041)	(0.031)	(0.018)	(0.022)		
Controls	yes	yes	yes	yes		
Observations	654	1232	1340	538		
R-squared	0.060	0.094	0.076	0.074		

[a] Control variables include gender, age, age-squared and education. Robust standard errors are in parentheses. ***,**,* represent significance at the 1%, 5% and 10% respectively.

Table 17: Estimates of the DD-model with t_1=2005 and migrants[a]

Sample: Age	Older than 25					
	Total		Men		Women	
	(1)	(2)	(3)	(4)	(5)	(6)
Treatment x time	0.107**	0.120*	-0.126*	-0.069	0.416***	0.418***
	(0.049)	(0.056)	(0.065)	(0.084)	(0.099)	(0.103)
Treatment	-0.004	-0.088*	0.114**	0.077**	-0.282**	-0.297**
	(0.063)	(0.045)	(0.042)	(0.033)	(0.103)	(0.100)
Time	0.015	-0.009	0.209***	0.137	-0.062***	-0.062**
	(0.022)	(0.024)	(0.057)	(0.077)	(0.014)	(0.025)
Controls	no	yes	no	yes	no	yes
Observations	443	443	311	311	132	132
R-squared	0.037	0.152	0.031	0.165	0.124	0.199
Sample: Age	26-35	36-45	46-55	56-65		
	Total	Total	Total	Total		
	(7)	(8)	(9)	(10)		
Treatment x time	-0.022	0.288***	0.103	0.276		
	(0.082)	(0.074)	(0.083)	(0.166)		
Treatment	0.030	-0.134*	-0.273**	0.035		
	(0.041)	(0.064)	(0.118)	(0.175)		
Time	0.100	-0.166**	0.124*	-0.301**		
	(0.057)	(0.061)	(0.057)	(0.119)		
Controls	yes	yes	yes	yes		
Observations	152	168	90	33		
R-squared	0.204	0.152	0.296	0.711		

[a] Control variables include gender, age, age-squared and education. Robust standard errors are in parentheses. ***,**,* represent significance at the 1%, 5% and 10% respectively.