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Migration from outside of the European Union –
Labor market outcomes in the Swedish municipalities

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Abstract

In the aftermath of recent years unusually large influx of immigrants to Sweden from outside of the European Union, the debate regarding the impact of immigration on the economy and the labor market has intensified. Some politicians and debaters raise concerns about the fiscal impacts of immigration, while others argue that immigration cause wage and employment drops for native workers. The goal of this study is to determine the impact of immigration from outside of the European Union on municipal wages and unemployment rate. The study has been conducted by regressing the percentage of immigrants from outside of the European Union on average yearly municipal income and municipal unemployment rate in order to evaluate the impact of migration from outside of the European Union on the two dependent variables. This study shows that immigration from outside of the European Union has a significant negative effect on average yearly municipal income and a non-instantaneous positive effect on the municipal unemployment rate for total, male and female population. A surprising negative effect on youth unemployment rate can also be observed.

Keywords: Immigration, labor market, wages, unemployment, municipalities, Sweden

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1. Introduction

Immigration and immigration policy is a debated and (in Sweden) a somewhat controversial issue of increasing importance. In fact, some polls show that it is by far the most important issue for the Swedish voters with as much as 40 % of voters considering it the most important topic according to Delin at Dagens Nyheter (2016, 8 February). These debates include, but are not limited to, the effect immigration has on government finances as well as the effect immigration has on unemployment and wages of native workers.

Some politicians and debaters argue that immigration is always an asset to a society, with immigrants working, purchasing produce and paying taxes. Hojem (2010) suggests that the Swedish municipalities face a major demographical challenge with an ageing population and too low fertility rates. He argues that immigration can help remedy this situation, especially in sparsely populated municipalities in northern Sweden.

On the other side of the debate, we find those who see the influx of immigrants as a huge cost for the government due to high unemployment and welfare costs. It is also sometimes argued that competition from immigrants puts downward pressure on native wages and that immigrants "take" jobs from natives, causing higher unemployment rates. The issue of downward pressure on native wages can be supported by the findings of Borjas (2003).

Åslund & Engdahl (2013) show that the immigration patterns to Sweden have changed greatly since the Second World War. The period from the end of the war to the late 1970's was dominated by labor immigration, mainly from Finland, Southern Europe and Central Europe. Starting in the 1970's, a gradual shift towards immigration of humanitarian character can be observed. From the end of the 1980's and onward, refugee migration and migration for family reunification has been the dominant types of migration to Sweden. As the composition of migrants has changed, the labor market performance of foreign-born has deteriorated. In addition, the foreign born share of the population has increased from 6.7 % of the total population in 1970 to 14.3 % in 2009 (Åslund & Engdahl, 2013). According to SCB (2017), this share has since then increased additionally and is by the end of 2016 at 17.9 %.

As the immigration to Sweden has both increased in volume and transformed from being dominated by labor immigration from Europe, to being dominated by immigration from

outside of Europe (Åslund & Engdahl, 2013), the economic effects of migration from outside Europe has become an increasingly important subject.

There is plenty of empirical research that covers immigration and its effect on labor market outcomes. Previous studies on the subject reach somewhat different conclusions. Borjas (2003) finds that an increase in immigration will have a negative impact on wage growth, especially for low skilled workers in the short run. Dustman, Frattini & Preston (2013) reach the conclusion that immigration to the United Kingdom has a negative effect on the lower end of the wage spectrum and a positive impact on the higher end of the spectrum. Conversely, Ottoviano & Peri (2008) find that immigration has a positive impact on wages, both in the short run and in the long run. The reasons for the differing results might be due to the fact that they investigated different countries, used different methods or studied different types of immigrants. There are also Scandinavian papers suggesting negative wage effects from immigration (Bratsberg & Raaum, 2012).

In order to get an understanding on the impact immigration (specifically immigration from outside of the European Union[1]) has on the Swedish economy, an empirical study which focuses on labor market outcomes in the Swedish municipalities will be conducted. None of the previous studies we looked into mentions gender. By looking at labor market outcomes for males and females respectively, one could potentially determine whether male or female dominated industries are the most affected by immigration. Smith (2012) finds that growth in immigration appears to have reduced youth employment in the United States. By adding youth unemployment to the analysis, we hope to determine how Swedish youths are affected by immigration from outside of the European Union.

The main goals of this study is to:

- Investigate whether immigration from outside of the European Union has a significant effect on wages in the Swedish municipalities (due to data availability, average yearly municipal income from labor will be used as a proxy for wages, more on this in section 4.2).

[1] In this paper, we have included EEA and EFTA member countries in the EU definition. These countries have been included because of their close cooperation and cultural proximity with the countries of the European Union.

- Investigate whether immigration from outside of the European Union has a significant effect on unemployment in the Swedish municipalities.

Åslund & Engdahl (2013) suggest that the impact of immigration is likely to vary depending on regional characteristics. Dividing the municipalities into four different categories makes it possible to investigate the (potentially different) effects immigration from outside of the European Union has on wages and unemployment in big city municipalities, urban municipalities, rural municipalities and sparsely populated rural municipalities.

Dividing the municipalities into four different categories allows us to:

- Investigate whether immigration from outside of the European Union has a significant effect on wages and unemployment in the four different municipality categories.

We will conduct an empirical study and the data used has been collected from official Swedish and Scandinavian institutions. We will be testing the effects of immigration from outside of the European Union on average yearly municipal income from labor and unemployment by conducting regressions based on municipal data for the years 2004-2010. The type of data used in our study is cross-sectional time series data, better known as panel data, where the variability of different municipalities are observed over a certain time period. This type of data makes it possible for us to control for variables which are not observable (for example differing regional policies or cultural factors), i.e. it accounts for municipal heterogeneity (more on this in section 4.4). Using these methods, we find that immigration from outside of the European Union has a significant negative effect on average yearly municipal income from labor, with the largest impact for big city municipalities and for females respectively. In addition, a significant "positive" non-instantaneous effect on municipal unemployment rate for total, male and female population can be observed. A surprising non-instantaneous significant negative effect on youth unemployment can be observed.

The rest of the paper is organized as follows: Section two includes a review of the previous research made in this field. Section three briefly discusses the basic theoretical framework on the subject of immigration and its effects on the labor market. Section four

provides the reader with a walkthrough of the methodology used. The section begins with the collection of data, followed by a description of the variables of choice before presenting some descriptive statistics. This is followed by an explanation of the econometric method. Section five presents our empirical results, while the final chapter consists of our conclusions and some suggestions for further research.

2. Previous research

There are a lot of previous research in the field of the different effects of immigration on an economy. This section will focus on the studies that discuss the impact that immigration has on labor market outcomes, more specifically wages and unemployment. The different studies reach different conclusions. Some studies suggest that an increase in immigration only shows a negative effect on wages and unemployment in the short run, while others conclude that there will be some negative repercussions from migration even in the long run (Borjas, 2003, Dustman & Frattini 2014). Others suggest that immigration has a positive impact on wages both in the short run and the long run (Ottoviani & Peri, 2008). These studies will be discussed further in the following section in order to get an understanding to some of the effects immigration could have on an economy.

Ekberg (2009) suggests that immigration of people in working age is always an asset for an economy. However, his study concludes that the effect of immigration on public finance depends on several aspects, including size and the age composition. Ekberg also states that the effect on public finance has been very low, independent on whether it would have a positive or negative impact. An important aspect of how the public finance is effected by migration is how well the integration works in the labor market. The report also mentions the potential effects immigration has on the wages and the employment rates of the native population. The main conclusion is that some groups benefit while other groups are negatively impacted. He provides the example that theoretical economic models are able to show that native workers who are substitutes to immigrant workers will not benefit from a larger immigration, but native workers who are considered complements to the immigrant workers will. These effects can however be considered very small or even non-existent in some cases (Ekberg, 2009).

There are plenty of international empirical research covering immigration and its effects on labor market outcomes. Dustman & Frattini (2014) investigate different categories of immigrants contribution to the UK economy. The main findings in the report, is that immigrants from countries within the European Union always has a positive fiscal contribution while those who migrate from countries outside has a negative fiscal effect. In addition Dustman, Frattini & Preston (2013) show the effects that immigration has on

the wage distribution on native born workers in the United Kingdom. This report does not make any differentiation between what type of immigrants who are analyzed or where they originate from. The main conclusion drawn from this study, is that immigration has a negative impact on the lower part of the wage-spectrum, but a positive impact on the higher and the mid-range parts of the spectrum.

Ottoviano & Peri (2008) show the effect of immigration on average and individual wages for native workers in the US 1990-2004. They conduct this study by taking a general equilibrium approach and account for labor- and capital market interactions in production. Furthermore, this study shows that the effects that immigration has on the wages of native workers appears after a decade. In contrast to several other studies who suggest that immigration has a short term negative effect, this report states that immigration has a positive impact on the average native wages, both in short- and long run in the US during the investigated years.

Some researchers have been trying to provide information about the impact of immigration on wages by considering the evolution of the national wage structure. Borjas (2003) investigates this by looking at the wage growth in different skill groups and compare this to the increased number of immigrants in the various groups. Borjas (2003) finds evidence of negative correlation between the two variables, indicating that the groups with the largest growth in wages were those who were least affected by immigrants. The report indicates that if the share of immigrants in a specific skill group increases by 10 %, the average wage will decrease by 3-4 %.

By using the approach described above, Borjas & Katz (2005) studies the short-run and the long-run effects on native wages caused by the immigrant influx 1980-2000. The aggregate results over this period of time shows a short-run negative drop in wages for all native workers by 3.4 %, but in the long-run the wages are unchanged. They categorize the native workers in four different categories, in order to see which group is the most affected by the influx of migrants. They find a significant negative effect for all categories in the short-run, where *High school dropouts* are the most affected (8.2 %) and *High school graduates* the least (2.2 %). When analyzing the effects in the long-run, they find that there is a significant positive effect for *High school graduates* (1.2 %) and *Some college* (0.7 %), while there is still a significant negative effect for both *High school dropouts* (4.8 %) and *College graduates* (0.5 %). This is in line with the theoretical expectations of the impact

immigration has on the labor market. When immigrants in the low-skilled range are substitutes to the native born workers as they are in the *High school dropout* category, the impact will be the largest. This is also in line with the findings of Dustman, Frattini & Preston (2013).

While the previously mentioned studies focus on countries where the labor market is regulated by minimum wage, Bratsberg & Raaum (2012) investigate the effect on the Norwegian labor market which, much like Sweden, lack regulations regarding minimum wage but instead rely on collective agreements, formed by trade unions to work as guidelines for the different trades. This indicates that regardless of whether the wages are regulated through a minimum wage (for example U.S and UK) or if it relies on guidelines formed by unions (Scandinavia), immigration has an effect on the wages of the native workers. Looking into the wage growth in the Norwegian construction sector, Bratsberg & Raaum (2012) reveals a lower wage growth in trades where the share of employed immigrants increases. They find that if there is an increase in the share of employed immigrants by 10 % a reduction in wage growth by 0.6 % can be observed. While investigating the different skill levels, they find that the wage effects for native born workers and immigrants are the same for the low- and medium-skilled groups.

Swedish empirical studies on this subject are few, but one that is not insubstantial is Ruist (2013) who studies the impact of refugee immigration on Swedish labor market outcomes during 1999-2007. The main conclusion is that while he does not find any significant effect on total unemployment, he does find significant negative effects in the group that consists of previous immigrants from low or middle income countries. This indicates that the refugees are to be seen as substitutes to the previous immigrants and this group is affected to a greater extent than the native workers.

Looking into the labor market impact close to transport links following the 2004 enlargement of the European Union, Åslund & Engdahl (2013) find that opening up borders for low wage workers has a small negative effect on annual and monthly earnings in these areas. Their findings indicate that the negative impact is greater among younger people, those with less education, the foreign-born and those who are in the lower tails of the earning distribution i.e. those who to a greater extent can be considered substitutes to immigrants from low wage countries.

There are a lot of studies in this field of research and most of them reach similar results, although there are some differences in the results over time. Differences may however depend on several things, for example how the empirical research has been conducted, the current economic situation or what kind of country is being investigated. An issue regarding previous studies is that very few of them look at the geographical (such as country of origin) aspect of the migration. When they look at different kind of immigrants, they mainly focus on what type of migration a country receives such as refugees, workforce migration etc. It does however seem clear that in line with theoretical expectations (further discussed in section 3), the empirical evidence tends to show that those who have a marginal position and/or are considered closer substitutes to migrants are also the ones most affected by immigration.

3. Theoretical framework

This section will illustrate some of the basic economic principles on how immigration affects the labor market in the short and the long run. The basic theory of labor supply is based on whether or not a certain individual will supply the labor market at a specific wage. Theoretical studies show that an inflow of migrants to a certain region will affect the employment rate and wages for the total population of that specific geographical area. A great inflow of migrants will lead to a supply shock in the labor market due to an increase in the amount of potential workers in the specific area. What effect this supply shock will have depends on which type of immigration is discussed (Borjas, 2010). An immigrant in working age is either seen as a substitute or a complement to the native born workers. A substitute is defined as a foreign born worker who is to be found in the same level of productivity and skills as the native born worker and therefore compete for the same jobs. While a complement worker has a different level of productivity or skill and therefore will not compete for the same jobs.

By using a basic supply and demand model, we can show that an inflow of substitute workers will increase the supply of labor which will cause a fall in wages for the native born workers with the same or similar skills. This theoretical assumption is based on the argument that we do not see any change in demand for labor.

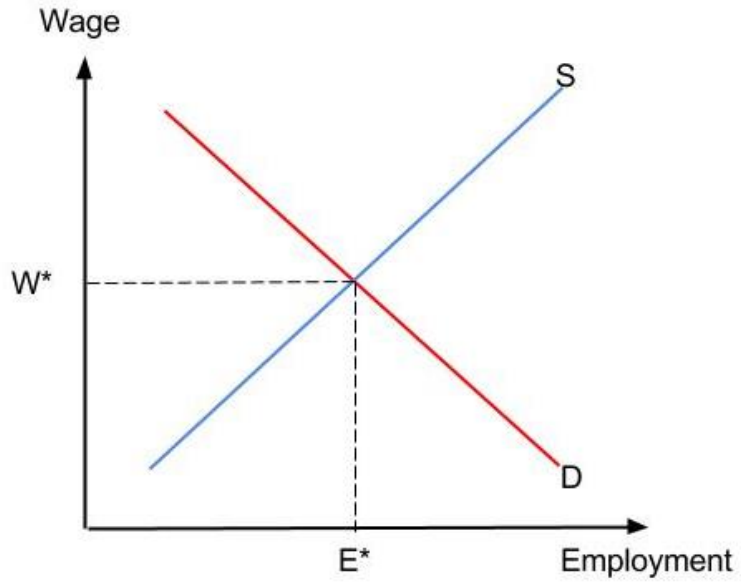

Figure 1: Supply and demand equilibrium for the labor market

Figure 1 illustrates equilibrium in the labor market where the supply curve and the demand curve are equal. When the wage is at level W*, the demand for workers in the labor market is E* (Borjas, 2010). That is, the number of workers who are looking for jobs equal the number of workers that employers want to hire.

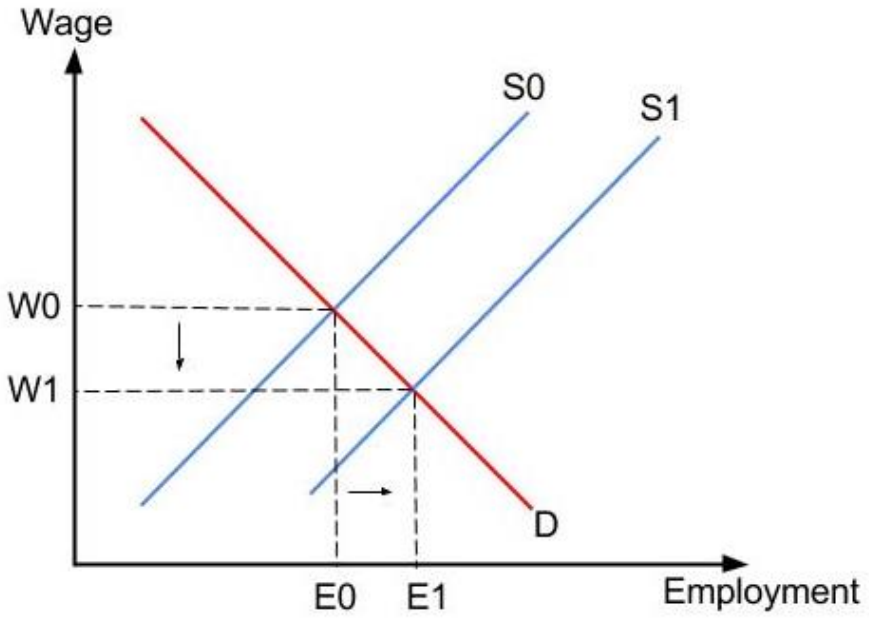

Figure 2: Supply shock in the labor market - short run

Figure 2 illustrates how an inflow of substitute workers affect the wages and employment in an open economy. The inflow of substitute workers increases the supply of labor, which causes the curve to shift to the right. This causes the wages to fall from W0 to W1 and the amount of workers demanded in the labor market increases from E0 to E1.

In the case of complementary immigrant workers, the theoretical assumptions differ from the previous. This theory suggests that an inflow of foreign complementary workers could create job opportunities and even increase wages for the native workers. This is the case since the immigrants and the native workers are not competing in the same labor market. The reason we see these changes is because of the assumption that immigration makes native workers more productive, causing a shift in demand curve to the right. Thus we see a positive shift in native wage and an increase in native employment (see figure 3) (Borjas, 2010).

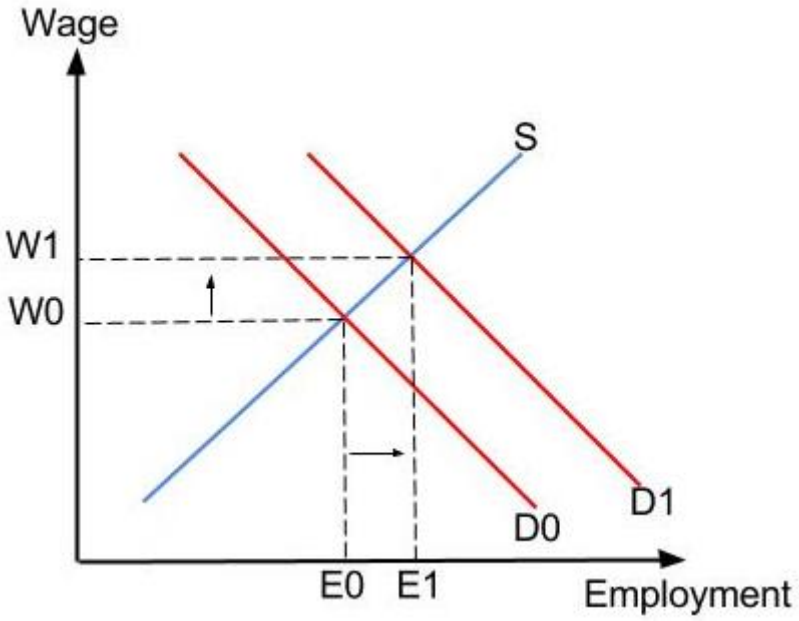

Figure 3: Demand shock in the labor market - short run

If immigrants are assumed to be perfect substitutes to natives, in the short-run, immigrants will lower the wages but also raise the returns to capital, since it is now possible for employers to hire employees at a lower cost. Theoretically, this means that over time there will be an increase in profit for firms on the market which eventually should lead to an inflow of capital, since old firms are able to expand and new firms begin their business. Because of the increase in the capital stock, the demand curve for labor will shift to the right and compensate for the initial negative consequences from the supply shock in the labor market (Borjas, 2010).

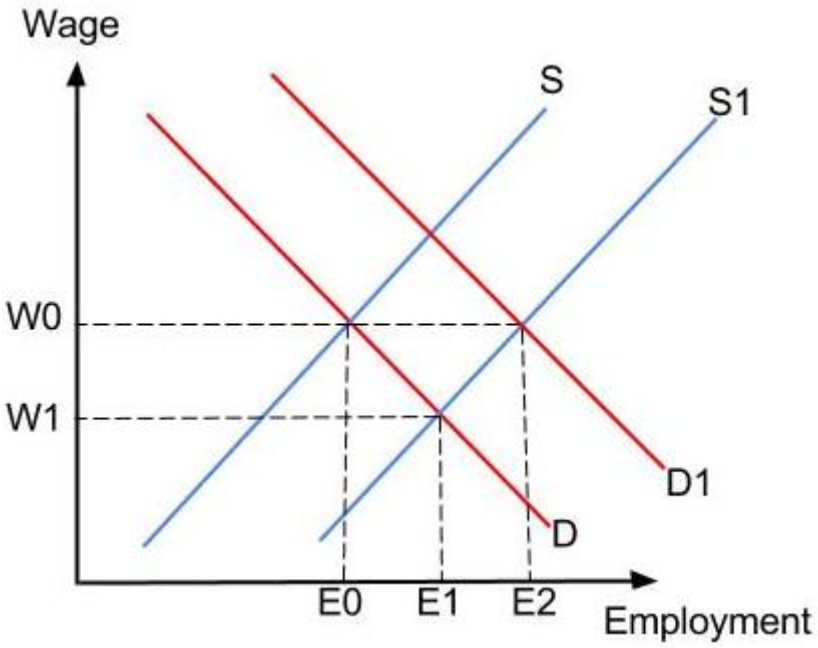

Figure 4: Long run effects - substitutes

Figure 4 shows that the new wage level forces the demand curve to shift to the right, causing a new equilibrium at W0 and E2 which would suggest that even if native workers and immigrants are perfect substitutes, immigration will not have a negative impact on wages or employment in the long run.

4. Methodology and data

This section will show how the data for this study was collected and formed to fit our econometric models. Further, a description of the included variables and the reasoning behind including these will be presented. In addition, some descriptive statistics has been included in order to provide the reader with a general picture on how the variables change over time. The last part of this section covers econometric method which describes our models and how they have been constructed.

4.1 Data collection

The main issue in writing this paper has been data availability. We have been limited to use secondary data from official Swedish and Scandinavian institutions, such as Statnord (a cooperation between the Swedish, Danish and Norwegian official statistics agencies), Statistics Sweden and Arbetsförmedlingen (the Swedish unemployment agency).

Data on the amount of individuals born outside of the European Union was collected from Statnord (2017), Unemployment data was collected from Arbetsförmedlingen (2016) and the rest of the data was gathered from Statistics Sweden (2017).

Data has been collected for all 290 Swedish municipalities on all variables for the years 2004-2010 (Statnord only provided data until 2010). Since labor market opportunities for immigrants and immigrant composition probably changes over time, more recent data would have been preferred in order to more accurately estimate how immigration from outside of the European Union will influence the Swedish labor market in the future. In addition, a longer time period, perhaps across the entirety of an economic cycle, would have been desired as it seems plausible to assume that the effect of immigration might differ between times of recession and times of economic prosperity.

The variables marked with (*) in table 1 were not available in the format we wanted and had to be created by combining official data. "% born outside of the European Union" was created by dividing the municipal amount of residents born outside of the European Union with the total population of the municipality. "% with high education and % with low education" was created by dividing the number of highly/lowly educated in the municipality with the total population of the municipality.

For the next part of the analysis, the municipalities has been divided into four different categories using data and definitions from Jordbruksverket (2013). The first category "big city municipality" includes Malmö, Göteborg, Stockholm and some of their adjacent municipalities. The second category "urban municipality" includes municipalities with a population of at least 30.000 or municipalities with a city of at least 25.000 residents. Adjacent smaller municipalities may also be included in this category. The third category "Rural municipalities" includes municipalities which do not fall into the previous two categories and has a population density equal to or higher than two per square kilometer. The fourth category "Sparsely populated rural municipalities" includes municipalities which do not fall into the three previous categories, i.e. municipalities with a population density of less than two per square kilometer.

Variable definitions

VARIABLE NAME	VARIABLE DESCRIPTION
% born outside of the European Union	Percentage of municipal population born outside of the EU, EFTA and EEA
Unemployment rate	Percentage of the municipality in open unemployment including those in government labor market programs (ages 16-64). This variable is available for total, male and female population.
Youth Unemployment rate	Percentage of the municipality in open unemployment for the ages (18-24) including those in government labor market programs.
Average yearly municipal income**	Average yearly income from labor in the municipality for ages 20-64 (measured in 1000 SEK). This variable is available for total, male and female population.
Municipal cost**	Per capita net expenses of the municipality (measured in 1000 SEK).
Average age	Average age in the municipality.
Tax rate	Municipal and County council tax rate in the municipality.
Equalization contribution	Money received or payed by municipalities in an effort to reduce income inequalities between the municipalities (measured in 1000 SEK).
Population density	Population density per square kilometer.
Population	Population of the municipality.
% High education level*	Percentage of the municipal population (aged 25-64) with 3 or more years of tertiary education.
% Low education*	Percentage of the municipal population (aged 25-64) with no more than 9 years of basic education.
% working age*	Percentage of the municipal population aged between 20 and 64.
Big city municipality	Category 1, Includes the three major cities in Sweden and some of their suburb municipalities (46/290).
Urban Municipality	Category 2, Municipalities that has a city with 25000+ residents or a population of 30000+, sometimes include some of their suburb municipalities(48/290).
Rural Municipality	Category 3, All municipalities which do not fall in Category 1 or 2 while having a population density equal or higher than two per square kilometer (163/290).
Sparsely populated rural Municipality	Municipalities with a population density below two per square kilometer (33/290).

Table 1 : Variable definitions, * variables combined using official data, ** variables in logarithmic form. Source: Statistics Sweden, Arbetsförmedlingen, Statnord.

4.2 Choice of variables

With no individual level or industry specific wage data available, we have been limited to use average yearly municipal income as a proxy for wages. This can be a problem since a change in yearly municipal income caused by a change in "% born outside of the European Union" must not necessarily mean that the average wages has changed in the municipality. It could also mean that immigrants work less/more hours with higher/lower wages than natives, most likely a combination of these factors. Data on wage development across different industries could have shown how immigration influences wages and unemployment in different trades, which would have been helpful in determining what type of workers can be considered substitutes or compliments (further discussed in section 2 and 3) to immigrants from outside of the European Union. Data on average yearly municipal income has been gathered for total, male and female population respectively.

The second dependent variable will be municipal unemployment rate. Data for this variable has been collected for total, male and female population respectively. Including male and female labor market outcomes in the analysis may provide some additional insight as to whether male or female dominated industries are the most affected by immigration. Since the empirical evidence tends to show that that those who have a marginal position on the labor market are the most affected by immigration (Borjas, 2010), and some scholars (Smith, 2012) argue that immigrants can be considered substitutes to youth. Youth unemployment will be considered in the analysis.

For the second part of the analysis, the municipalities has been divided into four different categories. This has been done in order to evaluate whether the effects of immigration differ between the municipality categories. It is for example possible that the demand for labor is higher in cities and urban areas, which could potentially lead to better labor market outcomes for immigrants in these areas.

The independent variable of interest in this paper will be percentage of municipal population born outside of the European Union. In addition, control variables such as average age, tax rate, equalization contribution**,** population density, population, percentage with a certain education level and share of population in working age has been included in order to more accurately estimate the effect of immigration from outside of

the European union to the municipalities. These control variables were chosen simply because it seems plausible that they might help explain the variability of the dependent variables. In addition, lagged variables ($t-1$ and $t-2$) of the independent variable of interest (% of population born outside of the European Union) has been created in order to take the possibility of a non-instantaneous effect of immigration into account. A very important issue with this variable is that immigration from outside of the European Union can include very different types of immigrants at different points in time. Our model will only provide an accurate estimate as long as the migrant composition remains constant. Composition changes can be due to exogenous reasons, such as new conflict zones and poverty or endogenous reasons such as legislation changes, which can limit or increase the amount of labor immigration or the amount of refugees admitted. An important issue with this variable is that due to its design. It will not only measure the effect of immigration from outside of the European Union, it will also measure the effect of previous immigrants moving between the Swedish municipalities. From a theoretical standpoint, this should not be an issue as the municipalities will still experience a labor supply shock.

4.3 Descriptive statistics

This study covers all 290 Swedish municipalities over a period of seven years. We have managed to gather data for all variables (except for the lagged % born outside of the European Union) for the years 2004-2010. This section will provide the reader with a general picture of how the different dependent variables change over time and how the independent variables change over time. When looking at this data, it is important to note that the graphs and the table show ***unweighted municipal averages***. For example, the income shown for "Big city municipalities" is not the average income of people living in big city municipalities, but the average of all municipalities within this category.

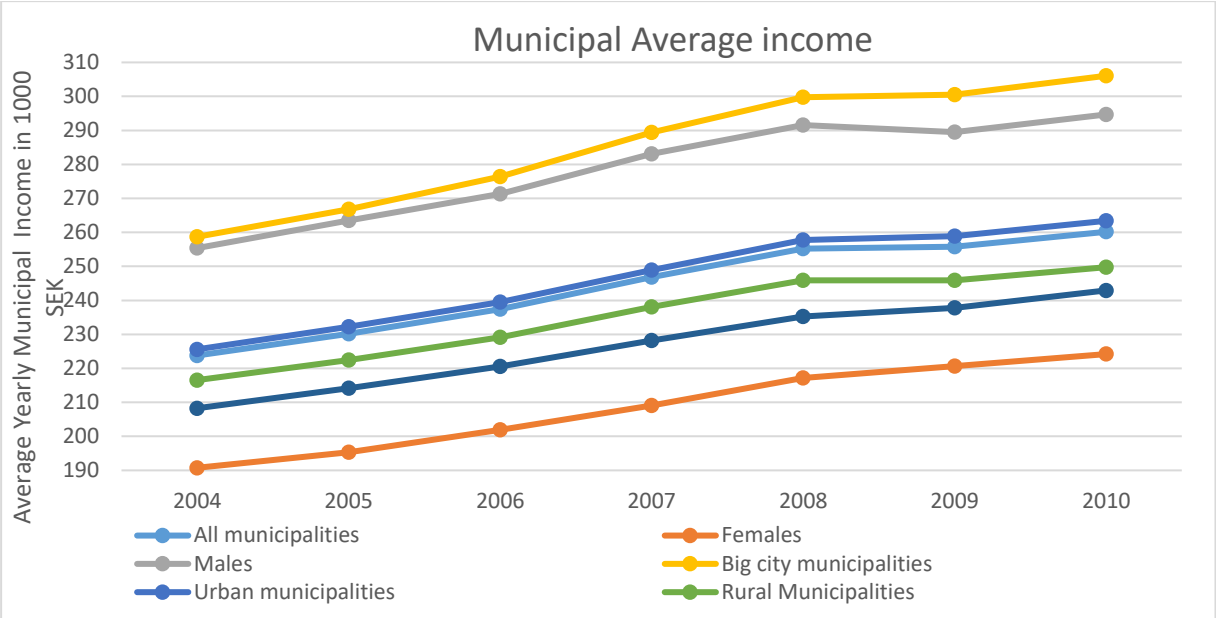

Figure 5: Unweighted municipal averages for yearly municipal income 2004-2010. Source: Statistics Sweden.

Figure 5 shows that the income for all categories is increasing over the time period. A slight reduction can be seen for some categories following the financial crisis of 2008. The big city municipalities have a significantly higher average income than the other municipality categories with sparsely populated rural municipalities showing the lowest income. A noteworthy difference between male and female average incomes can also be observed.

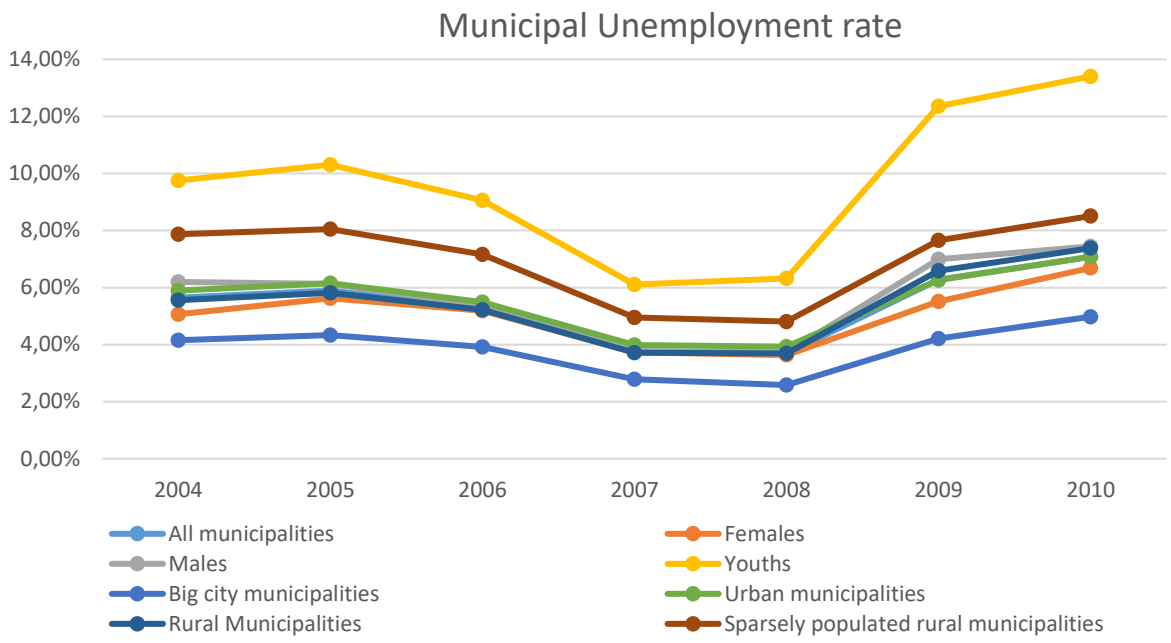

Figure 6: Unweighted unemployment rate for different categories 2004-2010. Source: Arbetsförmedlingen.

Figure 6 shows the unemployment rate for males, females, youth and total population. In addition the unemployment rate of the different municipality categories has been included. As expected, the unemployment rate appears to change cyclically with the economic situation in the country and/or the world economy. The youth unemployment rate is higher than any other category. It is also more volatile than the others and seems to be more affected by the cyclical changes. Looking at the different municipality categories, we find that the sparsely populated rural municipalities (often located in northern Sweden) have the highest unemployment rate, while the big city municipalities have the lowest. Female unemployment seems to be lower and less volatile than the male counterpart.

Variable	2004	2005	2006	2007	2008	2009	2010
% Born outside of the EU	3.9	4.1	4.3	4.6	4.9	5.2	5.4
% Low education level	21.7	20.9	20.2	19.5	18.9	18.3	17.7
Municpal cost*	36695	37898	39349	41481	43642	44063	45398
Average age	42.1	42.2	42.4	42.5	42.6	42.8	42.9
% Tax rate	31.8	31.9	31.9	31.9	31.9	32.1	32.1
Equalization contribution*	897.5	638.6	621.7	598.8	545.5	480.4	411.2
Population	31074	31199	31425	31665	31918	32209	32467
Population density**	126.4	127.4	129	130.7	132.6	135.1	136.8
% High education level	13.3	14.1	14.6	15.2	15.7	16.2	16.6
% Working age	56.2	56.2	56.3	56.2	56	55.8	55.7
Municipalities observed	290	290	290	290	290	290	290

Table 2: Unweighted Municipal averages for 2004-2010. (*) per capita income/expenditure measured in SEK. (**) measured in population per square kilometer. Source: Statistics Sweden, Statnord.

Table 2 shows municipality averages for all of the independent variables for the years 2004-2010. This can help provide a general picture on how the independent variables change over time. The independent variable of interest (% of population born outside of the European Union) in this paper increases steadily over the time period and for a total of ~ 1.5 percentage points or a ~ 37 percent increase over the time period.

4.4 Econometric method

The purpose of this analysis is to determine the effect of migration from outside of the European Union on income and unemployment in the Swedish municipalities. Since we have data on the 290 Swedish municipalities over a time period of seven years, a panel data analysis is the best course of action.

The municipalities will be viewed as heterogeneous entities, with different unobserved municipality specific characteristics such as work ethics, level of individualism and labor market structure. These individual characteristics are likely to create income and unemployment disparities, which makes a fixed effects regression rather than a random effects regression the best choice as it essentially allows for municipality specific

intercepts. In addition, Wooldridge (2009) states that it is fairly common for researchers to conduct Hausman tests[2]. The idea is that a rejection is taken to mean that the key assumption **(*the expected value of α_i given all explanatory variables is constant)*** for random effects is violated and that fixed effects should be used instead.

As we believe that part of the variability in the dependent variables is caused, not by the variability in the independent variables but the general time trend and exogenous shocks such as the financial crisis of 2008 time fixed effect[3] will be included in the upcoming regressions. In addition, a Modified Wald tests for group-wise heteroscedasticity[4] has been conducted, a rejection of the null (homoscedasticity) means that there is heteroscedasticity present in the data, and regressions should be run with heteroscedasticity-robust standard errors.

By using the framework described by Wooldridge (2009), we have constructed the following econometric model:

$$(\mathbf{1}) \qquad Y_{it} = \alpha_i + \beta_1 Z_{it} + \beta_2 X_{it} + \beta_3 \delta_t + \varepsilon_{it}$$

Where Y_{it} is the average income from labor or unemployment rate of municipality i for the general population, for males and for females (youth category included for unemployment) respectively at time t. α_i is a municipality specific intercept. Z_{it} is the share of immigrants from outside of the European Union in municipality i at time t. X_{it} is the level of all municipal specific control variables in municipality i at time t. δ_t is the time specific effect of year t and ε_{it} is the municipality specific error term of municipality i at time t. As we are looking into the effect of immigration from outside of the European Union to the Swedish municipalities, β_1 will be the variable of greatest interest to us.

In addition to model (1), a second model which takes the possibility of a non-instantaneous effect of immigration into account has been constructed. A large share of migrants from outside of the European Union are asylum seekers and family members of previous asylum seekers (Åslund & Engdahl, 2013). Asylum seekers and those who migrate for family reunification do not always enter the labor market instantly but, might

[2] Output from the (rejected) Hausman tests can be found in the appendix.
[3] F-test rejected that the coefficients for all years are jointly equal to zero, which means fixed time effects should be used. Output can be found in the appendix.
[4] Output from the (rejected) Modified Wald tests group-wise heteroscedasticity can be found in the appendix.

instead be enrolled in education programs such as SFI (Swedish for immigrants). This would mean that at least some of the immigrants from outside of the European Union will not influence wages and unemployment in their first, second and possibly even third year living in a municipality. Controlling for $t-1$ and $t-2$ we end up with the following model:

$$(\mathbf{2}) \qquad Y_{it} = \alpha_i + \beta_1 Z_{it} + \beta_2 Z_{it-1} + \beta_3 Z_{it-2} + \beta_4 X_{it} + \beta_5 \delta_t + \varepsilon_{it}$$

Where Z_{it-1} is the share of immigrants in municipality i at time $t-1$ and Z_{it-2} is the share of immigrants in municipality i at time $t-2$.

For the next part of the analysis, we have divided the municipalities into four different categories in order to evaluate whether the effect of migration from outside of the European Union on unemployment and average income from labor differ between the municipality categories:

$$(\mathbf{3}) \qquad Y_{it(n)} = \alpha_{i(n)} + \beta_1 Z_{it(n)} + \beta_2 X_{it(n)} + \beta_3 \delta_t + \varepsilon_{it(n)}$$

$$(\mathbf{4}) \qquad Y_{it(n)} = \alpha_{i(n)} + \beta_1 Z_{it(n)} + \beta_2 Z_{it-1(n)} + \beta_3 Z_{i(n)t-2} + \beta_4 X_{it(n)} + \beta_5 \delta_t + \varepsilon_{it(n)}$$

Where $Y_{it(n)}$ is the average income from labor or unemployment rate of municipality i at time t if the municipality is category n. $\alpha_{i(n)}$ is a municipality specific intercept if the municipality is category n. $Z_{it(n)}$ is the share of immigrants born outside of the European Union in municipality i at time t if the municipality is category n and so forth. We will be running model (3) and (4) for each of the municipality categories.

All regressions will be run with fixed effects, fixed time effects and heteroscedasticity-robust standard errors.

5. Results

This section will present output from the models presented in previous sections. Table 3-6 shows results from fixed effects regressions with and without time lag on the independent variable of interest. Regression results marked with (1), (2), (3) and (4) are based on econometric models (1), (2), (3) and (4) respectively (see section 4.4).

Y = Average yearly municipal income from labor*	(1) Total population	(1) Female population	(1) Male population	(2) Total population – lagged variable	(2) Female population – lagged variable	(2) Male population – lagged variable
VARIABLES						
% Born outside of the EU	-0.00737***	-0.00860***	-0.00684***	-0.00298*	-0.00419***	-0.00253
	(0.00122)	(0.00131)	(0.00146)	(0.00156)	(0.00158)	(0.00209)
Average age	-0.00142	-0.00217	-0.000838	-0.00195	-0.00124	-0.00289
	(0.00244)	(0.00245)	(0.00296)	(0.00268)	(0.00267)	(0.00335)
Tax rate	0.00321*	0.00151	0.00457*	0.00346	0.00128	0.00527*
	(0.00187)	(0.00167)	(0.00237)	(0.00232)	(0.00173)	(0.00306)
Equalization contribution	-0.000796	0.00117	-0.00211*	-0.000789	-9.82e-05	-0.00118
	(0.000859)	(0.000737)	(0.00119)	(0.00127)	(0.00124)	(0.00179)
Population density	5.49e-05***	3.44e-05***	6.80e-05***	6.95e-05***	4.05e-05***	9.12e-05***
	(1.71e-05)	(1.16e-05)	(2.50e-05)	(1.75e-05)	(1.30e-05)	(2.30e-05)
Population	-9.05e-08	2.91e-09	-1.70e-07	-1.73e-07	-9.68e-08	-2.61e-07*
	(1.36e-07)	(1.30e-07)	(1.85e-07)	(1.33e-07)	(1.40e-07)	(1.58e-07)
% Population in working age	-0.00394***	-0.00435***	-0.00378**	-0.00422***	-0.00467***	-0.00411**
	(0.00116)	(0.00115)	(0.00150)	(0.00150)	(0.00128)	(0.00196)
Municipal cost*	0.00161	0.0166	-0.00829	-0.00101	0.00566	-0.00608
	(0.0127)	(0.0128)	(0.0163)	(0.0120)	(0.0115)	(0.0160)
% High education level	0.0100***	0.0113***	0.00910***	0.00715***	0.0109***	0.00436**
	(0.00119)	(0.00130)	(0.00143)	(0.00133)	(0.00136)	(0.00169)
% Low education level	0.00279***	0.00250**	0.00288**	0.00310***	0.00302***	0.00298**
	(0.000973)	(0.00103)	(0.00116)	(0.00105)	(0.00109)	(0.00141)
2005.year	0.0223***	0.0170***	0.0259***			
	(0.00165)	(0.00182)	(0.00199)			
2006.year	0.0513***	0.0477***	0.0540***			
	(0.00308)	(0.00336)	(0.00372)			
2007.year	0.0874***	0.0782***	0.0941***	0.0385***	0.0318***	0.0434***
	(0.00466)	(0.00505)	(0.00559)	(0.00163)	(0.00159)	(0.00216)
2008.year	0.118***	0.113***	0.122***	0.0720***	0.0683***	0.0751***
	(0.00605)	(0.00648)	(0.00730)	(0.00311)	(0.00298)	(0.00412)
2009.year	0.119***	0.127***	0.113***	0.0744***	0.0825***	0.0692***
	(0.00718)	(0.00784)	(0.00860)	(0.00440)	(0.00428)	(0.00581)
2010.year	0.134***	0.140***	0.130***	0.0920***	0.0975***	0.0889***
	(0.00846)	(0.00917)	(0.0101)	(0.00579)	(0.00557)	(0.00764)
% Born outside of the EU t-1				-0.00365*	-0.00414**	-0.00332
				(0.00195)	(0.00184)	(0.00248)
% Born outside of the EU t-2				-0.00345	-0.00259	-0.00410
				(0.00209)	(0.00178)	(0.00270)
Constant	5.411***	5.300***	5.509***	5.549***	5.381***	5.716***
	(0.175)	(0.166)	(0.216)	(0.195)	(0.166)	(0.251)
Observations	2,030	2,030	2,030	1,450	1,450	1,450
R-squared	0.971	0.977	0.949	0.943	0.964	0.891
Number of municipalitynum	290	290	290	290	290	290

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Variables marked with * in logarithmic form

Table 3: fixed effects regression with and without time lag – Average yearly municipal income

Table 3 shows results for model (1) and (2) with average yearly municipal income from labor (for total population, for males and for females) as dependent variable. With model 1, we find that immigration from outside of the European Union has a negative significant impact on average yearly municipal income. The coefficient is to be interpreted as "if the share of the population born outside of the European Union increases with 1 percent unit in municipality i, average yearly income will decrease by 0.73 % in municipality i". This is in line with theoretical expectations and the findings of Borjas (2003) and Dustman & Frattini (2014). One must however be aware that average yearly municipal income from labor is a relatively poor proxy for wages and that a reduction in average yearly municipal income from labor caused by immigration must not necessarily mean that downward pressure has been put on native wages. It could also mean that immigrants from outside of the European Union (on average) work less hours and/or receive lower wages than natives, causing a drop in average yearly municipal income from labor, most likely a combination of these factors. Because of this, we can only speculate as to the magnitude of the wage impact.

In the case of different impacts for males and females respectively, we find significant negative effects for both males and females, with female average municipal income being the most affected. However this cannot be taken as evidence for a more negative effect on wages in female dominated industries. It is possible that foreign born (outside of the European Union) women work less hours for potentially lower wages than foreign born (outside of the European Union) males, causing the average yearly municipal income to drop more for females than for males. Once again, we are limited to speculation as we could not find industry specific or individual level wage data. In addition, the lack of industry specific data has made it impossible to determine whether the immigrants are to be considered compliments or substitutes to the workers in different industries.

The second model shows that immigration from outside of the European Union has a negative significant impact on average municipal yearly income from labor for the total population. Negative coefficients can also be found for female and male incomes albeit in the case of males, this effect is not significant. It also shows the effect of immigration for % Born outside of the European Union $t-1$ and $t-2$. For $t-1$, we find negative effect for all of our categories. However, in the case of males the effect is once again not

significant. $t-2$ shows negative effects for total population, for male population and for the female population. These effects are not significant for any of the categories. While we cannot draw any clear conclusions on how immigration from outside of the European Union influence wages in the municipalities, we do find a significant negative impact on average yearly municipal income from labor, which might provide some insight for policy makers looking to evaluate the fiscal effects of immigration.

Y = Municipal Unemployment rate	(1)	(1)	(1)	(1)	(2)	(2)	(2)	(2)
VARIABLES	Total population	Female population	Male population	Youth population	Total population - lagged variable	Female population - lagged variable	Male population – lagged variable	Youth population – lagged variable
% Born outside of the EU	0.00962	0.0884	-0.0601	-0.0244	0.0378	0.165	-0.0847	0.256
	(0.0861)	(0.0750)	(0.111)	(0.196)	(0.135)	(0.117)	(0.171)	(0.328)
Average age	0.0987	0.161	0.0349	-0.115	0.100	0.143	0.0495	-0.00835
	(0.153)	(0.121)	(0.206)	(0.373)	(0.171)	(0.153)	(0.224)	(0.474)
Tax rate	0.296***	0.285***	0.303**	1.113***	0.398***	0.371***	0.418***	1.564***
	(0.103)	(0.0865)	(0.139)	(0.262)	(0.111)	(0.105)	(0.145)	(0.328)
Equalization contribution	0.278***	0.170***	0.366***	0.292**	-0.0848	0.00631	-0.170*	-0.429**
	(0.0576)	(0.0439)	(0.0774)	(0.132)	(0.0743)	(0.0749)	(0.0904)	(0.204)
Population density	-0.000518	0.000294	-0.00131	0.000987	-0.00117	-0.000360	-0.00199*	0.00115
	(0.000634)	(0.000654)	(0.000864)	(0.00215)	(0.000839)	(0.000758)	(0.00103)	(0.00208)
Population	-5.91e-06	-6.84e-06	-5.21e-06	-4.32e-05*	-2.05e-05	-1.21e-05	-2.80e-05	-9.26e-05**
	(1.03e-05)	(1.10e-05)	(1.04e-05)	(2.58e-05)	(1.66e-05)	(1.46e-05)	(1.86e-05)	(4.34e-05)
% Population in working age	0.157**	0.0987*	0.206***	0.301**	0.141*	0.0951	0.179*	0.202
	(0.0608)	(0.0569)	(0.0787)	(0.141)	(0.0722)	(0.0741)	(0.0909)	(0.195)
Municipal cost*	0.851	-0.0807	1.713*	0.511	0.822	0.123	1.473	1.225
	(0.707)	(0.657)	(0.971)	(1.729)	(0.793)	(0.747)	(1.009)	(1.843)
% High education level	0.0491	0.0196	0.0768	0.0531	-0.00218	-0.0754	0.0701	-0.126
	(0.0712)	(0.0622)	(0.0928)	(0.157)	(0.0800)	(0.0763)	(0.0992)	(0.205)
% Low education level	-0.0847	-0.0700	-0.0997	-0.167	-0.0791	-0.128**	-0.0363	-0.213
	(0.0642)	(0.0539)	(0.0836)	(0.152)	(0.0717)	(0.0649)	(0.0928)	(0.205)
2005.year	0.753***	1.024***	0.494***	1.289***				
	(0.125)	(0.101)	(0.165)	(0.289)				
2006.year	0.710***	1.100***	0.339	0.958*				
	(0.248)	(0.199)	(0.325)	(0.572)				
2007.year	-0.0759	0.332	-0.468	-0.802	-0.462***	-0.630***	-0.313	-0.998**
	(0.392)	(0.317)	(0.513)	(0.905)	(0.176)	(0.161)	(0.216)	(0.448)
2008.year	0.511	0.842**	0.186	0.499	0.346	-0.0499	0.701*	0.851
	(0.524)	(0.423)	(0.684)	(1.199)	(0.333)	(0.304)	(0.410)	(0.833)
2009.year	3.074***	2.659***	3.445***	6.437***	2.863***	1.713***	3.923***	6.694***
	(0.585)	(0.471)	(0.769)	(1.340)	(0.405)	(0.363)	(0.512)	(1.028)
2010.year	4.169***	4.091***	4.222***	7.966***	4.036***	3.148***	4.846***	8.439***
	(0.677)	(0.548)	(0.888)	(1.545)	(0.513)	(0.464)	(0.644)	(1.298)
% Born outside of the EU t-1					-0.0796	-0.122	-0.0343	-0.526*
					(0.105)	(0.123)	(0.125)	(0.306)
% Born outside of the EU t-2					0.268**	0.243*	0.289*	0.436
					(0.116)	(0.134)	(0.149)	(0.338)
Constant	104.0***	94.31***	113.2***	150.1***	147.1***	116.1***	176.4***	244.5***
	(17.88)	(14.63)	(23.48)	(44.91)	(20.49)	(19.02)	(25.84)	(56.31)
Observations	2,030	2,030	2,030	2,030	1,450	1,450	1,450	1,450
R-squared	0.814	0.803	0.780	0.763	0.881	0.862	0.864	0.831
Number of municipalities	290	290	290	290	290	290	290	290

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Variables marked with * in logarithmic form

Table 4: fixed effects regression with and without time lag – Unemployment rate

Table 4 shows results for model (1) and (2) with municipal unemployment rate (for total population, females, males and youths) as the dependent variable. Model (1) shows "positive" impacts for total population and females i.e. the unemployment rate of the total population and female's, increases when the share of immigrants increases. In contrast, we find "negative" effects for male and youth unemployment rate, i.e. the unemployment rate of males and youths decreases when the share of immigrants increases. However, these impacts are insignificant and should probably be taken lightly. In addition, many of the municipality-specific control variables are insignificant. An interesting finding is that an increase in the tax rate seems to have a "positive" effect on unemployment, especially for youths.

Model (2) provides more substantial information on how immigration from outside of the European Union affects unemployment in the municipalities. We find that $t-1$ has "negative" significant effect on the unemployment rate of youths. The estimate is to be interpreted as "if the share of the population born outside of the European Union increases with 1 percent unit in municipality i, the youth unemployment rate will be reduced with 0,53 percent units in municipality i". This is unexpected, since youths have a weak position on the labor market (see figure 6) and some studies (Borjas, (2003), Åslund & Engdahl, (2013), Dustmann, Frattini & Preston (2013) etc.) argue that those who have a marginal position on the labor market will be the most affected by immigration. We would also argue that youths and immigrants could be considered substitutes (more similar skill and education levels) and according the theoretical framework, the workers who are considered to be the closest substitutes to the immigrants should be the most affected by immigration. In addition, Smith (2012) shows that immigration from substitutable labor, such as immigrants, lead to more negative employment effects for native youths than for native adults.

We also find that immigration from outside of the European Union at $t-2$ has a significant "positive" effect on unemployment for the total population and for males and females respectively. These findings provides some substance to the theory that at least some of the immigrants from outside of the European Union will not enter the labor market instantaneously, but might instead start influencing the labor market in their second, third and possibly even fourth year living in a municipality. Overall though, it

seems as if our municipality specific independent variables does quite a poor job in explaining the changes in unemployment rate in the Swedish municipalities. Instead, the variability in unemployment seems to depend more on exogenous effects such as the economic situation in the country and/or the world. We can for example observe huge spikes in unemployment following the financial crisis of 2008, especially for youths.

Table 5 and 6 shows results for model (3) and (4), with municipal average income from labor and unemployment rate as the dependent variable.

Y = Average yearly municipal income from labor* Variables	(3) Big city municipality	(3) Urban municipality	(3) Rural municipality	(3) Sparsely populated municipality	(4) Big city municipality – lagged variable	(4) Urban municipality – lagged variable	(4) Rural municipality – lagged variable	(4) Sparsely populated municipality – lagged variable
% Born outside of the EU	-0.0112***	-0.00406	-0.00500**	-0.00697**	-0.00157	-0.000627	-0.00508**	-0.00533*
	(0.00107)	(0.00333)	(0.00214)	(0.00320)	(0.00336)	(0.00378)	(0.00255)	(0.00314)
Average age	-0.000893	0.00938	0.00462	0.00398	0.00329	0.00663	0.00471	0.000565
	(0.00329)	(0.00736)	(0.00363)	(0.00594)	(0.00329)	(0.00881)	(0.00411)	(0.00766)
Tax rate	-0.00327	-0.000746	0.00348	0.00703	-0.00915**	-0.000740	0.00135	0.0133**
	(0.00322)	(0.00444)	(0.00239)	(0.00523)	(0.00380)	(0.00410)	(0.00285)	(0.00525)
Equalization contribution	0.00293*	-0.000564	-0.00217	-0.00414***	-0.00107	0.00178	-0.00306	-0.00413
	(0.00165)	(0.00359)	(0.00143)	(0.00136)	(0.00177)	(0.00355)	(0.00210)	(0.00341)
Population density	8.58e-05***	-0.000229	0.000618	0.0534	9.44e-05***	-0.000340	0.00156	0.0159
	(2.45e-05)	(0.000384)	(0.00177)	(0.0478)	(1.67e-05)	(0.000464)	(0.00262)	(0.0399)
Population	-1.38e-07	1.71e-06*	9.03e-06***	-9.98e-06	-2.81e-07***	1.52e-06	9.29e-06**	-8.30e-06
	(1.20e-07)	(9.37e-07)	(3.37e-06)	(1.65e-05)	(9.36e-08)	(1.04e-06)	(4.24e-06)	(1.97e-05)
% population in working age	-0.00477**	-0.00375	-0.00220	-0.00194	-0.00513**	-0.00148	-0.00529**	-0.00125
	(0.00185)	(0.00366)	(0.00194)	(0.00335)	(0.00237)	(0.00410)	(0.00228)	(0.00425)
Municipal cost*	-0.0147	0.00158	0.0379**	-0.0588	-0.00538	0.00412	0.0255**	-0.0204
	(0.0117)	(0.0298)	(0.0184)	(0.0490)	(0.00979)	(0.0249)	(0.0125)	(0.0568)
% High education level	0.00692***	0.00637**	0.0116***	0.00558	0.00682***	0.00300	0.00877***	-0.00235
	(0.00131)	(0.00277)	(0.00234)	(0.00460)	(0.00195)	(0.00318)	(0.00233)	(0.00408)
% Low education level	0.000352	-0.00217	0.00124	0.00444	-0.00121	-0.000480	0.00188	0.000103
	(0.00180)	(0.00190)	(0.00153)	(0.00342)	(0.00264)	(0.00227)	(0.00161)	(0.00383)
2005.year	0.0237***	0.0202***	0.0174***	0.0186***				
	(0.00223)	(0.00400)	(0.00231)	(0.00502)				
2006.year	0.0556***	0.0451***	0.0409***	0.0528***				
	(0.00398)	(0.00804)	(0.00422)	(0.00739)				
2007.year	0.0961***	0.0776***	0.0714***	0.0904***	0.0391***	0.0376***	0.0335***	0.0368***
	(0.00596)	(0.0122)	(0.00637)	(0.0108)	(0.00174)	(0.00370)	(0.00223)	(0.00452)
2008.year	0.128***	0.106***	0.0973***	0.125***	0.0689***	0.0724***	0.0622***	0.0704***
	(0.00786)	(0.0164)	(0.00824)	(0.0139)	(0.00337)	(0.00734)	(0.00423)	(0.00785)
2009.year	0.128***	0.105***	0.0920***	0.136***	0.0677***	0.0771***	0.0590***	0.0802***
	(0.00891)	(0.0192)	(0.0100)	(0.0166)	(0.00501)	(0.0104)	(0.00636)	(0.0106)
2010.year	0.143***	0.117***	0.103***	0.160***	0.0818***	0.0945***	0.0720***	0.103***
	(0.0106)	(0.0225)	(0.0117)	(0.0193)	(0.00640)	(0.0137)	(0.00820)	(0.0146)
% Born outside of the EU t-1					-0.00592	-0.00406	-0.00169	-0.000139
					(0.00371)	(0.00406)	(0.00277)	(0.00307)
% Born outside of the EU t-2					-0.00317	-0.00608	-0.00220	-0.00488
					(0.00337)	(0.00440)	(0.00285)	(0.00531)
Constant	5.904***	5.149***	4.741***	5.140***	5.989***	5.250***	5.066***	5.184***
	(0.233)	(0.520)	(0.264)	(0.512)	(0.282)	(0.593)	(0.285)	(0.599)
Observations	322	336	1,141	231	230	240	815	165
R-squared	0.991	0.985	0.968	0.962	0.980	0.973	0.939	0.937
Number of municipalitynum	46	48	163	33	46	48	163	33

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Variables marked with * in logarithmic form

Table 5: Fixed effects regressions with and without time lag – Average yearly municipal income

Table 5 shows output for model (3) and (4), with average yearly municipal income from labor for the different municipality categories as dependent variable. With model (3), we find that immigration from outside of the European Union has a negative effect for all the municipality categories albeit in the case of "Urban municipalities", this effect is not significant. Surprisingly, we find the largest negative impact for the big city municipality category. The coefficient is to be interpreted as "if the share of the population born outside of the European Union increases by 1 percent unit in big city municipality i, the average yearly income from labor will be reduced by 1.12% in big city municipality i". Again, this must not necessarily mean that native wages has been more affected in big city municipalities than the other municipality categories. Instead, our explanation for this would be that because the average yearly municipal income from labor is much higher in this municipality category (see figure 1), the municipality average will be pulled down more by the (on average) lower incomes of immigrants.

When looking at the differences between municipality categories, we find that the different independent variables including "% Born outside of the European Union" have different effects depending on what type of municipality is discussed. For example, there is a major difference in the estimated impact of "% born outside of the European Union" on average yearly municipal income from labor between the big city municipality category and the rural municipality category. The estimated impact is more than twice as large for big city municipalities as for rural municipalities. This might bring some substance to Åslund & Engdahls (2013) claim that the impact of immigration is likely to vary depending on regional characteristics.

Model (4) provides little additional insight, with "% Born outside of the European Union" at $t-1$ and $t-2$ being insignificant for all municipality categories. In addition, the previously significant "% Born outside of the European Union" is not significant in the model which includes $t-1$ and $t-2$.

Y = Municipal Unemployment rate	(3)	(3)	(3)	(3)	(4)	(4)	(4)	(4)
VARIABLES	Big city Municipality	Urban Municipalitiy	Rural Municipality	Sparsely populated Rural Municipality	Big city Municipality - with lag	Urban municipalities - with lag	Rural municipalities - with lag	Sparsley populated municipality - with lag
% Born outside of the EU	0.223	-0.0206	0.118	0.0788	-0.386	0.313	0.0823	0.442
	(0.152)	(0.169)	(0.131)	(0.306)	(0.440)	(0.260)	(0.172)	(0.332)
Average age	-0.175	0.199	-0.0732	0.371	-0.612	0.587	-0.160	0.538
	(0.362)	(0.365)	(0.172)	(0.544)	(0.457)	(0.491)	(0.218)	(0.605)
Tax rate	0.461**	0.311	0.275**	-0.0309	0.754***	0.599*	0.266*	-0.314
	(0.228)	(0.261)	(0.137)	(0.295)	(0.275)	(0.310)	(0.150)	(0.368)
Equalization contribution	0.0961	0.322	0.137**	0.468***	0.0454	0.296	0.0614	-0.141
	(0.125)	(0.194)	(0.0664)	(0.131)	(0.152)	(0.217)	(0.109)	(0.257)
Population density	-0.00199	0.0153	0.00592	-0.947	-0.00375***	0.0114	-0.0775	-0.963
	(0.00139)	(0.0183)	(0.0572)	(2.553)	(0.00123)	(0.0287)	(0.0864)	(2.459)
Population	1.25e-06	-4.32e-05	5.15e-05	-0.000411	8.28e-06	-0.000110**	-0.000110	-0.000968
	(8.51e-06)	(4.33e-05)	(0.000181)	(0.000829)	(9.15e-06)	(4.92e-05)	(0.000176)	(0.000912)
% Population in working age	0.0481	0.239	0.231***	0.0331	0.0607	0.473**	0.112	0.0687
	(0.120)	(0.177)	(0.0746)	(0.208)	(0.142)	(0.207)	(0.0866)	(0.245)
Municipal cost*	-0.290	-0.814	1.534*	0.541	0.505	-0.698	0.887	0.0877
	(0.897)	(1.430)	(0.851)	(2.998)	(1.081)	(1.437)	(0.938)	(4.264)
% High education level	-0.181	0.0547	0.112	0.669***	-0.408**	0.0898	0.125	0.801**
	(0.136)	(0.141)	(0.134)	(0.228)	(0.158)	(0.192)	(0.145)	(0.299)
% Low education level	0.00288	-0.0345	-0.0461	0.231	-0.147	-0.131	0.0148	0.299
	(0.162)	(0.112)	(0.0742)	(0.242)	(0.258)	(0.131)	(0.0881)	(0.270)
2005.year	0.342	1.012***	0.696***	1.410***				
	(0.241)	(0.250)	(0.164)	(0.440)				
2006.year	0.132	1.265**	0.621*	1.051				
	(0.479)	(0.489)	(0.319)	(0.807)				
2007.year	-0.767	0.943	-0.186	-0.562	-1.105***	0.101	-0.367	-1.610***
	(0.761)	(0.735)	(0.506)	(1.251)	(0.267)	(0.376)	(0.225)	(0.522)
2008.year	-0.733	2.006**	0.412	-0.139	-1.289**	1.486**	0.577	-1.214
	(1.021)	(0.950)	(0.673)	(1.678)	(0.517)	(0.723)	(0.422)	(0.993)
2009.year	0.976	4.469***	3.231***	2.771	0.475	3.892***	3.394***	1.668
	(1.172)	(1.101)	(0.748)	(1.874)	(0.744)	(0.893)	(0.513)	(1.201)
2010.year	1.873	5.796***	4.281***	4.124*	1.232	5.318***	4.617***	2.791*
	(1.381)	(1.261)	(0.867)	(2.210)	(0.964)	(1.125)	(0.651)	(1.577)
% Born outside of the EU t-1					-0.0235	-0.480	-0.00293	-0.0448
					(0.326)	(0.288)	(0.147)	(0.231)
% Born outside of the EU t-2					0.927***	0.402	0.155	0.248
					(0.253)	(0.277)	(0.157)	(0.291)
Constant	9.931	141.3***	105.0***	118.2**	-23.32	175.3***	174.5***	160.1**
	(40.13)	(36.47)	(22.08)	(55.80)	(33.89)	(57.22)	(24.36)	(58.55)
Observations	322	336	1,141	231	230	240	815	165
R-squared	0.811	0.882	0.861	0.819	0.884	0.926	0.915	0.879
Number of municipalitynum	46	48	163	33	46	48	163	33

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Variables marked with * in logarithmic form

Table 6: Fixed effects regressions with and without time lag – Municipal Unemployment rate

Table 6 shows output for model (3) and (4), with municipal unemployment rate as the dependent variable in the different municipality categories. Overall, model (3) and (4) provides few significant municipality specific control variables. We find no significant effect from the independent variable of interest *"% Born outside of the European Union"* at t or $t-1$. For big city municipalities we do however find a significant "positive" effect at $t-2$. The coefficient is to be interpreted as "if the share of the population born outside

of the European Union increases with 1 percent unit in big city municipality i, the unemployment rate of big city municipality i will increase with 0,927 %.

6. Conclusion

The purpose of this study was to investigate the effect of immigration from outside of the European Union on the labor market in the Swedish municipalities by conducting fixed effects regressions on panel data. More specifically, we wanted to investigate what impact immigration has on wages and unemployment rate in the Swedish municipalities. We find that immigration from outside of the European Union has a short run negative impact on average yearly municipal income from labor for total population, for males and for females respectively. These findings are line with theoretical expectations and the empirical findings of Borjas (2003) and Dustman & Frattini (2014). When interpreting these results, one must however be aware that average yearly municipal income from labor is a relatively poor proxy for wages and a drop in municipal average income can be caused by other factors than lower average wages. In addition, we find that immigration from outside of the European Union has a significant positive, delayed short run impact on the municipal unemployment rate for total, male and female population. This indicates that immigration from outside of the European Union leads to a higher unemployment rate for these categories. Surprisingly though, we find a significant negative effect on youth unemployment, which means that immigration from outside of Europe leads to lower unemployment rate for this category.

The weakness of our dependent variable (average yearly municipal income from labor) has made it impossible to properly evaluate how immigration from outside of the European Union influences wages in the Swedish municipalities. By using wage data for different levels of education or industry specific wage data, one could potentially evaluate how immigration influences different categories of workers. In addition, the models presented in this study measure only the short run effects of immigration. With access to data from a longer time period, potential positive long run effects could be evaluated.

Another important and interesting aspect of immigration is how it affects the fiscal situation of the receiving country. While the model for Average yearly municipal income does quite a poor job in explaining how wages change in the municipalities, information about how this variable changes is still highly relevant for policy makers looking to evaluate fiscal effects of immigration. By using these models (or models similar to these), one could estimate the effect immigration has on important municipal variables, such as

per capita municipal tax revenue and per capita municipal expenses. By evaluating how these variables change, conclusions could potentially be drawn as to how immigration influences the fiscal situation in the Swedish municipalities.

7. References

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Appendix

Hausman test					
	Total		**Female**	**Male**	**Youth**
	Y=Income	**Y=Unemployment**	**Y=income** **Y=Unemployment**	**Y=Income**	**Y=Unemployment**	**Y=Unemployment**
chi2	**119.84**	**89.69**	**164.92** **102.01**	**84.20**	**69.74**	**110.46**
Prob>chi2	**0.0000**	**0.0000**	**0.0000** **0.0000**	**0.0000**	**0.0000**	**0.0000**

Test: Ho: difference in coefficients not systematic

Modified wald test for heteroscedasticity					
	Total		**Female**	**Male**	**Youth**
	Y=Income	**Y=Unemployment**	**Y=income** **Y=Unemployment**	**Y=Income**	**Y=Unemployment**
chi2	**79950.19**	**32354.73**	**36068.79** **64665.17**	**Y=Unemployment**	**20911.65**
Prob>chi2	**0.0000**	**0.0000**	**0.0000** **0.0000**	**64665.17** **1.1e+05**	**0.0000**
				0.0000 **0.0000**	

Test: Ho: sigma(i)^2 = sigma^2 for all i

F-test for seasonal dummies					
	Total		**Female**	**Male**	**Youth**
	Y=Income	**Y=Unemployment**	**Y=income** **Y=Unemployment**	**Y=Income**	**Y=Unemployment**	**Y=Unemployment**
F (6, 289)	**248.42**	**482.58**	**257.44** **456.24**	**230.60**	**410.96**	**328.93**
Prob>F	**0.0000**	**0.0000**	**0.0000** **0.0000**	**0.0000**	**0.0000**	**0.0000**