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No. 615

Immigration in the EU: An Empirical Analysis of the Impact of Immigration on the German Labor Market

Fred DeVeaux

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Immigration in the EU: An Empirical Analysis of the Impact of Immigration
on the German Labor Market

Fred DeVeaux

Research Seminar on European Integration

Professor Sophie Meunier

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This paper represents my own work in accordance with University regulations

- Fred DeVeaux

Immigration in the EU: An Empirical Analysis of the Impact of Immigration on the German Labor Market

Abstract

This paper analyzes the impact of immigration on Germany's labor market in the context of the recent 2004 and 2007 EU enlargements. In order to measure the effect of immigration supply shocks on individuals' labor outcomes, this paper uses economist George Borjas's "Skill-Group" approach, which divides the workforce into skill-groups determined by education and work-experience. Estimates on the basis of microdata collected by the Luxembourg Income Study in 2004, 2007 and 2010 confirm the hypothesis that immigration depressed annual wages and annual weeks worked for native German citizens. The results indicate that a 10 percent rise of the share of immigrants in the workforce would in general reduce wages of native German citizens by about 3 percent and decrease wages of incumbent foreigners by about 9 percent. Across the different model specifications the negative effect is even larger for immigrant workers and workers in the highest level of education.

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1. Introduction

The 2004 and 2007 integration of ten new member states (NMS) from Central and Eastern Europe into the enlarged European Union labor market has no historical precedent.¹ Hailed on one hand as a driving economic force behind the EU's success as the world's leading economy, the free movement of labor within the EU is also a divisive issue. While it is not highly disputed that member states of an enlarged EU benefit from the free movement of labor in terms of aggregate output and productivity, the distributional consequences on individual wages and employment opportunities are markedly debated in political discourse as well as in economic literature (Kahenec & Zimmerman, 2010, p. 48).

Nowhere else in Europe are the impacts of Eastern migration more large-scale and potentially consequential than in Germany. The attraction of Germany's competitive economy and its proximity to Eastern Europe gave rise to considerable fears that an influx of poverty-driven migration – estimates placed the total EU-directed migration from the NMS at over 3 million – would depress wages and threaten employment opportunities for native German citizens (Bauer & Zimmerman, 1999, p. 33). Despite the fact that this EU-migration only increased from 893,000 in 2003 to 1.91 million in 2007, and that Germany imposed temporary restrictions to divert much of this movement to the UK, labor flow from the NMS to Germany soared in the past decade, from 173,000 in 2004 to 280,000 in 2012 (Wagstyl, 2014a).

¹ On May 1st of 2004, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia joined the EU (plus two Mediterranean countries Malta and Cyprus). Bulgaria and Romania followed on January 1st 2007

In this paper, therefore, I examine the impact that immigration had on the wages and employment of German natives during the decade of the EU enlargements. Though many prominent economists continue to debate these distributional consequences using a wide variety of research methodologies, I will use an empirical approach developed by economist George Borjas (2003) that has been widely cited for discovering a significant negative effect of immigration in the US. An application of this approach to Germany, which divides the labor force into categories determined by education and work-experience skill-groups, I find that a 10% supply shock (i.e. an immigrant flow that increases the number of workers in a skill-group by 10 percent) decreases the annual wages of similarly skilled native workers by 3.2 percent. Upon further examination, I find that a 10% supply shock decreases the wages of similarly skilled immigrants by 9.2 percent, and that this effect becomes increasingly negative for both natives and immigrants among skill-groups with higher education.

This paper begins with an overview of immigration trends in Germany during the past decade of the EU enlargements, presented in section 2. Next, section 3 summarizes the methodology used in economic literature to examine the impact of immigration on labor markets, followed by my hypothesis and a detailed explanation of the “skill-group approach” that I will use in my econometric analysis. Section 6 then presents the dataset used in this paper as well as descriptive statistics that shed light on differences in immigrant and native labor outcomes. Next, section 7 reports my findings and offers an interpretation of the results in terms of immigration supply shock effects. Lastly, section 8 discusses the main findings and offers possible explanations and policy implications in view of the results.

2. Germany: Post–Enlargement Migration Trends and Trajectories

Before examining the debate in economic literature surrounding the question of labor market impacts, it is first important to understand how immigration to Germany has changed over time and why it continues to be such an important political issue. The number of immigrants in Germany has steadily increased since 1961, when the foreign population of approximately 670,000 represented 1.2% of the total population, to over 7 million in 2013, or 9% (German Federal Office of Statistics). Although extra-EU migration to Germany, particularly from Turkey, has traditionally been at the center of immigration policy debates, the recent EU enlargement refocused a lot of attention on the issues caused by intra-EU migration: in 2013, net migration to Germany increased over 13% from the previous year, with a majority of immigrants from Poland, Romania, and Bulgaria. This contributed to an overall increase in net migration of 370,000, the highest level in 2 decades, driven largely by the employment opportunities of Germany's strong economy (Wagstyl, 2014a)

With 29 million people currently living in Romania and Bulgaria, immigration from the NMS is expected to increase further in 2014 when the 7-year immigration restrictions imposed by almost all Western European countries are set to expire (Wagstyl, 2014b).² Given that Germany was among the majority of countries to adopt these protectionist policies and that it expects a sizable migration inflow once these barriers expire, a recent panel organized by Angela Merkel's center-right Christian Democrats party (CDU) has proposed several new measures to further restrict immigration: a

² These transitional arrangements are known as the "2+3+2" formula: for the first two years following the NMS accession, access to the labor markets of incumbent member states depended on their national laws and policies, lasting up to a maximum of seven years (Kahenec, Zaiceva & Zimmerman, 2009).

maximum job-search period limited to 3 months and stricter bureaucratic controls to limit immigrant access to welfare benefits. In opposition to these policies, however, the center-left Social Democratic party (SPD) maintain that a more open German immigration policy is the best way to energize the nation's competitive global markets and provide a solution to the ageing population and shrinking native workforce ("German Panel", 2014). Though most members of both main political parties agree that the free movement of labor is a cornerstone of the European Union, disagreement about the preconditions and legislative controls necessary has generated an intensifying national debate.

3. Theoretical Framework: Measuring the Impacts of Immigration

The discussion as to whether an increased supply of immigrant labor damages the work opportunities of native citizens is one that is neither unique to Germany nor to the European Union. Basic supply and demand theory have led many influential leaders in the field of labor economics such as Alan Greenspan and Paul Samuelson to predict that an increase in the size of a labor pool increases competition which therefore reduces the average wages and weeks worked (as cited in Borjas, 2003, p. 2). Despite the intuitive implications of this theory, however, most recognized empirical studies over the past several decades in the US have revealed little or no negative effects associated with immigration supply shocks (Friedberg, 1995; Borjas, 1994; Borjas, 1995; Borjas 1997; Lalonde & Topel, 1997).

In the context of Germany, similar research has found that less-skilled native citizens are insignificantly affected by depressed wages and increased unemployment

associated with increased immigration, and that medium and high-skilled natives actually see positive results (Baas, Brucker & Hauptmann, 2009). Other studies, however, have shown that incumbent foreigners have suffered a moderate negative wage and employment effect while natives have benefited (Bagriel, Geis & Felbarmayr, 2010), or that across the board there was no significant labor market impact at all (Bonin, 2005).

It is important to note that the empirical approaches used to examine this issue have evolved significantly over the years. Most of the studies cited above have employed a variation of what is commonly referred to as the geographical approach. This method examines the impact of immigration in a labor market defined by regional boundaries or metropolitan zones.³ As economist George Borjas (2003) points out, however, this geographical approach is unsatisfactory. Economic currents that attract both natives and immigrants to move in and out of small geographical areas are influenced by labor outcome expectations. This unexamined movement therefore conceals the potential negative impact of immigration supply shocks that Borjas finds in his own original (2003) study.

3.1 A Skill-Group Approach

As an alternative to the geographical approach, Borjas's (2003) study called "The Labor Demand Curve is Downward Sloping" takes the textbook supply and demand theory and refines it with a more specific analysis of substitution effects between

³ This typical empirical analysis is best exemplified by the famous study of the Marietal Boatlift (Card, 1990) in the United States. This incident presented itself as a unique natural experiment when Cuban immigration increased the labor workforce in Miami by 7% overnight. From his analysis Card concluded that even for low-skilled native workers in Miami – workers who most resembled the newly arrived population – this increase had no measurable adverse effect on native wages (Card, 1990). Critics such as Borjas later revealed that Card did not control for the large native emigration response from Miami.

workers. The motivation is as follows: an increase in the supply of workers with particular skillsets should have adverse impacts on workers with those same skillsets. Defining substitute groups by education-level alone is insufficient, he argues, because within each education group those with many years of experience on the job are unlikely to compete for employment with those without any years of experience (Borjas, 2003, p. 9).

Borjas's approach therefore organizes the national labor force into skill-groups determined by both work-experience *and* education. In short, his skill-group approach exploits the changes in immigrant proportions – supply shocks – within narrowly defined skill-groups in order to measure the effect of these changes on the labor market outcomes of workers within these clusters. With this new approach he finds that the supply shock of immigration does in fact have significant negative impacts on natives in the US during the 1960 to 2000 time period. He concludes that an immigrant influx that increases a particular skill-group by 10 percent lowers the wages of native workers in that skill-group by about 3 to 4 percent and reduces the annual weeks worked in a given year by 2 to 3 percent (Borjas, 2003).

4. Hypothesis

The contradictory findings in the current and past economic literature provide room for further exploration. In order to contribute to the existing debate, this paper will use Borjas's skill-group approach to analyze the impact of immigration on Germany's labor market outcomes in the past decade with the goal of measuring whether it had a

positive, negative, or insignificant effect on native wages and employment. Given Borjas's significant negative findings in the US, a close application of his methodology on Germany's labor market will provide consistency in the econometric methodology used to examine the highly debated issue, and can therefore serve as a replicable examination of Germany's labor market in a context of much political and empirical debate.⁴

For the purpose of defining the scope of this paper, I will concentrate solely on the distributional consequences of immigration on individual labor outcomes in Germany's national labor market. The effect of immigration on aggregate production, earnings, GDP, welfare, or other social consequences such as integration, ageing, and discrimination are beyond the extent of this paper's focus.

5. Using the Skill-Group Approach to Measure the Impact of Immigration in Germany

5.1 Regression Analysis

The skill-group approach that I will use is based off of a component of human capital theory, which stresses that skills acquired on the job increase individual productivity (Mincer, 1974). Therefore in addition to education, work-experience is a

⁴ Throughout the paper I will refer to both Borjas's (2003) study and a replication of his study applied to Germany over the 1975-97 time period (Bonin, 2005). One key difference between Bonin's study and mine is that his time frame included the period of German unification. Although he finds that the overall impact of immigration is insignificant, he did find negative wage effects prior to German unification. A critique of his study is that a large part of the immigration shock during the post-unification period is from East Germany, and it is therefore difficult to assume that the impact of immigrants on a newly unified Germany reflects typical immigration supply shocks like the type Borjas analyzes in the US and the type I will examine in Germany over the past decade.

characteristic that can help determine whether workers are substitutes in the labor market (i.e. competing for the same employment opportunities). This definition of skill-groups, and most importantly, the variation in the proportion of immigrants in these skill-groups over time and across different skill levels, can be used to identify the labor market impact of immigration (Borjas, 2003, p. 10).

As formulated by Borjas (2003), let N_{ijt} be the number of native workers who have schooling level i , work-experience level j , and who are observed in year t . Similarly, let M_{ijt} be the number of immigrants in the education-experience group (i, j, t) . To measure immigrant supply shocks for a specific skill-group, define

$$m_{ijt} = \frac{M_{ijt}}{M_{ijt} + N_{ijt}} \quad (1)$$

(i.e. the percentage of total labor supply in a skill-group from immigrant workers).

To analyze the correlation between a change in immigrant supply and labor outcomes of natives, estimate:

$$\bar{y}_{ijt} = \beta m_{ijt} + \sigma_i + \vartheta_j + \theta_t + (\sigma_i \times \vartheta_j) + (\sigma_i \times \theta_t) + (\vartheta_j \times \theta_t) + \varepsilon_{ijt} \quad (2)$$

where \bar{y}_{ijt} is the mean value of a particular labor market outcome (i.e. annual wage or weeks worked) for native workers in skill cell (i, j, t) . We also have σ_i which represents a vector of fixed effects associated with education levels, ϑ_j as a vector of fixed effects associated with years of work-experience, θ_t as a vector of fixed effects associated with the time period, and a full set of interaction terms to control for possible correlations between the fixed effects. The hypothesis tested in this regression is whether the parameter β is significantly different from zero.

5.2 Preemptive Limitations of the Skill-Group Approach

Before continuing with the empirical analysis, it is important to recognize several limitations of Borjas's approach. First of all, the division of the labor force into skill-groups assumes that workers compete in the labor market only with other workers in the same group. Evidence from several studies show that immigrants, including Eastern European immigrants, are employed in jobs that are far below the qualification that their education and work-experience levels would predict (Buchel & Battu, 2003). If this type of immigrant over-qualification is significant then we might see a negatively biased effect of immigrant supply on outcomes of lower skilled native workers, because both low-skill and high-skill immigrants would compete with low-skilled natives. Therefore a key underlying assumption of this model is that there is a single national labor market for each particular skill-group, and that both immigrant and native workers compete for wages with each other only in their corresponding skill-group.

Secondly, because the model assumes that nothing other than education and work-experience define a skill-group, this paper will analyze total immigration to Germany, not only labor flows from the NMS. Although this approach overlooks the specific impact of NMS immigration, the model assumes that the only characteristics that matter in determining worker substitution or complementarity in the labor market are education and work-experience skill-groups. Therefore this approach measures the labor market impacts of total intra-EU and extra-EU immigration flows to Germany regardless of country of origin.

6. Data and Sample

The following empirical analysis uses data provided by the Luxembourg Income Study (LIS). The LIS is the largest available database of harmonized microdata collected from multiple countries over several decades. It is the only one of its size to store micro-economic information on individual income as well as demographics. In regards to Germany, it contains harmonized datasets produced every several years on a random selection of over 20,000 individuals residing in Germany (Luxembourg Income Study [LIS], 2014). The most recent years it was completed in Germany are 2004, 2007 and 2010, all three of which I will use in my analysis.⁵

6.1 Dependent Variables

The two labor outcome variables that I will use as dependent variables in this study are annual income and annual weeks worked. Total income is measured as the sum of all monetary and non-monetary goods received by an individual in a given year. This quantity includes income from labor as well as any kind of transfer income (LIS, 2014). Although the dataset provides wages and weeks worked for each individual, the dependent variable in the regression will be a weighted average for each skill-group.

⁵ As opposed to 1% national population surveys, which gather information on several million people per year in the US for example, my dataset only has about 20 thousand observations per year. Therefore an analysis of the absolute size of immigration is not possible. The weights provided in the LIS dataset, however, correct for the probability of surveying certain types of people, and therefore validates further econometric analysis.

6.2 Independent Variables

Individuals are categorized into one of three levels of education. The lowest level of education applies to those with less than secondary education completed: either no completed education or education completed at the ISCED levels 0, 1 or 2. The middle level of education applies to those with secondary education completed (ISCED levels 3 or 4), and the high level of education corresponds to those with tertiary education completed (completed ISCED levels 5 or 6).

Because of the lack of information on individual work-experience in the dataset, any estimate of this classification will be partially inaccurate. To estimate the potential work-experience of individuals, most economists, including Borjas (2003), assume that work-experience is the number of years since leaving education. Therefore I will generate a variable: $\text{experience} = \text{age} - \text{age of education completion}$. According to the ISCED education codes, I will assume that those with low education joined the work force at age 16, those with middle level education joined the work force at age 21 and those with high education joined at age 23 (Bonin, 2005; ISCED Mappings, 2014). This study will not include individuals who are still enrolled in education.

Due to the high amount of variability in income for more senior individuals, caused primarily by the inclusion of transfer income as well as important differences between retirement behavior of German natives and immigrants, the skill-group approach will only include individuals with work-experience between 0 and 40 years (Bonin, 2005).⁶

⁶ My analysis will not measure what Borjas describes as “effective experience”: the years of experience that an immigrant has in the recipient country. The reason for using effective experience is to control for the value that employers place on experience acquired in the new country, which can potentially better define

Individuals are reported as having immigrant status in the LIS if they self-define as immigrants or are citizens of another country. The lack of information on whether or not immigrants are born abroad or in Germany will cause the empirical analysis to partly reflect the supply of second-generation immigrants, as opposed to solely new immigration shocks. Given that this paper seeks to measure the effects of immigration supply shocks in general, whether new or accumulated, the inclusion of second-generation immigrants should not be a limitation.

Lastly, I will include both male and female workers in my empirical analysis. Most of the past literature on immigrant impacts does not include female populations due to the large differences in labor outcomes and labor participation rates which were much more significant during the last half of the 20th century when these studies were conducted (Friedberg, 1995; Borjas, 1994; Borjas, 1995; Borjas 1997; Lalonde & Topel, 1997). The LIS dataset shows no significant differences between the proportion of native females and immigrant females, and although annual income and weeks worked are slightly lower for women, these labor outcomes are not significantly different between the sexes when other fixed effects such as education, work-experience and year are controlled for. Therefore in my regression I deviate slightly from Borjas's model with my inclusion of a variable for the sex of the individual. Finally, I also take the liberty to include a marital status variable to more accurately isolate the effect of the immigration supply shock, controlling for possible differences in marital status distributions between immigrants, natives, men and women.

which skill-group immigrants belong to (Borjas, 2003). Borjas, however, obtains similar results using both experience and effective experience models, so I should not expect this to be a limitation in my analysis.

6.3 Descriptive Statistics

Before discussing the results, it is important to visualize how the proportion of immigrants in each skill-groups varies between education levels and years of work-experience. Figure 1 displays the immigrant shares for each skill-group aggregated over the three observational years, and includes both male and female populations. For the skill-group approach to be effective there must be a sufficient amount of variation in these proportions in order to isolate the effect of these changes on labor outcomes (Borjas, 2003, p. 10). As we can see from the graph, the variation in the share the of immigrants between the three educational levels is very high: the proportion of immigrants in the skill groups belonging to the lower education level almost reaches 50% of the total population, particularly among workers with about 20 years of work-experience. It therefore appears as if the supply shocks have been primarily from lower educated immigrants, while medium and higher educated immigrants only comprise around 10% of their respective skill-groups.

A closer look at the dataset shows an unsurprising increasing return to higher education, with both immigrants and natives in high education groups making almost 3 times more than those in low education groups. And lastly, for the purpose of illustrating the potential issue of immigrant over-qualification mentioned before, Figure 2, 3 and 4 show the gap in average wages between immigrants and natives who belong in the same education-experience skill-groups. It is important to note here that the gap in income is significant for all three education levels. Furthermore, this gap appears to be almost twice as large between immigrants and natives in the highest education level. This gap will likely influence my analysis, and I will return to this issue in the discussion of the results.

In sum, the data shows that the immigration supply to Germany did not have a balanced impact on the different segments of worker populations. Therefore the large differences in labor market outcomes between education-experience cells suggest that there is enough independent variation with this m_{ijt} , or “share” variable in equation (1) to isolate the impact of immigration supply shocks on natives, and to continue the analysis with Borjas’s proposed model.

7. Econometric Analysis and Results

In this section I will present a formal analysis of the regression results for a variety of models. The dependent variables used are the log of annual wages and the log of annual weeks worked. All regressions are weighted by the sample size used to calculate the mean outcome \bar{y}_{ijt} for the skill-group (i, j, t) .

Table 1 presents the estimates of the coefficient β on the m_{ijt} variable, defined in equations (1) and (2) as the effect of a change in the proportion of immigrants in a specific skill-group on the labor outcomes of that specific skill-group.

Consider first the similarities between the models that include only men, and those that include both men and women in the regression results presented in Table 1. A quick comparison of these coefficients suggests that there is no significant difference of the supply shock effect when women are included. Secondly, all coefficients are statistically significant and negative. Furthermore, Table 1 reveals that the negative effect of immigrant supply on natives is less significant than the effect on other immigrants.

In order to better interpret the coefficient β , I will use Borjas's definition of factor price elasticity. This elasticity represents the percent change in wages or weeks worked associated with a percent change in labor supply. Therefore let $z_{ijt} = \frac{M_{ijt}}{N_{ijt}}$, where z_{ijt} is the percentage increase in the labor supply of skill-group (i, j, t) caused by immigration (Borjas, 2003, p. 15). The factor price elasticity can then be defined as:

$$\frac{\partial \log w_{ijt}}{\partial \theta z_{ijt}} = \beta \frac{1}{(1+z_{ijt})^2} \quad (3)$$

Looking at the dataset over the 3 surveyed years, immigration increased the total number of men and women in the dataset by 14%. Using equation (3), the factor price elasticity can be obtained by multiplying the coefficient β by 0.77. We can interpret our β coefficient as implying that the factor price elasticity for annual wages is 0.32 (0.42×0.77). In other words, a 10 percent supply shock (i.e. an immigrant influx that increases the number of workers in a skill-group by 10 percent) lowers the annual wage of natives in that group by 3.2 percent and reduces annual weeks worked by 11.8 percent. When looking at the impact of immigration on other immigrants (either already residing in Germany or newly arrived) a 10 percent supply shock has an even greater negative effect: immigrant wages are reduced by 9.1 percent and weeks worked by 13.4 percent.

For a more nuanced understanding of the effects of immigration, consider the results demonstrated in Table 2, which separates the effects of immigrant supply shocks by education levels.⁷ These results suggest that immigration has no significant impact on natives with low education, has slightly negative effects on natives with middle education, and a very significant negative effect on natives with high education. This

⁷ All the models in Table 2 use both men and women in the regressions.

pattern of increasing negative effect applies to both native wages and native weeks worked. The effect on immigrant labor outcomes is similar, but more negative in every category. One significant difference is that immigration seems to also have a negative impact on low educated immigrants, but it is not nearly as significant as the impact on highly educated immigrants.

8. Discussion of the Results

The results presented in this paper are significant and are similar in size to the negative effects discovered by Borjas (2003) in the US. In the context of Germany, however, these results are different from many of those presented in the current economic literature. Most examinations of labor market impacts in Germany have in fact shown little or no significant adverse effects of immigration (Bonin, 2005; Bagriel, Geis & Felbarmayr, 2010)⁸. Given that the structure of my analysis differs insofar as it uses Borjas's established skill-group approach, there may be a variety of reasons why my findings are different; some as a result of the model's limitations, some as a result of the model's unique ability to highlight important trends in Germany's immigration. I will explore both types of possible explanations in the section below.

⁸ Most of the literature that examines labor market impacts of immigration in Germany uses a variety of methods, including regional studies of metropolitan labor markets (Bagriel, Geis & Felbarmayr, 2010) and estimations of wage-setting elasticities (Layard, 2005; Felbarmayr, Geis & Kohler, 2010). The only study to use a replication of Borjas's skill group approach on Germany was Bonin's 2005 study, which, as mentioned earlier, may have produced different results because of its inclusion of immigrant from the period of Germany's reunification (Bonin, 2005).

8.1 The Negative Impact of Immigration on Natives

My results show that on average, an increase in the proportion of immigrants in a skill-group reduces the wages and weeks worked of natives in that same skill-group. Upon further analysis, however, my results show that the impact is smallest on skill-groups belonging to the lowest education level and largest on the skill-groups in the highest education level. Considering the fact that the fear of immigration is more commonly associated with the negative impacts of low-skilled workers in Germany – as evidenced by the 7-year restriction quotas placed almost exclusively on low-skilled NMS immigration – these results deserve further discussion.

A logical reason why the impact might be greater for higher skill-groups is that this effect is a direct consequence of Germany's temporary restriction policies. The 7-year temporary restrictions implemented in 2004 and 2007 on NMS immigration were specifically designed with quotas to slow the influx of low-skilled migrants into Germany, while keeping the border largely open for high skill immigration. Despite the fact that total immigration to Germany was 2.5 times larger in the four-year period after the 2004 enlargement than the four-year period before, my findings could be a result of this immigration policy (Zimmerman, 2009, p. 22): the potential adverse impact of an unrestricted influx of low-skill immigration was neutralized with quotas, while high-skill immigration was allowed to run its course and have a negative impact on domestic wages and weeks worked.

Although this reasoning is intuitive, several key characteristics of Germany's economy introduce certain limitations for this explanation. First of all, studies have

shown that Germany's growing economy and ageing population⁹ has created a labor shortage, particularly in high tech industries that require skilled work from engineers, doctors and scientists. Despite several initiatives to attract more foreign high-skill work, such as the minimal quotas on high-skilled NMS immigration and harmonization legislation to facilitate temporary high-skilled immigrant work, Germany's inability to attract high-skill labor is seen as major threat to the increasing demands of its competitive and technologically based economy (Kulish, 2013). Estimates produced by the Association of German Engineers, or V.D.I, claim that it needs 70,000 engineers as soon as possible to fill vacant positions (as cited in Dempsey, 2013). Therefore the logic that a large supply shock of skilled workers as opposed to low-skill workers led to an adverse impact on skilled natives seems implausible, given the elevated demand for these types of immigrants.

8.2 Differences in Immigrant and Native Labor Outcomes: Wage Dumping

Therefore while the size of the high-skill immigration might not be a reasonable explanation for the negative impact, recent political debate has highlighted another potential cause known as wage dumping: the employment of foreign workers at lower wages than native workers.¹⁰ A potential consequence of wage dumping is that native

⁹ The German Federal Statistics Office has estimated that the working-age population of those between 20 and 65, who number about 50 million today, will fall to 33 million by 2060, unless there is sufficient immigration (Dempsey, 2013)

¹⁰ The difference between wage dumping and over-qualification can be best explained by differing motives. On one hand, wage dumping is commonly associated with the incentive of immigrants to accept lower prices because the wage is already better than wages available their country of origin. Over-qualification, on the other hand, is more often seen as a form of wage discrimination on the side of employers who place a lower value on immigrant work than native work, and immigrants have no choice but to accept. Despite the difference between the two, both have potential effects on the significance of my results and will be treated more or less analogously in this section.

workers are forced to also accept lower wages if they want to remain competitive in the labor market (Der Spiegel, 2005). Looking back at wage differentials in the LIS dataset, the wage gap between natives and immigrants in the highest education level shown in Figure 4 is about twice the size of the gap in the other two education groups, Figure 3 and Figure 2. Therefore these differences in gap sizes suggest that the potential for wage dumping is the greatest among highly educated workers, which might explain the education-related negative impact of immigration.

The policy implications associated with the problem of wage dumping are numerous. Many have argued that Germany's lack of general minimum wage has made the nation particularly susceptible, as there is no limit to how much immigrants can lower their wages. In 2005, estimates linked cheap immigrant labor from the EU enlargement to a 1.2% decrease in wages on average for German workers (Deutsche Welle, 2005). Almost decade later, after much debate between the Social Democrats (SPD) and the Christian Democrats (CDU), Chancellor Merkel's cabinet approved a national minimum wage of € 8.50 per hour, to come into effect on January 2015 (BBC News, 2014). Although the minimum wage might help tackle the problem of wage dumping among low-skilled jobs, particularly from Roma migrants accepting wages as low as 3 to 4 euros per hour, the regulation of fair wages among high skill jobs is a more difficult problem to solve and the debate about industry-specific minimum wages for higher skilled occupations is far from translating into policy in the near future (Deutsche Welle, 2005).

8.3 Emigration of High Skilled Workers from Germany

Wage dumping as an explanation for the adverse impact of immigration on high skill labor, however, is not completely satisfactory on its own. Although Figures 2, 3, and 4, reveal a larger immigrant-native wage gap among highly educated workers, it is counterintuitive that an economy in need of skilled labor would pressure qualified foreign workers to reduce their wages significantly more than less demanded labor. This explanation is reinforced, however, when one considers a trend that Borjas's skill-group model does not take into account: the emigration of high-skilled workers from Germany. A central assumption that Borjas makes in his model when looking at the US is that the native population remains consistent in each skill-group over time, so that an increase in the proportion of immigrants in each skill-group is a result of immigrant supply shock, and not a result of changes in native populations (Borjas, 2003). For workers in Germany, however, a decrease in the number of highly skilled German workers might artificially inflate the negative coefficient on the measured immigrant supply shock variable used in my analysis.

In Germany, not only is it relatively easy to emigrate to neighboring countries within the EU, but the attraction of higher wages in countries such as the United States, the UK and Switzerland has caused an exodus of Germany's highest skilled workers (Deutsche Welle, 2008). High taxes, relatively low salaries and inflexible working conditions are among the reason why a record 144,815 German citizens left the country in 2005, a number nearly up 25% from 2002 (Wall Street Journal, 2007). The pace of the exodus has only increased since then, with another 160,000 skilled workers emigrated in 2007 (Deutsche Welle, 2008). Therefore a potential reason why my findings show that an

increase in the proportion of immigrants has a negative effect on skilled wages is because of the emigration of native German high-skilled workers. However, given the size of this emigration compared with the nation's population of about 80 million, it is difficult to predict how much of an impact this emigration had on my analysis. Further research into this question should control for the endogeneity of the immigrant proportion variable m_{ijt} in order to verify that changes in this variable do in fact reflect supply shocks of immigrants instead of changes in native populations, because these latter changes may be linked with expected labor outcomes.

8.4 Impact of Immigration on Immigrants

Lastly, in my results I find that immigration has a larger negative impact on labor outcomes for immigrants than it does on natives. The implication of this finding, namely that immigrants compete more with each other than they do with native citizens, is widely supported by current economic literature (Borjas 2003; Bonin, 2005; Bagriel, Geis & Felbarmayr, 2010)¹¹. Increased substitutability among immigrant workers can be the result of several reasons: insecure employment among immigrants due to inflexibilities in the German labor market for job seekers, or immigrant characteristics that place foreign workers in more competition with each other (i.e. clustering into oversaturated immigrant neighborhoods, shared language barriers, or devalued foreign education or work-experience) (Brenke, Yuksel & Zimmerman, 2009; Bauer, Flake & Sinning, 2012). Due to these many possible explanations, a consensus among most contemporary studies is that the 7-year restriction plans were viewed in retrospect as particularly beneficial to

¹¹ Even studies in Germany that show no significant negative effect of immigration still find results that are more negative for immigrants than for natives (Bonin 2005; Bagriel, Geis & Felbarmayr, 2010)

current immigrants residing in Germany, whose job security were most protected by the barriers to large-scale NMS immigration.

9. Conclusion

The application of Borjas's skill-group approach to the analysis of immigration in Germany provides several key insights that contribute to the current debate about the distributional effects of immigration. My results show that increased immigration in the past decade has had an adverse impact on the German labor market, reducing annual wages and weeks worked of native citizens. The separation of the workforce into skill-groups has also revealed that this substitutability effect seems to be greatest between immigrants, as well as between workers in higher education groups. Although the negative significance of my results contradicts most contemporary studies, the application of Borjas's skill-group approach has shed light on the potential importance of several current developments in Germany: wage dumping, Germany's emigration trends, and the higher competition between immigrants. For a more thorough examination of the impact of immigration on Germany's labor market, further research should closely examine these possible sources of substitutability. As the debate intensifies during the first few months after the final 7-year temporary restrictions ended on January 1st 2014, further investigations of labor market impacts are essential in order to legislate the appropriate policy responses in a time of uncertainty.

10. Appendix

Figure 1

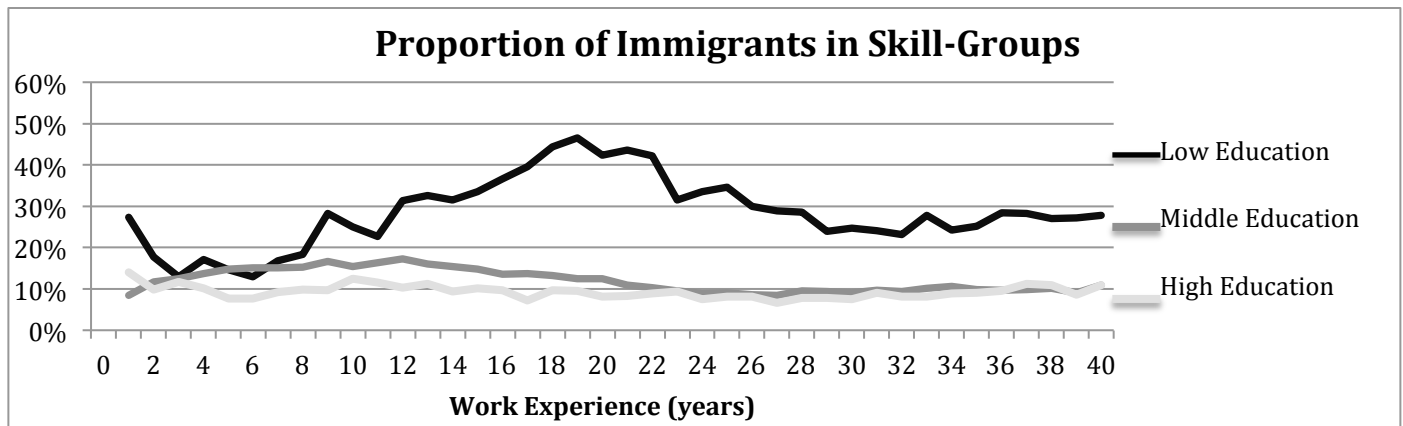


Figure 2

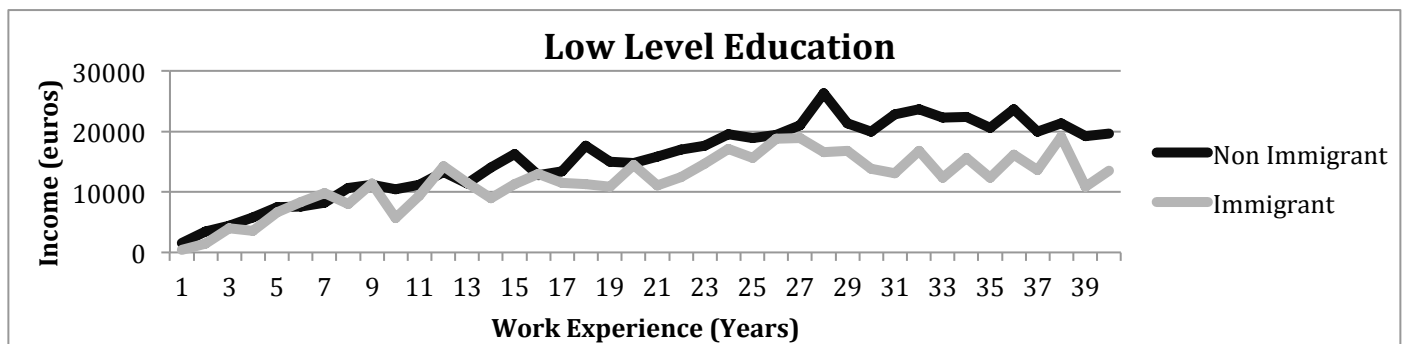


Figure 3

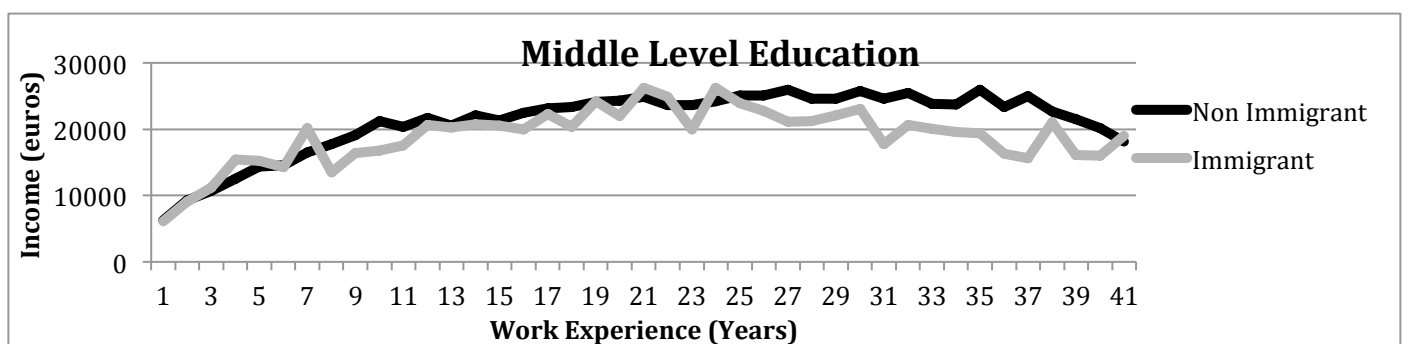


Figure 4

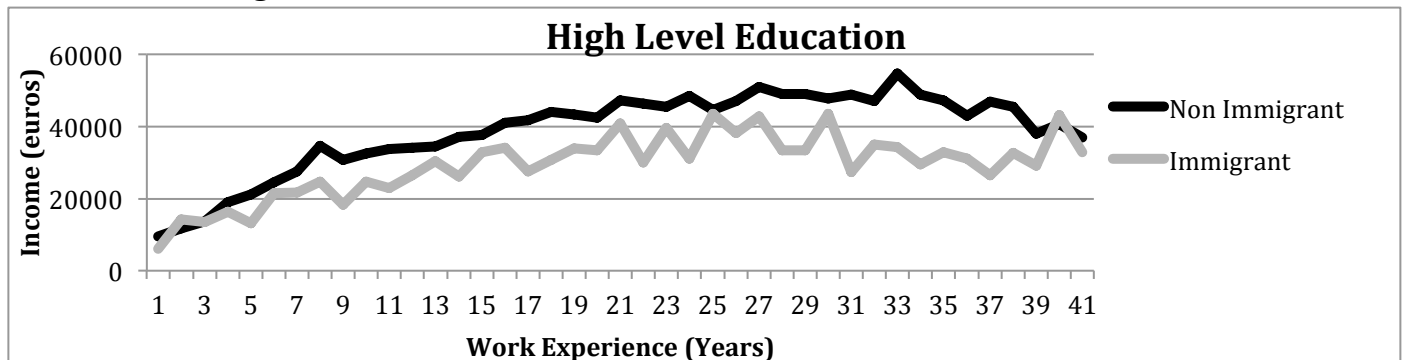


Table 1: Impact of Immigrant Supply Shocks on Average Labor Market Outcomes

	Log Annual Income	Log Annual Weeks Worked
<u>NATIVES</u>		
Men and Women	-0.42*** (0.17)	-1.54*** (0.30)
Men Only	-0.42*** (.26)	-1.47*** (0.42)
<u>IMMIGRANTS</u>		
Men and Women	-1.19*** (0.32)	-1.75*** (0.59)
Men Only	-1.20** (0.55)	-2.41*** (1.08)
<u>ALL WORKERS</u>		
Men and Women	-0.53*** (0.16)	-1.64*** (0.28)
Men only	0.50*** (0.24)	-1.64*** (0.41)

*, **, *** Significance level at 10%, 5%, 1% level respectively

Note that the education-experience skill cells are weighted by their relative size

**Table 2: Impact of Immigrant Supply Shocks on Average Labor Market Outcomes
By Education Groups**

	Log Annual Income	Log Annual Weeks Worked
<u>NATIVES</u>		
Low Education	-0.14 (0.29)	-0.12 (0.44)
Medium Education	0.50*** (0.19)	-1.90*** (0.40)
High Education	-2.73*** (0.19)	-5.81*** (0.42)
<u>IMMIGRANTS</u>		
Low Education	-1.09*** (0.40)	-1.00 (0.72)
Medium Education	0.60 (0.55)	-3.54*** (1.12)
High Education	-3.47*** (0.54)	-6.24*** (0.90)

*, **, *** Significance level at 10%, 5%, 1% level respectively

Note that the education-experience skill cells are weighted by their relative size

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