The Effect of Language Proficiency on Immigrants' Labour Earnings

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Abstract:

This study examines the returns to language proficiency for immigrants in Germany. It uses self-reported language proficiency as a proxy for the objective skill level. Estimating the effect is complex and it is likely to be biased due to several factors, such as unobserved heterogeneity, measurement errors, and reverse causality. We therefore employ instrumental variable (IV) strategies to attempt to mitigate these issues, using father's education, and leads and lags of self-reported language proficiency. The findings suggest large returns to language proficiency; 14.5% for OLS, 21.4-26.5% for different combinations of leading and lagging variables as instruments, and 59.5% using father's education as an instrument. We find no difference in returns between genders. Furthermore, there is a higher return for refugees compared to economic migrants, and a higher return for high-skill workers compared to low-skill workers. Much of the effect on earnings from improved language proficiency seems to be through the possibility of receiving a higher-paying job, rather than through improving productivity within a specific occupational position. This in turn suggests that language proficiency is an important complementary to other forms of human capital.

Keywords:

Earnings, Immigration, Refugee, Language, Human Capital

JEL:

J24, J31, J61

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Introduction

Achieving successful labour market integration of immigrants is dependent on a multitude of different factors. This paper aims to first examine the effects of language skills on earnings, with a broad approach and with recent data from Germany – including samples from the recent migration wave – in order to see whether differences in the composition of immigrants has altered the conclusions. Second, we intend to further the analysis by looking at different occupational positions, and to see whether the effect of language proficiency is differentiated depending on the skill requirements of the occupation the person is employed within. Third, we will attempt to identify potential differences between the returns for asylum seekers and refugees, and those who migrate for mainly economic reasons. Fourth, potential gender differences in the returns to improved language proficiency will be briefly analyzed.

The focus will be on the importance of human capital, specifically by examining the effect of language proficiency on labour earnings for immigrants. For something to be classified as human capital, three requirements have to be met: it has to be productive, costly to produce, and embodied in the person. Language skills can be seen as fulfilling these criteria and hence we will analyze it in the vein of the human capital literature (Adserà & Pytliková, 2016). According to Ohlsson, Broomé, and Bevelander (2012), the economic literature has usually attributed differences in labour market outcomes between natives and immigrants to differences in human capital, including native language skills, structural economic change, access to native networks, and discrimination. However, it is important to note that the four previously mentioned categories – native language skills, structural economic change, access to native networks, and discrimination – are not necessarily mutually exclusive. Rather, it is likely that they depend on one another, so that for example increased language proficiency decreases the amount of discrimination towards an individual. One implication for the analysis of language skills being viewed as human capital is that since individuals with lower levels of human capital are more likely to be employed in low-skill industries or to be unemployed, all else equal, individuals with low proficiency in the host country language will show the same tendencies and are thus more likely to have lower wages.

There are many reasons for why language skills could be an important factor for a potential employer. According to Adserà and Pytliková (2016), improved language skills could lead to easier matching between skills and employer requirements through, for instance, more efficient job search. Furthermore, increased proficiency could lead to improved productivity – either directly or indirectly. As a direct positive effect, Chiswick and Miller (2003) mention

that better language skills lead to more efficient communication between different actors, such as co-workers, subordinates, and customers. Regarding the indirect impacts, they refer to the fact that improved language proficiency can lead to complementary effects in other forms of human capital. Without the appropriate language skills, other human capital will not be utilized in an efficient manner. For example, an immigrant with high levels of education will not be able to make the most of his/her knowledge without first acquiring the necessary degree of language proficiency.

Due to these direct and indirect effects, language proficiency is likely to affect earnings positively, as well as open up for more job opportunities that previously were inaccessible because of the need to be able to communicate efficiently. Thus, it is of interest to study whether there are different effects of increased language proficiency for the employability in different professions depending on their skill levels. Apart from the above-mentioned economic improvements, language proficiency is also likely to affect several non-economic factors, for instance through improved social integration (Adserà & Pytliková, 2016). Potentially, improving language skills may also be beneficial in the labour market due to signalling effects, rather than through improving an individual's human capital. In the vein of Spence (1973), signalling may be used to decrease the information asymmetries between the employer and a potential employee. Thus, being proficient in the language may signal that the job seeker is more ambitious and able in general, and therefore more productive, rather than being more productive simply because of better communication skills.

As for the determinants of language proficiency, Chiswick and Miller (1995) suggest that there are three categories influencing the degree of language skill acquisition: exposure, efficiency, and economic incentives. Exposure refers to the idea that the more someone is exposed to the host-country language, the more proficient in the language that person will become. An example of this may be that if at least one family member is proficient in the language, that member may increase the exposure to the language of the other members, and thus improve the skills of these other members. Efficiency instead focuses on the ability to channel the exposure into actual learning. In this case, age of migration is an example of a negatively correlated variable, or in other terms, a lower age at migration leads to increased efficiency in learning the new language.

Linguistic distance may also be an important factor affecting the efficiency of learning. Empirically, a lower linguistic distance is associated with more easily transferred human capital from one country to the other, and with increased migration flows (Isphording & Otten, 2014). Lastly, economic incentives are important since there are costs and benefits associated with

acquiring a new language. If there are higher expected returns of improving language skills, this will lead people to exert more effort into doing so. For instance, if a person intends to stay in the country for a longer period of time, or believes that there is a large return to acquiring the necessary language skills, that person will all else equal invest more into acquiring those skills. This individual will therefore have higher economic incentives than one who intends to stay for a relatively shorter period of time. In the same vein of reasoning, someone who has a harder time learning the language will experience higher costs through having to exert more effort and time in doing so – and will need a higher expected return in order to have similar incentives to learn the language.

Literature Review

The literature regarding immigrants and their labour market performance initially focused on the initial earnings gap between immigrants and natives after immigration, and why that gap seems to decrease over time. The first study of this form of earnings assimilation among immigrants was, to our knowledge, a cross-section study performed by Chiswick (1978). Chiswick argues that because knowledge and skills are not perfectly mobile, immigrants will initially tend to have lower wages than native-born people, as their human capital is initially less worth than that of natives. He finds that the earnings gap decreases over time as the immigrants invest in human capital that is relevant for the specific country, thereby reducing the human capital divergence between the immigrant and the natives. Borjas (1985) furthered the scientific discussion and argued that the previous cross-section studies were potentially misleading. By looking at cohorts over time instead, he concluded that many cross-section studies suggested a faster earnings convergence than was the case, due to changing immigrant demographics over time. If subsequent cohorts have lower entry wages than previous ones, a simple cross-section study will suggest that earnings converge faster due to the change in composition. Either way, disregarding the speed of the earnings growth, immigrants do seem to improve their earnings relative to natives over time, and hence there must exist some reason for the initial gap.

One of the abilities that immigrants improve over time relative to natives is their proficiency in the language of the destination country. Language skills may therefore be an important part of the improved human capital leading to a decreased native-immigrant gap and can be an important complementary for other forms of human capital (Chiswick & Miller, 2003). It is thus of interest to study to what extent destination country language proficiency

affects labour market outcomes, and there have been a multitude of studies attempting to do so. When attempting to identify the effects of language proficiency on earnings of individuals, there are several potential issues associated with the identification of the true effect. Yao and van Ours (2015) mention three potential sources which can lead to a biased estimate.

First, there is a potential problem of omitted variables in the form of unobserved characteristics that are correlated with the independent language variable and the dependent variable. For instance, people who are more proficient in the language may also be more ambitious or have a higher ability in general, hence causing an overestimation of the effects of improved language skills. Second, there may be reverse causality between the dependent variable and the independent variable of interest. As people are employed in different types of jobs with different exposure to the destination country language, they may learn the language more or less efficiently depending on where, or if, they work. Third, self-reported language proficiency may be subject to measurement error as people cannot accurately assess their own skills or may simply misreport. If these measurement errors are idiosyncratic in the sense that the true value is uncorrelated with the measurement error, there will be issues associated with attenuation bias, so that the effect will be underestimated. If the measurement errors instead are correlated with the true value, so that the measurement error is correlated with the level of proficiency, the direction of the bias is more difficult to determine as the true value is unobserved. Previous research has suggested that the measurement errors associated with self-reported language skills lead to a large negative bias, and in fact may even offset the positive bias caused by unobserved heterogeneity (Dustmann & van Soest, 2002; Dustmann & Fabbri, 2003; Bleakley & Chin, 2004).

Due to the various potential sources of biases, many of the papers attempting to identify the effects of language on earnings make use of instrumental variable (IV) approaches in order to mitigate the potential biases caused by unobserved heterogeneity, reverse causality, and attenuation bias through measurement error. Examples of previous instruments that have been used are critical-age (Bleakley & Chin 2004; Guven & Islam, 2015), veteran status (Chiswick & Miller, 1992), foreign marriage (ibid), father's education (Dustmann & van Soest, 1998; Dustmann & van Soest, 2002), leads and lags of self-reported language proficiency (Dustmann & van Soest, 2002), and minority language concentration measures (Dustmann & Fabbri, 2003). One of the most prevalent instruments which have been used is the one called critical-age. This instrument is based on the idea that language skills are more easily acquired the younger a person is. The idea was tested by Johnson and Newport (1989) who found that there

is indeed a critical period before puberty, where the capacity to learn a language is linearly decreasing.

Regardless of the method used, many of the studies conducted have found a positive return to language proficiency, although the size of the estimates varies widely. Dustmann (1994) looks at immigrants to West Germany and creates three categories for self-reported language proficiency: very well or well, intermediate, and badly or not at all. He finds that individuals who speak German very well or well on average have 6.9% higher earnings for males, and 7.1% higher earnings for females compared to those who speaks German badly, or not at all. Although neither of his results are statistically significant, he still concludes that language proficiency is an important determinant for migrant earnings. Chiswick and Miller (1995) use an estimation model of language fluency based on the level of economic incentives, exposure, and efficiency. They find higher earnings associated with fluency in the language of the destination country. For immigrants from non-English speaking countries, they find an 8.3%, 16.9%, 12.2%, and 11% increase in earnings in Australia, the United States, Canada, and Israel respectively.

Dustmann and van Soest (2002) argue that unobserved heterogeneity is most likely to bias the estimates upward, due to correlation between ability and language proficiency, while potential measurement errors in self-reported data is likely to lead to a downward bias, due to attenuation bias. They create a dummy variable for being good or very good in German and compare it to the group who are intermediate, poor, or very poor in German. By using father's education as an instrumental variable, they attempt to mitigate the issues associated with standard OLS. They find that the returns to becoming good or very good in German using their instrumental variable increases compared to the standard OLS regression from 5.03% to 14.12% for males and 4.16% to 11.99% for females. They therefore conclude that the downward bias seems to be larger than the upward bias, and that the effect of language on earnings will tend to be underestimated using a simple OLS regression.

Dustmann and Fabbri (2003) find that proficiency in English in the UK leads to 18-20% higher earnings using a standard OLS estimate. Bleakley and Chin (2004) estimate the returns to language skills in the United States, where the skills are graded on a scale from 0 to 3. They attempt to mitigate the potential biases caused by endogeneity by using an IV approach with critical age interacted with country of birth as an instrumental variable. By including immigrants from English-speaking countries, they estimate the non-language effects of age at arrival, and hence attempt to differentiate away the effect that is caused by factors that affect the outcome, but which are not due to language proficiency. The results show that there seems

to be significant returns to language proficiency, around 33% from improving one step on their gradual scale, but that much of the effect is mediated through the fact that better language skills lead to increased educational attainment. Compared to their OLS estimate, the IV estimate is about 11 percentage points higher. They, similarly to Dustmann and van Soest (2002), conclude that unobserved heterogeneity seems to bias the estimate upwards, while the measurement error seems to significantly bias the estimate downwards. Di Paolo and Raymond (2012) estimate the effects of being proficient in Catalan for immigrants in Catalonia. In their standard OLS regression, they find positive returns of 7.5%. After attempting to mitigate endogeneity issues by using instrumental variables, they find that the return to language proficiency is around 18%. Budría and Swedberg (2015) also use an IV approach, applied on micro-data from the Spanish National Immigrant Survey, and find a substantial earnings premium – approximately 20% – associated with increased language proficiency. They further find that this premium is larger for high-educated immigrants than for low-educated ones.

There are also examples of studies that do not seem to find any returns to language proficiency, such as Yao and van Ours (2015), who examine immigrants to the Netherlands. They find that females with language problems have substantially lower wages than their counterparts with no language problems. However, among males they find no statistically significant difference between those who have language problems and those who have not.

When it comes to analyzing the effects of language proficiency in different occupations or sectors, the literature is more scarce. Berman, Lang, and Siniver (2003) find that there seems to be no evidence of positive returns to fluency in the destination country language in low-skill occupations. However, they find a large premium in high-skill occupations (between 33-42%). Similarly, Chiswick and Miller (2010) find that earnings increase as the English proficiency required for the occupation increases. Thus, those who are language proficient and work in jobs that require good language skills will tend to have higher earnings. Chiswick and Miller (2013) examine how successful matching – in terms of the language skills of the employee being at the level expected by the occupation – affects earnings. They find that the increased returns from being successfully matched is considerably higher than the increased earnings caused by overqualification, in the sense of being more proficient than needed for the specific occupation. This suggests that improved human capital, more specifically in terms of language skills, may be more important through increasing the possibility of becoming employed at higher-skill jobs, rather than through increasing productivity at a specific workplace. De Matos (2017) compares Brazilian immigrants with Eastern European immigrants that have immigrated to Portugal. She finds that the two groups are sorted into different occupations, with Brazilians

becoming employed within sectors with greater language requirements relative to Eastern Europeans, but she finds no evidence of a difference in the level of wages or wage growth.

To conclude, the literature in general has found that there are positive returns to language proficiency, but there are exceptions. As for the specific size of the estimates, there is a wide range of results, and there is considerable uncertainty due to the risk of potential biases. The results of the research that has been done on the relative effects in different occupations with different language requirements are more ambiguous, although they suggest that much of the earnings increase due to increased language proficiency is through gaining access to jobs with higher language requirements rather than increased productivity within current positions.

Background

Labour Market

The German labour market has developed positively over time. From 2000 until 2014, the employment rate for 25-65 year olds increased by about ten percentage points. A growing employment rate, shrinking unemployment rate, a decreasing retirement rate, and an increasing share of female full-time participation in the labour market are all signs of a more efficient labour market (Steiner, 2017).

One reason for Germany outperforming other OECD countries is the fact that the German labour market has developed more favourably after the financial crisis than that of most other EU countries. In the last quarter of 2017, the unemployment rate among 15-74 year olds had declined to 3.6% (OECD, 2018), substantially lower than the OECD average of 5.5%. The full-time employment rate has seen a similar improvement. Even though it has been declining and subsequently stagnating for younger groups, it has seen an upswing for older groups, especially for those aged 60-65 years. On net, the full-time employment rate has thus increased. Among the German foreign population between 15-74 year olds, the unemployment rate was 6.4% in 2017, while the employment rate was 68.1% (OECD, 2019a, 2019b).

There have been several policy reforms which may have aided in creating this well-functioning labour market. Some of the most important reforms of the German labour market were the so called Hartz-reforms, which were implemented between 2003 and 2005 and aimed to improve the flexibility of the labour market, improve the mobility of workers, and increase the incentives for unemployed to seek work. Prior to these reforms, Germany had experienced

an unemployment rate persistently above 10% (Bauer & King, 2018), and was often referred to as "the 'sick man' in Europe" (Bofinger, 2017, p. 353). The Hartz-reforms consisted of four different parts: Hartz I, II, III, and IV. The primary focus for Hartz I-II was to increase the demand for labour, Hartz III aimed at improving labour market efficiency, and Hartz IV at increasing labour supply. Among other things, Hartz I made it easier to hire temporary workers and introduced certain subsidies for training. The Hartz II-reform primarily implemented more generous conditions for the so called "mini-jobs" and "midi-jobs", also known as marginal employment jobs, and offered subsidies for unemployed who started their own business (Bradley & Kügler, 2019).

Essentially, "mini-jobs" are subsidized through lower tax rates and lower contributions to social security. A "mini-job" is defined as a job where the monthly wage does not exceed 450 Euro, or is higher than that but the employment does not last more than three months or seventy days per year. A "midi-job" is a job for earnings up to 850 Euros per month, with a tax reduction that is phased out as earnings increase (Fichtl, 2015). The Hartz III reform focused on restructuring the Federal Employment Agency, in order to facilitate job matching. Hartz IV altered the incentive structures for unemployed and was one of the largest labour market reforms. For instance, sanctions for not actively searching jobs during unemployment were introduced (Bradley & Kügler, 2019). In 2015, 7.8 million people, compared to 5.6 million people in 2003, were employed in marginal employment. This increase represents 6% of total German employment and 14% of the total employees in Germany has a "mini-job" with below €450 per month. Despite this, it is unclear whether those would otherwise be employed in regular jobs, and the effects from the Hartz reforms is still debated (see e.g. Bofinger, 2017; Stephan & Lecumberry, 2015; and Bauer & King, 2018).

Disregarding the discussion about the Hartz-reforms' impact, the German labour market does outperform many of its constituents. Casares and Vázquez (2016) compare the German labour market to the Spanish equivalent and find that between 1996 and 2013, the German labour market had lower wage rigidity and lower fluctuation in unemployment in comparison. A more elastic labour force and a seemingly more flexible labour market might be one reason for the higher volatility in quarterly growth data compared to Spain. This more flexible wage-setting compared to other well-developed European countries should allow for low-skilled immigrants to more easily enter the labour market, rather than being shut out due to firms not being able to hire them for wages that corresponds to their expected productivity. This in turn may lead to faster language acquisition, in line with increasing the exposure to the native language. It may also indirectly, through altering economic incentives to make it

relatively more important to find a job, make it more important to learn the language. In fact, the unemployment gap between natives and immigrants (20-64 year olds) in Germany was lower than the average for the EU-28 countries in 2017, despite the large inflow of immigrants, both in absolute and per capita terms. Comparing the unemployment gap to Sweden, which has had the largest inflow of immigrants in per capita terms in the past few years, Germany had a gap of just over two percentage points, while Sweden had a gap of almost eleven percentage points (Eurostat, 2018). This suggests that the German labour market is relatively well-equipped to integrate low-skilled workers with low country-specific human capital in comparison to other European countries. Despite this comparative outperformance, there are signs that less flexible wage-setting is becoming more prevalent in the German labour market. In 2015, a minimum wage of €8.50 per hour was introduced. Caliendo, Schröder, and Wittbrodt (2018) suggest that this led to a small reduction in employment and reduced working hours. Especially affected were those who were previously in marginal employment jobs.

Migration

Different terminologies regarding immigration are often intertwined, which may cause confusion. In order to discuss potential effects of migration, and the labour market integration of migrants, a distinction between economic migrants, asylum seekers, and refugees has to be made. Economic migrants choose to migrate, often based upon economic considerations. Asylum seekers are people who have applied for asylum, but whose application has not yet been decided upon. Refugees are those who have applied for asylum and have successfully been granted protection (OECD, 2017). Asylum seekers, and hence also refugees, have very different conditions compared to economic migrants. Instead of choosing where to migrate, primarily based upon economic considerations, they are forced to migrate, and they might end up in places which they had not planned for initially. These differences also lead to the fact that countries primarily make economic judgements about economic migrants, while the acceptance of refugees is based on humanitarian reasoning (Dustmann et al, 2017). Hence, there is likely to be poorer matching in terms of the labour market regarding refugees compared to economic migrants. In this paper, for simplicity, refugees will be used as a synonym for both asylum seekers and refugees.

In the years following World War II, immigration to West Germany increased, largely consisting of guest-workers from Italy, Turkey, Spain and Greece. This pattern continued until the early 1970s, peaking at more than one million arrivals in 1970. In 1973, the guest-worker

program ended however, as the oil crisis was slowing down the economy. This led to a large outflow of migrants from West Germany consisting mostly of guest-workers who returned to their home countries, although there was still a significant number that stayed (Rietig & Müller, 2016). As the composition of immigrants had changed from consisting mostly of temporary workers to permanent ones, language training for foreign workers was introduced in 1974. In 1978, the Federal government declared for the first time that one of their tasks is to integrate foreigners (Liebig, 2007).

During the 1980s and onwards, the migrants increasingly consisted of people with humanitarian needs, with Yugoslavia, Romania, and Bulgaria as the main origin countries. Since there had been an increasing number of immigrants, Germany took additional steps to assure that they had measures in place which aided in improving the integration, and in 1987 they gave additional immigrant groups the right to receive language training. Refugees and people with German background and their families, if unemployed, got the legal right to language programs without cost, and received benefits during their studies. As for labour immigrants, they had the right to a shorter language course, but with no economic support. Immigrants from the EU had no right to language training (ibid). As a response to the increased inflow of migrants, the German government decided to tighten their admission policies in 1993. This policy change, in combination with the reunification of Germany leading to the economy moving into a recession, as well as fewer Balkan state asylum seekers, led to a sharp decrease in the amount of people seeking asylum. In 1992, there were more than 400 000 asylum seekers, while in 2008, these numbers had declined to less than 30 000 (Rietig & Müller, 2016).

In January 2005, Germany introduced a new integration programme, which included the establishment of integration courses (BAMF Integration Course), conducted by certified private or semi-public providers. These courses were comprised of 630 hours training in total, of which 600 was dedicated to language training and 30 hours to an “orientation course”. They were in many cases obligatory, and it could lead to cuts in social benefits if an individual did not participate. Furthermore, the same courses were provided for ethnic Germans, humanitarian migrants and other migrants, so that there was no separation among migrant groups with regards to integration aid (Liebig, 2007).

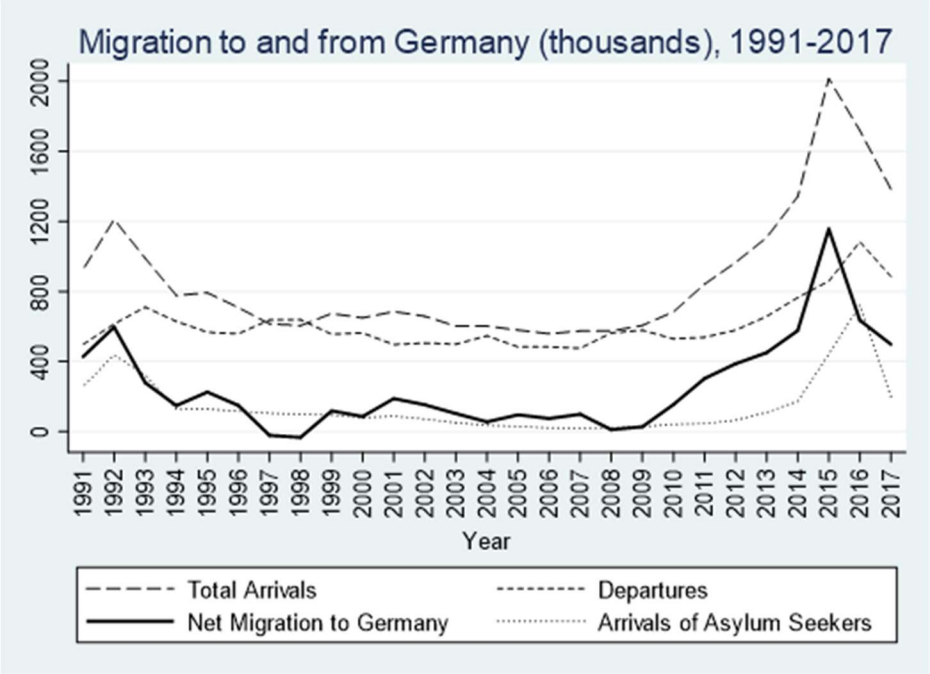

Figure 1. Source: Own calculations based on Statistisches Bundesamt (2019a).

During the 2000s, net migration to Germany was relatively steady (see Figure 1), except for during the financial crisis, where the number of arrivals was similar, but more people departed from the country. However, after the financial crisis, the number of immigrants increased sharply, initially mostly consisting of economic migrants rather than refugees up until the recent migration crisis. In 2011, the Syrian Civil War broke out and the amount of people seeking protection started to increase considerably. 5.3 million people have applied for asylum in Germany since 1953. Out of these, 1.5 million applications were filed between 2014 and the first half of 2017 (Grote, 2018). If we compare the amount of people seeking protection in 2010 and in 2017, the amount has more than tripled (Statistisches Bundesamt, 2019b). This large influx of asylum seekers in such a short period of time has made the question of labour market integration of foreign-born even more important than before. As can be seen from Figure 2, the share of foreign population has increased by more than four percentage points since 2011. It should be noted here that comparability with earlier years than 2011 is problematic as these numbers are based on a different census.

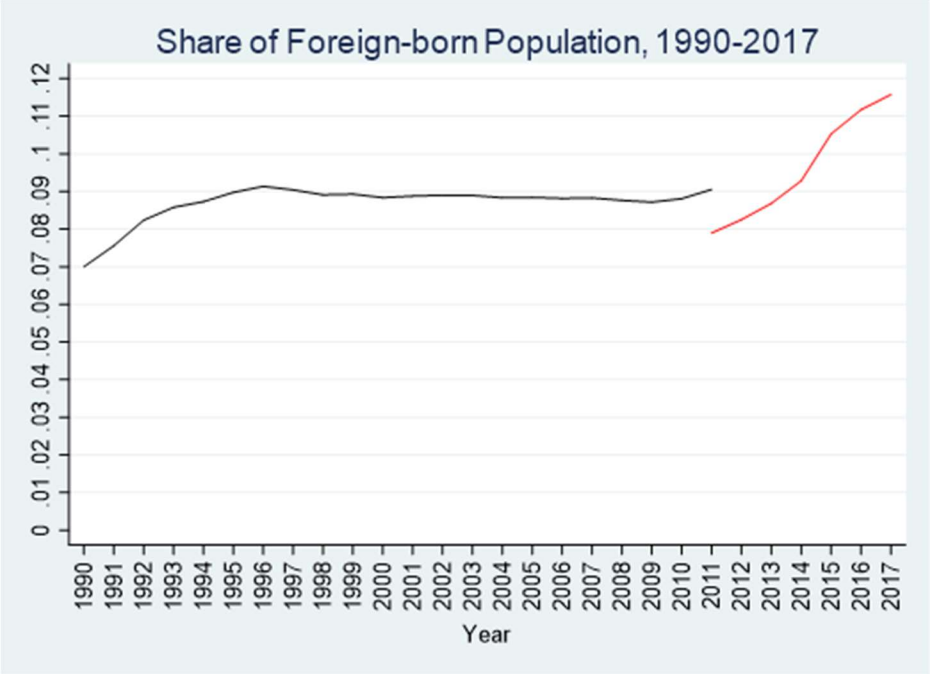

Figure 2. Source: Own calculations based on Statistisches Bundesamt (2018).

The composition of immigrants seeking protection has changed significantly over the years. Among the foreign population that entered the country between 1990 to 1999, only 6 855 were from Syria. Of those who entered between 2010 to 2017, that amount was 678 480. The two other main countries of people seeking asylum in the period 2010-2017 was Afghanistan and Iraq (Statistisches Bundesamt, 2019c). The average education level of individuals from these countries are very different, where Syrians are relatively well-educated, with only a few percentages of individuals having no formal education. In contrast, the number of Afghans and Iraqis without formal education are almost 30% and 10% respectively (OECD, 2017). Thus, despite there having been a large inflow of refugees also during the early 1990s, albeit not as large as the more recent inflow, the demographic of the immigrants in recent years has changed considerably. Between 1990 and 1999, the three largest immigrant groups seeking protection were from Kosovo, Turkey, and Serbia (Statistisches Bundesamt, 2019c). According to OECD (2015), the share of refugees with a tertiary degree between 1988 and 1993 was less than 10% in Germany. In 2015, adult first time asylum seekers were asked about their education levels. Among the respondents, 27% of Syrians stated that they had a tertiary education, while the same number was 13.8% and 5.9% for Iraqis and Afghans respectively (Rich, 2016). There is therefore considerable heterogeneity among the asylum seekers.

Apart from the differences in human capital, the different countries and their corresponding languages also have different linguistic distances to German[1], suggesting for instance that learning the language may be easier for immigrants from Balkan countries compared to people from the Middle East. This may therefore have contributed to previous immigrant groups more easily acquiring the necessary language skills in order to be able to utilize their human capital. Additionally, some countries had a large share of refugees which already knew some German. For instance, migrants from Kosovo, one of the three largest groups of asylums seekers during the 1990s, had a share of almost 20% of asylum seekers in 2015 who could speak German (ibid).

In light of the increased challenges of successfully integrating immigrants, Germany introduced its first national integration law in 2016. By this time, there had been an increase in the amount of time dedicated to learning about German society from 30 to 100 hours, while still including 600 hours of language training. If a participant does not manage to pass the final examination after those initial 600 hours, there is a possibility of applying for a further 300 hours of lessons (OECD, 2017). Germany's integration efforts are thus heavily focused on language training.

In 2015, Germany also opened up for asylum seekers to gain access to the course, if they are from countries where more than 50% of the asylum seekers have been accepted. This is important as it in 2016 took on average seven months until a decision about an asylum application was made, and a few additional months until the registration was complete (Joyce, 2017). After finishing the first integration course, there are also additional free courses available, such as the ESF-BAMF language course, which is more focused on occupation-specific language training (Kosyakova & Sirries, 2017).

In a joint employer survey by the OECD and the Association of German Chambers of Commerce and Industry together with the German Federal Ministry of Labour and Social Affairs, 50% of the employers for low-skilled jobs stated that they believe that their employees require good language skills. This rate increased to 90% when employers for medium-skilled jobs were asked. Similarly, of those who had employed refugees or asylum seekers, the most common issue mentioned was a lack of language skills (OECD, 2017). This fact emphasizes the idea that language proficiency is an important part of immigrants' human capital.

[1] See appendix Table A1 for a sample of specific linguistic distances. Calculated with data from Automated Similarity Judgment Program (ASJP), using a standardized variant of Levenshtein Distance (LD) as a measure of linguistic distance. LD is measured as the minimum number of changes necessary to convert one word into another. See more information at https://asjp.clld.org/.

Data

The empirical analysis in this paper is based on data from the German Socio-Economic Panel (SOEP). SOEP is a longitudinal panel sampling private German households. In the questionnaire, one question asks the participants to rate their German language skills on a scale from one (very good) to five (not at all), which will be used as a proxy for their true language skills in this paper. From 2013 and onwards, SOEP has a specific sample of migrants, which is made through a cooperation between the Institute for Employment Research (IAB) and SOEP (Deutsches Institut für Wirtschaftsforschung [DIW], 2019). Therefore, the sample size is significantly larger from 2013 and onwards. As can be noted in Table 1, there are few respondents who have classified themselves as not at all proficient in German, although the frequency has increased after the migration wave in the latter years.

Table 1: Language Proficiency

	2007	2008	2009	2010	2011	2013	2015	2016	2017
[1] Very Good	301	298	326	289	345	1349	1164	41	1070
[2] Good	330	304	285	254	324	1431	1202	162	1335
[3] Fairly	149	143	132	110	145	748	744	224	874
[4] Poorly	53	39	34	32	25	125	231	90	222
[5] Not at All	1	4	4	1	0	3	17	16	17
Total	834	788	781	686	839	3656	3358	533	3518
N	14993								

Source: *Socio-Economic Panel, data for years 1984-2017. Version 34.*

From the SOEP data, we have removed any native-born and only included years where questions about language proficiency were asked, hence the lack of data in 2012 and 2014. We have chosen to focus on the years 2007-2017 as this period is fairly distant from the unification of Germany in the early 1990s and should thus have much less effect on the data than earlier years, while also catching some of the effects of the migration wave during the latter years. Furthermore, as the Hartz-reforms were fully implemented in 2005, comparing samples from periods before and after the reforms may be difficult to interpret, as there may be other factors in play. In total, after having removed those who are native-born, unemployed and have no reported language proficiency, the sample consists of 14 993 observations. As we are interested in examining the effects of language proficiency on earnings, we further reduce the sample size by removing those who are classified as employed but have no earnings reported. After removing these, the sample decreases to 14 816. Finally, a set of control variables are used in the regressions, further limiting the size of the sample due to various missing values among these variables. Summary statistics for our main variables can be seen in Table 2, which also shows the reasons for the decreased sample sizes in our regressions.

Table 2: Descriptive Statistics

	count	mean	sd	min	max
Lnearnings	27119	7.296502	.9274157	0	10.81978
Language	14993	.7210031	.4485209	0	1
Age	31318	40.10943	12.1476	7	97
Education	26581	11.59793	2.562184	7	18
Experience	27017	13.26597	11.30145	0	55.8
YSM	30855	17.78707	11.70829	0	63
Married	27713	.7307401	.4435833	0	1
Female	31393	.4624598	.4985967	0	1
Refugee	31323	0.0808032	0.2725371	0	1
Language, lagged	8836	4.07062	.8798784	1	5
Language, lead	8480	4.127476	.8590484	1	5

Variable Description: *Lnearnings*: Logarithmized Monthly Gross Labour Earnings, *Language*: Dummy for Self-Reported Language Proficiency (1 corresponds to Good or Very Good in German), *Age*: Age in Years, *Education*: Years of Education
Experience: Full-Time Work Experience (in years), *YSM*: Years since Migration, *Female*: Dummy for being Female, *Refugee*: Dummy for Refugee Country, *Language, lagged*: One Period Lagged Self-Reported Language Proficiency
Language, lead: One Period Lead Self-Reported Language Proficiency
Source: *Socio-Economic Panel, data for years 1984-2017. Version 34.*

Finally, in Table 3, the relative distribution among different countries of origin can be observed. The table shows the number of observations for the fifteen most frequent countries of origin in our sample.

Table 3: Country of Origin

	N
Austria	442
Bosnia-Herzegovina	492
Croatia	460
Greece	787
Iraq	548
Italy	1331
Kazakhstan	3327
Kosovo-Albania	834
Poland	3571
Romania	2023
Russia	3439
Serbia	475
Syria	1425
Turkey	2871
Ukraine	687
Total	22712

Source: *Socio-Economic Panel, data for years 1984-2017. Version 34.*

Empirical Strategy

The empirical strategy of this paper is based on attempting to identify the effects of improved language proficiency on gross monthly labour earnings of immigrants to Germany. As previously mentioned, there are several potential sources of bias from a standard OLS regression of language proficiency on earnings. We will therefore discuss these biases in more detail in order to get some indication of what to expect.

First, the regression is likely to suffer from omitted variable bias, such that there are unobserved factors correlated with earnings and with language proficiency. While the direction of the bias is impossible to pinpoint exactly, previous research suggests that this unobserved heterogeneity will bias the estimate upwards (see e.g. Dustmann & van Soest, 2002; Dustmann & Fabbri, 2003; Bleakley & Chin, 2004). One example of a variable that is likely to contribute to biasing the estimate is natural ability. Those who are relatively more proficient in a language may be so because they are more able and ambitious – something which will also aid them in improving their earnings. Thus, this effect will cause estimates based on language proficiency to overestimate the effect on earnings.

Second, self-reported variables will generally be associated with measurement errors, which can be either idiosyncratic over time, or systematic over time. For instance, certain individuals may be more confident in themselves, and systematically over-report their skills. If the measurement errors in the independent variable are idiosyncratic, the estimate will be attenuated. In other words, the estimate will be closer to zero. If they are systematic, the bias will differ depending on the distribution of the measurement errors. As an example, those who have high earnings may tend to overestimate their language skills more than those who have low earnings. If that is the case, the estimate will be biased upwards rather than being attenuated. Further complicating the strategy of this paper is that both the dependent and independent variables are self-reported. Idiosyncratic measurement errors in the dependent variable lead to higher standard errors but does not bias the results. However, there is a risk of overconfident people overestimating their earnings, leading to a bias with ambiguous direction, depending on the correlation with their self-reported language proficiency. The prevalence of measurement errors in both the dependent and main independent variable makes it difficult to predict the direction of the potential bias.

Third, there may be reverse causality between the dependent and the main independent variable. Entering the labour market and climbing the corporate ladder, leading to higher earnings, may indirectly lead to improved language proficiency. Having a job and an income

could thus function as a form of integration measure, as interaction with colleagues is likely to improve language proficiency. There may also be large differences between sectors. Compare, for example, cleaning personnel to middle managers in the HR department of a large corporation and the different amount of human interaction between these two roles. This potential effect of people learning the language from working, and thus earning money, could potentially bias the estimate upwards.

Apart from the general risks of biases caused by the natural complexity of trying to identify the effect of language proficiency on earnings, the fact that the analysis is based on panel data, tracking individuals over time, may also lead to problems of attrition bias. This refers to the fact that people drop out from the panel study in question, potentially biasing the results if the attrition is systematic. For instance, it is possible that those who are successful in general, learn the language, make a decent amount of money, and manage to build a good network are more likely to stay in the country. Migrants who return to their home country and leave the panel may therefore be overrepresented with those who have not succeeded. Similarly, if people joining the sample during the latter years are systematically different from those who arrived earlier, this may also be a potential cause of bias. If the composition of immigrants differs between years with some groups doing better, or worse, than others over time, then the conclusions regarding the entire immigrant population may not be accurate, as all individuals are not followed up for a similar amount of years. Since this form of bias is difficult to mitigate, we will not be analyzing it specifically, but it is important to remember that it may be affecting the results.

We will begin our analysis with simple OLS regressions based on self-reported language proficiency, controlling for a variety of factors, and stepwise attempt to mitigate the issues associated with that type of regression by adding more independent variables as controls to try to isolate the effect we are interested in. We will also include different interaction effects to examine whether there are heterogeneous effects of language proficiency on incomes for different groups. As noted above, there are several potential sources of bias associated with these regressions. The most common method of mitigating these problems is by using IV methods, which we will also be doing. However, there will be associated uncertainty with the different regressions no matter which method is used. Using a non-valid instrument for example may aggravate the bias. Despite this, an indication of the direction and size of the effect should still be possible to achieve from the OLS and IV specifications. Ideally, there would exist a more or less exogenous factor affecting language proficiency, such as a policy change affecting certain individuals or regions, but not others. However, without such a natural

experiment, one can only attempt to identify the effects of language with the tools and data at hand.

When using panel data, it is possible to conduct regressions using random or fixed effects methods. Due to the large measurement errors in our data, these methods are not suitable as much of the within-variation is biased due to measurement errors. Thus, the bias may be aggravated as some or all of the between-variation is removed, increasing the noise-to-signal ratio (Dustmann & van Soest, 2002). Furthermore, all the regressions conducted will be made with robust standard errors due to the risk of heteroskedasticity in labour earnings on language proficiency.

Regression Specification

Homogeneous Returns to Language Proficiency

Our first regression specification is a simple OLS regression looking at the effect of improved language proficiency on labour earnings.

$$Ln(Y_{it}) = \alpha + \beta Language_{it} + \delta_i + \theta_t + \gamma_{it} + X_{it} + u_{it} \qquad (1)$$

Y_{it} is the outcome of interest for individual *i* at time *t*, in this case earnings, measured as the current monthly gross labour income in Euro. $Language_{it}$ is a dummy for the language proficiency for individual *i* in period *t*, proxied by two categories corresponding to different levels of self-reported language proficiency. On the self-reported language scale from 1-5, with 1 being the most proficient, $Language_{it}$ takes the value one when language proficiency corresponds to 1 or 2, and zero when language proficiency corresponds to 3, 4, or 5. One reason for reducing the scale is to mitigate some of the measurement error issues mentioned previously, as distinguishing one's own skills is necessarily a subjective operation. Another reason for doing this is that there are very few respondents who have stated that they are not at all proficient in German. This may be due to the fact that most of the interviewed individuals have been at least a few months in Germany, and thus have learnt some German. However, it is also possible that the immigrants who should have answered that they are not at all proficient in German have a lower tendency to answer, possibly due to language difficulties or simply a general mistrust towards authorities.

X_{it} corresponds to a vector of control variables. The control variables include sex, age, age squared, years since immigration, years since immigration squared, marital status, marital status interacted with sex, years of education, full-time work experience, and full-time work experience squared. The dummy variable for sex in combination with marital status and their

interaction term is used to examine the effect of being married for both males and females. Worth to note is that same-sex marriage became legal in Germany in October 2017 (Escritt, 2017). As this is a judiciary change with unclear practical importance on the lives of those affected, we include registered same-sex partnerships as married for all periods. Controlling for age is relevant as people of different ages may have different levels of human capital, in turn affecting language acquisition and earnings. Furthermore, age is an exogenous variable as it is given by nature and not affected by other factors. Years since immigration is included in the regression as is it likely to correlate positively with earnings through other channels than just affecting language skills. People who have stayed for a longer period of time in the destination country are likely to have gained improved access to social networks, and also to have learnt more about the culture, improving their potential for better labour market outcomes. The same reasoning is applicable to years of full-time work experience. Years of education is also an important factor to control for as it increases an individual's human capital, and hence expected earnings. We have not included any education squared term as the effect on earnings spikes at levels of education corresponding to having finished a certain level of schooling.

Including squared terms in the regression for other suitable independent variables allows for non-linear effects, which may improve the fit to the model as their effects may be diminishing or increasing over time. In order to remove the risk of temporary effects, such as a recession or economic boom, biasing the results, dummy variables (θ_t) for different years are included. Additionally, δ_i consists of dummies for different countries of origin. Country of origin is included in order to control for any systematic differences between countries. Finally, γ_{it} includes dummies for different occupational positions. By controlling for occupational position, we also attempt to identify the effect of proficiency on earnings within occupational positions, in order to be able to make a rough judgement of how increased language proficiency increases wages both within occupational positions, as well as the possibility to increase earnings by switching into more qualified positions. The error term captures the remaining variables affecting earnings, some of which will be correlated with the language proficiency of individuals, and hence lead to a biased estimate. Such omitted variables are for instance natural ability, motivation, and intelligence.

$$\text{First stage: } Language_{it} = \pi_0 + \pi_1 z_{it} + \delta_i + \theta_t + \gamma_{it} + X_{it} + v_{it} \qquad (2.1)$$

$$\text{Outcome: } Ln(Y_{it}) = \alpha + \beta \widehat{Language}_{it} + \delta_i + \theta_t + \gamma_{it} + X_{it} + u_{it} \qquad (2.2)$$

In the second specification, we attempt to mitigate problems with measurement errors and omitted variables through instrumenting our independent language variable with different

instruments. As long as the instrument is uncorrelated with the measurement error in the self-reported language proficiency variable, then the estimates will not suffer from any bias due to measurement error. However, for the estimates to be unbiased with regards to omitted variables, the instrument must be exogenous. In other terms, the instrument has to affect earnings only through affecting language proficiency, and not through other channels. This assumption is unlikely to hold fully, but as there are biases associated with previous regressions as well, IV regressions could still produce less biased results than the OLS regressions, and hence still be worth performing.

Using father's education as well as leads and lags of self-reported language proficiency as instruments, we aim to see how the estimated returns to language proficiency differ between specifications. Both father's education and leads and lags of self-reported language proficiency have been used as instruments in previous papers analyzing the effect of language proficiency on earnings (Dustmann & van Soest, 2001; Dustmann & van Soest, 2002). Although Dustmann and van Soest (2002) mention that father's education has been criticized as an instrument in the wage literature, they argue that the critique is less applicable to the analysis of migrants since the father will not have had time to establish social networks. We echo this sentiment and believe that father's education is a useful instrument which can lead to smaller biases compared to a standard OLS regression. The level of the father's education will likely be positively correlated with the child's language proficiency, but not be as affected by other omitted variables leading to improved earnings. This does not mean that the instrument is in any way completely exogenous however. For instance, if the father is more able and therefore has a higher education level, the child is also likely to be more able. Still, the natural ability will not be perfectly correlated as in the OLS regression, and thus the potential bias will likely be smaller, depending on the relevance of the instrument compared to the correlation with the bias. If the different specifications, including OLS, indicate similar directions and effects, a stronger conclusion about the true returns could be made.

As the German education system is somewhat complicated, with different types of schools of different quality on the same level of education, the translation of foreign education of fathers in the German sample does not make for a continuous linear scale. For father's education, we therefore use dummies to represent which level of education the father has.[2] We deem it unlikely that an individual's propensity to mismeasure his/her own language

[2] The levels in the data are: Do not know, Secondary General School (Hauptschule), Intermediate School (Realschule), Technical High School (Fachoberschule), Upper Secondary Degree (Abitur), Other Degree, No School Degree, Migrant Compulsory Schooling abroad, and Migrant Secondary School abroad.

proficiency will be as correlated with the level of education of his/her father, reducing the risk of measurement errors biasing the results. An additional benefit of using father's education is the fact that the risk of reverse causality decreases compared to the OLS. Getting a well-paying job that increases your income might also improve your language proficiency, but it is unlikely to have a causal effect on your father's level of education, decreasing the potential upwards bias from this. Despite there being a risk for bias when using this instrument, it may still produce a less biased estimate compared to the OLS regression since the bias in the IV regression depends both on the relevance and the exogeneity of the instrument. Given a certain level of endogeneity, the more relevant the instrument, the smaller the bias. In other terms, the more relevant the instrument, the more endogenous it can be without causing large biases in the estimates.

Leads and lags of self-reported language proficiency should reduce problems associated with idiosyncratic measurement errors, which may lead to attenuation bias if not controlled for. However, this method will not help alleviate issues of systematic measurement errors, as both the previous and next period will include the same direction of the measurement error. It is also possible that the leading variable instrument controls for some of the effect of natural ability as those who are more able will tend to improve their language proficiency more in the future. In sum, neither of the instruments are perfect, but neither is the standard OLS, and together they may still give some indication of the direction of the effect.

Heterogeneous Returns to Language Proficiency

In our third specification, the analysis is extended to encompass language interaction effects for females, different occupational positions, and refugees. These variables are included in W_{it}.

$$Ln(Y_{it}) = \alpha + \beta Language_{it} + \delta_i + \theta_t + \gamma_{it} + X_{it} + W_{it} + u_{it} \qquad (3)$$

As there is no data available for which individuals arrived as refugees, we will use a proxy for being a refugee based on a grouping of certain countries of origin which have had a high relative amount of migrants seeking protection (over 70%) between 2010 and 2017, and which have been among the ten countries that in absolute terms have had the highest migration flow to Germany[3] (Statistisches Bundesamt, 2019c).

[3] The countries included are Afghanistan, Eritrea, Iraq, Somalia, and Syria. See appendix Table A2 for specific information.

By interacting this variable with the self-reported language proficiency variable, we seek to determine whether the returns to language proficiency is different for refugees compared to economic migrants. In order to estimate potential heterogeneity of returns to language proficiency within different occupations, we control for occupational position and include interaction terms between language proficiency and high-skill and low-skill workers. We test this using three categories, one consisting of high-skill workers, one of low-skill workers, and one with other occupational positions which are not clear whether they are high-skill or low-skill, mainly including those who are self-employed. By using these dummies, we hope to be able to investigate whether the returns to language proficiency is different depending on the required skill-level of an individual's occupational position. Previous research by Chiswick and Miller (2013) suggests that the largest effect on earnings due to improved language proficiency is through being able to access higher-skill jobs rather than by improving productivity within a specific occupation. Furthermore, Berman, Lang, and Siniver (2003) find no evidence of positive returns to fluency in low-skill sectors. We will also briefly analyze potential gender differences in the returns to improved language proficiency by adding an interaction term for females with language skills in German.

$$\text{First stage: } Language_{it} = \pi_0 + \pi_1 z_{it} + \delta_i + \theta_t + X_{it} + W_{it} + v_{it} \qquad (4.1)$$

$$\text{Outcome: } Ln(Y_{it}) = \alpha + \beta \widehat{Language}_{it} + \delta_i + \theta_t + X_{it} + W_{it} + u_{it} \qquad (4.2)$$

The fourth specification is simply an IV regression encompassing all the interaction variables included in the third specification, except for the control for occupational position, as we are focused on the possibility to improve earnings in general, rather than just within occupational positions. Furthermore, the general effects regarding improvements of productivity within the occupation are seen in the IV regression in (2) without the interaction terms when we control for occupational position. The same instruments as in the second specification will be used.

Results

Homogenous Returns to Language Proficiency

OLS Approach

Table 4 presents the results from a simpler version of the first specification of our standard OLS regression (1), without controlling for year, country of origin or occupational position. We then gradually introduce the control variables included in vector X_{it}. The results in column

1, without any controls, suggest an approximately 33.8% return to being good or very good in German. The effect decreases as more control variables are added, and in column 4 when all control variables in vector X_{it} are added we see a statistically significant positive effect of improved language proficiency of approximately 15.9%.

As for the other independent variables we can see a few coefficients that are of interest for providing a bigger picture of the dataset used, and which can provide an explanation for some of the factors in the sample. Including a dummy for females controls for systematic earnings differences between genders in the sample and makes sure that these do not affect the conclusions. For males, there is a positive earnings effect of being married corresponding to about 6.7%, probably partly associated with having to do less household work, but also due to marriage being a proxy for other factors, such as having settled down in general. For married women, the earnings are about 16.2% lower compared to unmarried women, illustrating differences between genders in the level of earnings when married. The returns to full-time work experience and years since immigration are both positive but decreasing over time, illustrated by a negative coefficient on the squared term. For age, we see a similar pattern, with positive but decreasing effects as age increases.

It should be noted that outlier values of these coefficients are to be viewed with caution, as the negative squared terms make the total effects negative after a sufficient number of periods. For work experience, the fact that the term becomes negative might be explained by people with long experience decreasing their working hours, and thus labour income, before retiring completely. Regarding the age variable, being old decreases the chances of being valuable on the labour market compared to a younger person with similar experience. However, it is not plausible that the effect would become negative for years since immigration, controlling for age and experience. This is also confirmed by the results. In this particular case, the effect stays positive until after 90 years since migration, after which there is no data in the sample.

Table 4: OLS Regression

	(1)	(2)	(3)	(4)
Language	0.338***	0.158***	0.158***	0.159***
	(0.0172)	(0.0164)	(0.0160)	(0.0160)
Age		−0.0220***	0.0591***	0.0624***
		(0.00119)	(0.00538)	(0.00558)
Age, squared			−0.00100***	−0.00102***
			(0.0000644)	(0.0000663)
Education		0.105***	0.0992***	0.0982***
		(0.00282)	(0.00276)	(0.00276)
Experience		0.0352***	0.0549***	0.0527***
		(0.00103)	(0.00223)	(0.00224)
Experience, squared			−0.000487***	−0.000466***
			(0.0000565)	(0.0000565)
YSM		0.0130***	0.0263***	0.0260***
		(0.000724)	(0.00210)	(0.00211)
YSM, squared			−0.000290***	−0.000289***
			(0.0000439)	(0.0000442)
Female		−0.402***	−0.388***	−0.234***
		(0.0162)	(0.0157)	(0.0263)
Married				0.0673***
				(0.0222)
Married Female				−0.229***
				(0.0307)
Constant	7.009***	6.353***	4.667***	4.566***
	(0.0148)	(0.0455)	(0.102)	(0.104)
Observations	14816	14016	14016	13969

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

$Ln(Y_{it}) = \alpha + \beta Language_{it} + X_{it} + u_{it}$

Table 5 presents the complete results from the first specification of our standard OLS-regression (1), with control variables introduced successively. Controlling for year fixed effects (column 1) and country of origin (column 2), respectively, both decreases the returns of becoming proficient in German to approximately 15.1%. Controlling for year fixed effects is a way to remove time trends from the analysis, thus controlling for different conditions in different time periods. Similarly, the person's country of origin might affect the results as immigrants from different countries may have different conditions for earnings and language proficiency. Controlling for both these factors at the same time, as in column 3, further decreases the return to approximately 14.5%. Other independent variables change slightly in these regressions, but the orders of magnitude and directions of the factors remain fairly stable.

In the last specification in column 4, the coefficient for language proficiency decreases substantially. This is due to the introduction of controls for occupational position, leading to a decrease in the estimated returns to becoming proficient in German to approximately 4.3%. This result suggests that a large part of the increased earnings associated with better language

skills is due to the fact that an individual can move to an occupation with better pay, rather than improve their productivity within the current occupational position. In general, the other terms remain statistically significant but with smaller coefficients, perhaps because the income difference within sectors is smaller than between sectors due to the prevalence of a skill premium (Mallick & Sousa, 2017), and differences in skill requirements between sectors and positions. The only coefficient losing statistical significance is the marriage premium for males. This illustrates that much of the effect depends on the fact that married males occupy better paying positions in comparison to unmarried males, rather than through the possibility of focusing more on work and earning more money when married.

Table 5: OLS Regression: Additional Controls

	(1)	(2)	(3)	(4)
Language	0.151***	0.151***	0.145***	0.0430***
	(0.0159)	(0.0160)	(0.0160)	(0.0147)
Age	0.0602***	0.0522***	0.0498***	0.0349***
	(0.00559)	(0.00576)	(0.00578)	(0.00548)
Age, squared	−0.00100***	−0.000897***	−0.000879***	−0.000639***
	(0.0000664)	(0.0000685)	(0.0000687)	(0.0000647)
Education	0.0957***	0.0900***	0.0892***	0.0218***
	(0.00275)	(0.00290)	(0.00289)	(0.00306)
Experience	0.0530***	0.0513***	0.0525***	0.0442***
	(0.00224)	(0.00228)	(0.00228)	(0.00209)
Experience, squared	−0.000475***	−0.000490***	−0.000501***	−0.000413***
	(0.0000564)	(0.0000574)	(0.0000574)	(0.0000530)
YSM	0.0239***	0.0212***	0.0227***	0.0170***
	(0.00214)	(0.00223)	(0.00227)	(0.00199)
YSM, squared	−0.000245***	−0.000251***	−0.000274***	−0.000242***
	(0.0000445)	(0.0000474)	(0.0000479)	(0.0000420)
Female	−0.247***	−0.286***	−0.281***	−0.232***
	(0.0263)	(0.0266)	(0.0266)	(0.0239)
Married	0.0614***	0.0754***	0.0788***	0.0136
	(0.0221)	(0.0222)	(0.0221)	(0.0197)
Married Female	−0.221***	−0.221***	−0.220***	−0.177***
	(0.0306)	(0.0306)	(0.0304)	(0.0271)
Constant	4.662***	4.956***	4.964***	5.691***
	(0.107)	(0.112)	(0.113)	(0.105)
Year	*Yes*	*No*	*Yes*	*Yes*
Country of Origin	*No*	*Yes*	*Yes*	*Yes*
Occupational Position	*No*	*No*	*No*	*Yes*
Observations	13969	13969	13969	13743

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

$Ln(Y_{it}) = \alpha + \beta Language_{it} + \delta_i + \theta_t + \gamma_{it} + X_{it} + u_{it}$

IV Approach

Table 6 consists of an IV specification (2) using father's education as an instrument for language proficiency. The instrument's F-statistic for rejecting that the instrument is weak decreases as more variation is removed. The null hypothesis is that the instrument is weak, in other terms that π_1 is equal to zero. The first two specifications suggest that the instrument is

strong on a 5% significance level and less than 10% significance level respectively, while in the last specification it significant at the 10% level. In column 1, using the same controls as in column 4 of the OLS regression in Table 4, the coefficient for being good in German increases to 0.584 from 0.159 – an increase of 42.5 percentage points. It is also statistically significant at the 1%-level. When controlling for year and country of origin fixed effects in column 2, the effect increases to 0.595, compared to 0.145 in the comparable OLS regression in column 3 of Table 5 – an increase of 45 percentage points. When controlling for occupational position in column 3, the effect of improved language proficiency is severely mitigated and not statistically significant, echoing the previous results from the OLS regression which suggest that a large part of the increased earnings associated with improved language proficiency is due to the possibility to change to jobs with higher earnings, rather than by improving the productivity within the occupation.

Table 6: IV Regression: Father's Education

	(1)	(2)	(3)
Language	0.584***	0.595***	−0.0615
	(0.179)	(0.204)	(0.197)
Age	0.0700***	0.0579***	0.0223***
	(0.00893)	(0.00899)	(0.00837)
Age, squared	−0.00104***	−0.000906***	−0.000517***
	(0.0000956)	(0.0000970)	(0.0000912)
Education	0.0895***	0.0856***	0.0236***
	(0.00743)	(0.00729)	(0.00569)
Experience	0.0577***	0.0577***	0.0490***
	(0.00340)	(0.00350)	(0.00308)
Experience, squared	−0.000637***	−0.000647***	−0.000517***
	(0.0000900)	(0.0000935)	(0.0000825)
YSM	−0.00477	0.00465	0.0181***
	(0.00638)	(0.00710)	(0.00642)
YSM, squared	0.000158*	−0.0000570	−0.000241***
	(0.0000878)	(0.0000920)	(0.0000814)
Female	−0.273***	−0.265***	−0.223***
	(0.0355)	(0.0355)	(0.0310)
Married	0.154***	0.201***	0.0879***
	(0.0318)	(0.0313)	(0.0275)
Married Female	−0.288***	−0.317***	−0.212***
	(0.0423)	(0.0428)	(0.0376)
Constant	4.412***	4.608***	5.862***
	(0.183)	(0.182)	(0.188)
Year	*No*	*Yes*	*Yes*
Country of origin	*No*	*Yes*	*Yes*
Occupational position	*No*	*No*	*Yes*
Observations	7193	7193	7118
F-statistic	18.826	14.174	10.799

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

First Stage: $Language_{it} = \pi_0 + \pi_1 z_{it} + \delta_i + \theta_t + \gamma_{it} + X_{it} + v_{it}$

Outcome: $Ln(Y_{it}) = \alpha + \beta \widehat{Language}_{it} + \delta_i + \theta_t + \gamma_{it} + X_{it} + u_{it}$

Table 7 instead uses different combinations of leading and lagging variables as instruments for language proficiency. In this specification, the first and last observation for each individual becomes excluded in the lag and lead regressions respectively as they have no value. This removes much of the effect on the return to language proficiency of the migration wave, which we are interested in looking at, as many of the recent immigrants have only one or two observations. Additionally, since all the respondents have not responded to the questionnaire each year, the time between two periods may differ between observations. The F-statistic for weak instruments is very large in all specifications, suggesting that there is a low likelihood of the instruments being non-relevant. This is due to the fact that the instruments are the same

variable as our original self-reported language proficiency, but from different time periods. From the regressions, we can see that the coefficients from the comparable OLS regression in column 3 in Table 5 all increase with between 6.9 and 12.0 percentage points, with the leading variables producing the largest positive coefficient. This may suggest that there is indeed some level of attenuation bias caused by measurement errors. Furthermore, the estimates are all statistically relevant on the 1%-level.

Table 7: IV Regression: Leads+Lags

	(1) Lag	(2) Lead	(3) Lag+Lead
Language	0.214***	0.265***	0.254***
	(0.0736)	(0.0776)	(0.0851)
Age	0.0493***	0.0318**	0.0199
	(0.0145)	(0.0142)	(0.0197)
Age, squared	−0.000848***	−0.000602***	−0.000481**
	(0.000166)	(0.000163)	(0.000220)
Education	0.0848***	0.0846***	0.0951***
	(0.00693)	(0.00725)	(0.00844)
Experience	0.0564***	0.0535***	0.0554***
	(0.00516)	(0.00506)	(0.00634)
Experience, squared	−0.000481***	−0.000488***	−0.000485***
	(0.000124)	(0.000119)	(0.000146)
Years since immigration	0.0242***	0.0252***	0.0422***
	(0.00674)	(0.00663)	(0.0100)
YSM, squared	−0.000344***	−0.000361***	−0.000698***
	(0.000126)	(0.000123)	(0.000185)
Female	−0.237***	−0.310***	−0.289***
	(0.0649)	(0.0648)	(0.0847)
Married	0.122**	0.0964*	0.126*
	(0.0530)	(0.0538)	(0.0746)
Married Female	−0.230***	−0.226***	−0.211**
	(0.0720)	(0.0733)	(0.0966)
Constant	4.887***	5.230***	5.204***
	(0.289)	(0.287)	(0.413)
Year	*Yes*	*Yes*	*Yes*
Country of Origin	*Yes*	*Yes*	*Yes*
Observations	2663	2656	1321
F-statistic	779.597	824.470	253.448

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

First Stage: $Language_{it} = \pi_0 + \pi_1 z_{it} + \delta_i + \theta_t + X_{it} + v_{it}$

Outcome: $Ln(Y_{it}) = \alpha + \beta \widehat{Language}_{it} + \delta_i + \theta_t + X_{it} + u_{it}$

In Table 8 we are controlling for occupational position while using leading and lagging variables as instruments. The results indicate similar effects as the OLS regression in column

4 of Table 5. The returns to language proficiency are much smaller within occupations than between them. The coefficients vary in size between a decrease of -1.3 percentage points to an increase of 6.7 percentage points in comparison with the OLS regression. However, in these regressions, the results show no statistical significance for the returns to language proficiency, and we cannot conclude neither that there is an effect at all nor that it differs from the estimated effect in the OLS regression. This may partially be due to the fact that there are a lot fewer observations, increasing the size of the standard errors.

Table 8: IV Regression: Leads+Lags

	(1) Lag	(2) Lead	(3) Lag+Lead
Language	0.0302	0.0981	0.110
	(0.0663)	(0.0694)	(0.0783)
Age	0.0461***	0.0319**	0.0210
	(0.0132)	(0.0136)	(0.0183)
Age, squared	−0.000774***	−0.000558***	−0.000449**
	(0.000150)	(0.000155)	(0.000204)
Education	0.0189***	0.0167**	0.0267***
	(0.00716)	(0.00746)	(0.00845)
Experience	0.0472***	0.0438***	0.0487***
	(0.00490)	(0.00489)	(0.00606)
Experience, squared	−0.000351***	−0.000364***	−0.000400***
	(0.000118)	(0.000117)	(0.000143)
YSM	0.0248***	0.0216***	0.0369***
	(0.00580)	(0.00594)	(0.00907)
YSM, squared	−0.000435***	−0.000376***	−0.000699***
	(0.000108)	(0.000112)	(0.000166)
Female	−0.210***	−0.263***	−0.282***
	(0.0545)	(0.0588)	(0.0712)
Married	−0.00233	0.0142	−0.00136
	(0.0435)	(0.0464)	(0.0550)
Married female	−0.124**	−0.147**	−0.0667
	(0.0601)	(0.0646)	(0.0804)
Constant	5.295***	5.738***	5.392***
	(0.262)	(0.270)	(0.365)
Year	*Yes*	*Yes*	*Yes*
Country of Origin	*Yes*	*Yes*	*Yes*
Occupational Position	*Yes*	*Yes*	*Yes*
Observations	2625	2624	1311
F-statistic	722.082	744.873	229.498

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

First Stage: $Language_{it} = \pi_0 + \pi_1 z_{it} + \delta_i + \theta_t + \gamma_{it} + X_{it} + v_{it}$

Outcome: $Ln(Y_{it}) = \alpha + \beta \widehat{Language}_{it} + \delta_i + \theta_t + \gamma_{it} + X_{it} + u_{it}$

Heterogeneous Returns to Language Proficiency

OLS Approach

Table 9 consists of the OLS specification with interaction terms (3). In these regressions, the control variables from the OLS regression in column 3 of Table 5 are used in combination with the different interaction terms. In other terms, all control variables except for occupational position are included. In column 1, an interaction term for females is used to separate the increased earnings to improved proficiency between genders. It shows somewhat higher earnings for males than females, although the difference is not statistically significant.

In column 2, the estimate for being from a country with a high share of refugees and having good language skills suggests that they have an average 7.9 percentage points higher return to improving their language skills compared to those from other countries. In column 3, the estimated effect from improved language proficiency is negative and significant on the 5%-level for low-skilled workers. However, for high-skilled workers the effect is significantly positive at the 1%-level with an estimated 49.6% increase in earnings for improved language proficiency.

In column 4, all interaction terms are controlled for at the same time. In this specification, low-skilled males have a statistically significant negative return to improved language proficiency, while their female counterparts have higher (although still negative) returns. The effect of becoming proficient in a high-skill sector still shows high returns. The coefficient for the proxy for refugees is statistically significant and illustrates that their return to becoming language proficient is 24.7 percentage points higher than for other migrants. The fact that the coefficient for low-skilled males decreases when controlling for the refugee interaction term suggests that those from refugee countries are overrepresented among both males and in low-skill sectors. Equivalently, that is also the reason for the refugee interaction term becoming more positive. The fact that the returns to language proficiency for males in low-skill sectors becomes negative may seem odd at first, and will be discussed in Table 10, where we introduce controls for occupational positions.

Table 9: OLS Regression: Interaction Effects

	(1)	(2)	(3)	(4)
Language	0.155***	0.137***	−0.0402**	−0.0898***
	(0.0186)	(0.0161)	(0.0168)	(0.0199)
Language Female	−0.0250			0.0536*
	(0.0303)			(0.0302)
Language Refugee		0.0788		0.247***
		(0.0646)		(0.0634)
Language			0.536***	0.546***
High-skill			(0.0146)	(0.0147)
Language			0.268***	0.278***
Other-skill			(0.0371)	(0.0371)
Age	0.0498***	0.0502***	0.0405***	0.0416***
	(0.00578)	(0.00578)	(0.00556)	(0.00556)
Age, squared	−0.000880***	−0.000884***	−0.000737***	−0.000750***
	(0.0000687)	(0.0000688)	(0.0000662)	(0.0000663)
Education	0.0892***	0.0891***	0.0606***	0.0596***
	(0.00289)	(0.00289)	(0.00295)	(0.00295)
Experience	0.0525***	0.0525***	0.0496***	0.0495***
	(0.00228)	(0.00228)	(0.00219)	(0.00220)
Experience,	−0.000501***	−0.000501***	−0.000479***	−0.000477***
squared	(0.0000574)	(0.0000574)	(0.0000556)	(0.0000556)
YSM	0.0227***	0.0227***	0.0177***	0.0177***
	(0.00227)	(0.00227)	(0.00218)	(0.00218)
YSM, squared	−0.000274***	−0.000273***	−0.000225***	−0.000220***
	(0.0000479)	(0.0000479)	(0.0000462)	(0.0000462)
Female	−0.260***	−0.279***	−0.260***	−0.299***
	(0.0364)	(0.0265)	(0.0252)	(0.0359)
Married	0.0796***	0.0795***	0.0513**	0.0513**
	(0.0220)	(0.0220)	(0.0212)	(0.0212)
Married Female	−0.222***	−0.221***	−0.202***	−0.200***
	(0.0304)	(0.0304)	(0.0290)	(0.0290)
Constant	4.955***	4.960***	5.514***	5.533***
	(0.114)	(0.113)	(0.110)	(0.111)
Year	*Yes*	*Yes*	*Yes*	*Yes*
Country of origin	*Yes*	*Yes*	*Yes*	*Yes*
Observations	13969	13969	13969	13969

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

$Ln(Y_{it}) = \alpha + \beta Language_{it} + \delta_i + \theta_t + X_{it} + W_{it} + u_{it}$

Language Female, Language Refugee, Language High-skill, and Language Other-skill are all interaction terms.

In Table 10, we use the same specification as in Table 9, but add a control variable for occupational position in all columns. The coefficients for the returns to language proficiency decrease substantially when adding this variable, similar to previous results without the interaction effects included. Compared to Table 9, migrants from refugee countries have a statistically significant higher return within occupational positions in column 2, most likely due to an overrepresentation in low-skilled positions. Thus, given that they are in the same occupational position as non-refugees, their return to improving their language proficiency is higher relative to without controlling for the occupational position. Another difference is that in column 3, low-skilled workers now have a slightly more positive return, and the estimate is no longer statistically significant.

The fact that the estimate increases illustrates that there is a correlation between high language proficiency and lower wages within the low-skilled segment that disappears when controlling for occupational position. The reason for this correlation may be that low-skilled jobs with lower demands for language proficiency have higher wages, consider for example construction workers with decent pay but little need for skills in German. Furthermore, those with high levels of proficiency that are still within the low-skill segment may generally be less able than those who became proficient and found occupations with higher skill requirements. It may also be the case that there are certain immigrant enclaves where receiving work is not conditional on German language proficiency, thus allowing for relatively high earnings with no German skills. Thus, the negative estimate for improving language proficiency within low-skill sectors in Table 9 is most likely not causal, but rather represents compositional effects.

Table 10: OLS Regression: Interaction Effects

	(1)	(2)	(3)	(4)
Language	0.0579***	0.0289*	0.0224	0.00923
	(0.0172)	(0.0147)	(0.0176)	(0.0210)
Language Female	−0.0361			−0.0125
	(0.0273)			(0.0279)
Language Refugee		0.158**		0.169***
		(0.0613)		(0.0621)
Language			0.0708**	0.0818***
High-skill			(0.0286)	(0.0294)
Language			0.0704	0.0798
Other-skill			(0.0697)	(0.0696)
Age	0.0349***	0.0354***	0.0348***	0.0354***
	(0.00548)	(0.00548)	(0.00547)	(0.00548)
Age, squared	−0.000640***	−0.000646***	−0.000638***	−0.000646***
	(0.0000646)	(0.0000648)	(0.0000646)	(0.0000646)
Education	0.0219***	0.0213***	0.0217***	0.0213***
	(0.00306)	(0.00305)	(0.00306)	(0.00306)
Experience	0.0443***	0.0443***	0.0442***	0.0443***
	(0.00209)	(0.00209)	(0.00209)	(0.00209)
Experience,	−0.000413***	−0.000413***	−0.000413***	−0.000413***
squared	(0.0000530)	(0.0000530)	(0.0000529)	(0.0000530)
YSM	0.0170***	0.0171***	0.0170***	0.0170***
	(0.00199)	(0.00199)	(0.00199)	(0.00199)
YSM, squared	−0.000242***	−0.000239***	−0.000242***	−0.000240***
	(0.0000420)	(0.0000420)	(0.0000420)	(0.0000420)
Female	−0.204***	−0.231***	−0.232***	−0.220***
	(0.0330)	(0.0239)	(0.0240)	(0.0335)
Married	0.0148	0.0144	0.0135	0.0148
	(0.0197)	(0.0197)	(0.0197)	(0.0197)
Married Female	−0.180***	−0.178***	−0.177***	−0.179***
	(0.0271)	(0.0271)	(0.0271)	(0.0272)
Constant	5.679***	5.688***	5.713***	5.709***
	(0.105)	(0.105)	(0.106)	(0.106)
Year	*Yes*	*Yes*	*Yes*	*Yes*
Country of Origin	*Yes*	*Yes*	*Yes*	*Yes*
Occupational Position	*Yes*	*Yes*	*Yes*	*Yes*
Observations	13743	13743	13743	13743

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

$Ln(Y_{it}) = \alpha + \beta Language_{it} + \delta_i + \theta_t + \gamma_{it} + X_{it} + W_{it} + u_{it}$

Language Female, Language Refugee, Language High-skill, and Language Other-skill are all interaction terms.

IV Approach

In Table 11, we use the IV regressions of leads and lags, and father's education, from previous regressions, this time including all the interaction terms from Table 10. The estimated coefficients for language for low-skilled males that are not from a refugee country are statistically significant when using father's education or leads and lags combined as instruments – in the other specifications the estimate is close to zero and not statistically significant. When using father's education as an instrument, the estimate becomes negative, something which is most likely due to the compositional effects mentioned previously in the OLS regression in Table 10. In other terms, when not controlling for occupational position,

those who are language proficient but remain in low-skill sectors are the least able, and there may also exist low-skill occupations which pay more and require less language proficiency. This result may also suggest that it is not the improved language proficiency per se that improves earnings, but rather that language proficiency in combination with other human capital contribute to being able to enter high-skill work. Thus, language proficiency may be an important factor for improved earnings, but it is not sufficient.

The overall directions of the interaction effects for different skills are similar to the previous OLS regression in Table 9, with high-skill individuals having substantially higher returns to improved language proficiency compared to low-skill individuals. Regarding the returns for females and individuals from refugee countries, the estimates are not statistically significant, with large standard errors. Thus, no conclusions about those estimates can be drawn from this regression. It is also important to mention that the F-statistic for the instrument is relatively low in this specification, suggesting that there is a relatively low correlation between the instrument and our independent variable, and that there is a risk of the instrument not being relevant. Additionally, the instrument may not accurately represent heterogeneous language effects if for instance father's education affects language proficiency heterogeneously between groups. For example, if it accurately represents the language proficiency for high-skill workers but not for the low-skilled or vice versa, the results may not be as comparable.

For the lead and lag specifications, the estimate for low-skilled workers is positive, but only statistically significant when using both leads and lags. The reason for this positive estimate may be because observations are systematically excluded. Those who remain in the sample are those who have at least three observations, and they may differ from those who are excluded. For instance, they may have had more time to improve their earnings. Additionally, the risk of attrition bias may potentially affect the estimates more than in the OLS regressions when observations are excluded.

Despite the difference between the results for low-skilled individuals when using leads and lags in columns 1-3 and the OLS regression in column 4 of Table 9, high-skill workers show consistent statistically significant higher returns in all three specifications. Furthermore, females show a lower return than males, although it is only barely statistically significant on the 10%-level in column 3 when using both leads and lags. When using either instrument separately, the estimate is not significant. Those who we have classified as refugees have a much larger return compared to those we have classified as non-refugees. However, the estimate is only statistically significant in column 3. The estimate in column 3 is also much larger than the previous estimate in the OLS regression and the reason may be that the excluded

observations using leads and lags is not random, as mentioned above. This in turn suggests that those who have arrived from refugee countries earlier have higher returns. The reason they have higher returns may for instance be due to the fact that they were more able or had more economic considerations when migrating. It may also be because they have had more time to improve their earnings after having become proficient, leading to a larger discrepancy between those who are not proficient and stuck in low-skill work and those who became proficient and have successively improved their earnings. It may also be plausible that those who are from refugee countries have larger idiosyncratic measurement errors compared to other groups, and thus eliminating that effect leads to a larger increase of the estimate. It is implausible that this effect will be as large as the effect we see in our estimates however, and so it is more likely that the main reason is compositional effects.

Table 11: IV Regression: Interaction Effects

	(1) Lag	(2) Lead	(3) Lag+Lead	(4) Father's Education
Language	0.0183	0.0351	0.173**	−0.353***
	(0.0738)	(0.0736)	(0.0837)	(0.129)
Language Female	−0.116	−0.0593	−0.238*	0.181
	(0.107)	(0.105)	(0.130)	(0.130)
Language Refugee	0.445	0.555	0.742***	0.183
	(0.379)	(0.361)	(0.0725)	(0.537)
Language	0.424***	0.429***	0.292***	0.588***
High-skill	(0.0337)	(0.0349)	(0.0422)	(0.0418)
Language	0.353***	0.348***	0.303***	0.316***
Other-skill	(0.0678)	(0.0751)	(0.0884)	(0.0610)
Age	0.0445***	0.0254*	0.0172	0.0309***
	(0.0141)	(0.0136)	(0.0192)	(0.00838)
Age, squared	−0.000785***	−0.000538***	−0.000458**	−0.000657***
	(0.000161)	(0.000157)	(0.000215)	(0.0000955)
Education	0.0648***	0.0649***	0.0819***	0.0699***
	(0.00669)	(0.00687)	(0.00818)	(0.00411)
Experience	0.0557***	0.0531***	0.0558***	0.0543***
	(0.00508)	(0.00496)	(0.00631)	(0.00329)
Experience,	−0.000465***	−0.000470***	−0.000473***	−0.000567***
squared	(0.000123)	(0.000117)	(0.000146)	(0.0000870)
YSM	0.0222***	0.0231***	0.0391***	0.0194***
	(0.00633)	(0.00621)	(0.00983)	(0.00417)
YSM, squared	−0.000328***	−0.000335***	−0.000662***	−0.000203***
	(0.000120)	(0.000119)	(0.000182)	(0.0000692)
Female	−0.118	−0.212*	−0.0428	−0.386***
	(0.112)	(0.110)	(0.145)	(0.113)
Married	0.0927*	0.0745	0.133*	0.132***
	(0.0515)	(0.0517)	(0.0725)	(0.0294)
Married Female	−0.190***	−0.200***	−0.213**	−0.240***
	(0.0695)	(0.0702)	(0.0961)	(0.0401)
Constant	5.230***	5.633***	5.376***	5.715***
	(0.282)	(0.278)	(0.403)	(0.184)
Year	*Yes*	*Yes*	*Yes*	*Yes*
Country of Origin	*Yes*	*Yes*	*Yes*	*Yes*
Observations	2663	2656	1321	7193
F-statistic	28.781	56.557	33.981	8.216

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

First Stage: $Language_{it} = \pi_0 + \pi_1 z_{it} + \delta_i + \theta_t + X_{it} + W_{it} + v_{it}$

Outcome: $Ln(Y_{it}) = \alpha + \beta \widehat{Language}_{it} + \delta_i + \theta_t + X_{it} + W_{it} + u_{it}$

Language Female, Language Refugee, Language High-skill, and Language Other-skill are all interaction terms.

Although our estimates vary considerably in the estimated size of the effect of increasing language proficiency, they generally show a large return. Furthermore, the increased size of the estimate in our IV regressions indicate that the OLS estimates may be biased downwards. This is consistent with previous research which has found that IV estimations are usually larger than the ones obtained by OLS, in turn suggesting that the downward bias from measurement errors are larger than the potential upward bias from omitted variable bias and reverse causality (Dustmann & van Soest, 2002; Dustmann & Fabbri, 2003; Bleakley & Chin, 2004).

Discussion

The results in the previous section suggest that there are positive returns to language proficiency for immigrants. This conclusion is in line with previous research, indicating large returns to improved language proficiency. We find no evidence of gender differences, as the effect is only statistically significant, at a 10%-level, when using leads and lags as instruments and in the OLS regression in Table 9 when controlling for all interaction factors. They also indicate opposite directions, with the lead and lag combination suggesting a negative return, and the OLS a positive return. Furthermore, we have identified that the improvement of earnings is mostly due to the possibility to change jobs, rather than through improved productivity within a specific occupation. This supports the conclusion by Chiswick and Miller (2013). Lastly, refugees seem to have larger returns to language proficiency than economic migrants.

Regarding the overarching conclusions about the returns to language proficiency, one can note that the size of the general estimated returns to language proficiency differs significantly. The OLS regression suggests a return of 14.5%, while the IV results vary from 21.4% to 59.5%. This is higher than the estimates presented by Dustmann and van Soest (2002), who found a circa 5% return in their OLS regression and around 14% when using both father's education, and leads and lags as instruments. One potential explanation for this may be that the composition of our sample face higher returns to improving their language proficiency than previous compositions, which in turn may be because there is a higher share of refugees in our sample.

Another reason may be that the German labour market has improved remarkably during the latter years, as we have explained previously in this paper. The Hartz-reforms leading to improved labour market flexibility is likely to have benefitted immigrants. If employers are uncertain about immigrants' productivity, and the immigrants who have poor language skills cannot effectively use their old human capital, increased flexibility will most likely lead to increased employment of immigrants. However, they will be employed at low wages, such as in marginal employment. Thus, the difference between those immigrants who become proficient in the language, and enter higher level occupational positions, and those who do not may be larger. This in turn would lead to our estimates suggesting a more positive effect of improving one's language skills. In other terms, the returns to language proficiency are higher given that you are already employed, as we are not analyzing the effects on unemployment.

Despite our results showing large returns, one should be careful to refer to a specific size of the return, as there is a considerable risk of biases skewing the results. The variation in the size of the estimated effect between the different regressions in this paper is most likely due to the fact that there are a multitude of unobserved factors affecting earnings and language proficiency – an inherent issue in trying to estimate the returns of language proficiency. There are also potentially substantial measurement errors due to the data being self-reported. When using methods to alleviate these problems, our results have indicated that the OLS estimates may underestimate the true effect of improved language proficiency, as all IV specifications show an increased size of the estimated effect.

Regarding the potential heterogeneity between the returns to language proficiency for genders, the regressions show no evidence of any differences. The estimates are regularly somewhat lower for females, although the difference is not statistically significant in most of the specifications. In column 4 of Table 9, females even have statistically significant higher returns. Thus, our conclusion is different to the one made by Dustmann and van Soest (2002), who find that females have lower returns compared to males. Dustmann (1994), on the contrary, finds females having returns that are a few percentage points higher, although the difference is very small and not statistically significant.

The results in this paper also indicate that the returns to improving one's language is larger for refugees, strengthening the hypothesis that part of the difference between the results of Dustmann and van Soest (2002) and this paper may be due to a larger share of refugees in our sample. Worth to mention is the fact that the coefficient for the return for refugees was not statistically significant using father's education and had very large standard errors, perhaps due to too little variation when using the instrument or the instrument being poor for analyzing the returns for refugees. Overall, the results suggest that there are larger returns for refugees, which in turn would mean that there are larger economic incentives for refugees to learn the language of the destination country compared to other migrants. At the same time, countries with a large share of refugees in our sample have a high linguistic distance, and so their efficiency in learning the language is probably lower. Therefore, although the benefits of learning the language may be higher, the associated costs may be so too.

There may be several reasons for why the returns to acquiring good language skills are higher for refugees than for other immigrants. Refugees generally have other reasons for their migration compared to economic migrants, where non-economic considerations are more prevalent (Dustmann et al, 2017). Thus, refugees may have less knowledge and plans regarding how to enter the labour market. Being proficient in the language may therefore help them match

with a relevant employer, for example through more efficient job search (Adserà & Pytlikova, 2016). There is also a possibility that employer preferences, and by extension the consumer preferences, are not beneficial to refugees. In other words, there may be discrimination against refugees, especially since they tend to come from culturally distant countries. Possibly, language proficient refugees are seen as more integrated compared to those who have not learnt the language, causing refugees to have a higher need of signalling that they are willing to integrate compared to other migrants. However, it is important to note that there may also be selection bias in play, in terms of an overrepresentation of the more able refugees learning the language. This may therefore skew the results in a positive direction, as the ones who are becoming proficient are also more productive in general.

Another important aspect of the results is the fact that the potential increase in earnings from improved language proficiency decreases from 14.5% to 4.3% in the OLS specification when controlling for occupational position. Similarly, in the IV regressions using father's education and leads and lags, controlling for occupational position also reduces the effect of the returns to language proficiency, and there is no statistical significance. Hence, the returns to improved language proficiency within occupational positions is much smaller than between them. This indicates that people improve their earnings by changing jobs to higher paying positions, rather than through improving productivity and getting a raise within their current position. However, this seems to be true mostly for low-skill work, as our OLS estimates show that even when controlling for occupational position, the returns to high-skill work is positive. In other terms, the return to improved language proficiency is differentiated between occupational positions. Part of the difference between occupational positions is because refugees predominantly work in low-skill sectors but have high returns to improved proficiency as noted above, thereby overestimating the returns to low-skill work.

In combination, the results from both the OLS and the IV regressions all suggest a larger return to language proficiency for high-skill workers compared to low-skill workers. This indicates that high-skill jobs have a higher premium for improved proficiency than low-skill jobs. Furthermore, those who are in low-skill occupational positions seem to improve their earnings through moving to high-skill jobs when improving their language proficiency. This is in line with the conclusions by Chiswick and Miller (2013) that the largest increase in earnings due to increased language proficiency is through switching into jobs with higher skill requirements, and Berman, Lang, and Siniver (2003) who find no returns to fluency within low-skill sectors.

Also, as previously mentioned, in a survey of German employers, only 50% of the employers of low-skill workers claimed that good language skills are required, while 90% said the same for high-skill workers (OECD, 2017). This illustrates that many low-skill jobs may function independently of language proficiency, in turn indicating that there will be lower returns to language proficiency within low-skill work compared to high-skill work, consistent with the results in this paper and previous research. The result of the survey is also consistent with theoretical intuition, as it is likely that a high-skill worker can benefit more from increased language proficiency since social skills may be more important compared to many low-skill jobs with less social interaction. Furthermore, the larger spread of salaries in high-skill sectors might be part of the explanation for high-skill workers having higher returns (The Balance Careers, 2018), as the possibility to be promoted and thus increase earnings within one's occupational position may be higher.

Another important aspect of our results is that the estimates show negative returns to language proficiency in low-skill work. This may be due to a number of different reasons discussed previously in this paper, and both the fact that there are occupations without a need for language proficient workers and the lower salary spread are likely to be part of the cause. It also suggests that there are people who become stuck in low-skill work, even when having improved their language proficiency. Therefore, language proficiency in itself is not necessarily sufficient in order to improve earnings, but rather improves the possibility to do so. This is consistent with previous theory regarding language proficiency, suggesting that it is an important complementary for other human capital (Chiswick & Miller, 2003). In other terms, without other necessary human capital, language proficiency will not lead to large increases in earnings.

Limitations

There are several limitations associated with the identification strategy regarding the returns to language proficiency on earnings. We have attempted to use methods which have been used in previous research to mitigate some of the associated problems, but there will always remain uncertainty regarding the reliability of the results. Despite this uncertainty, our results show statistically significant positive returns to improved language proficiency, although the true size of the returns is difficult to pinpoint. With additional data availability, there may have been other instruments which could have been used in the regression. For instance, we attempted to use the language of the questionnaire as a source of exogenous variation, but the necessary data

was unavailable. Furthermore, the critical-age instrument used in previous literature was not possible to use due to the relatively short and recent time period in our sample. Apart from using IV methods as a way to solve the issues associated with the estimations, some form of natural experiment could also be used, as it would remove a large part of the unobserved heterogeneity inherent in our analysis. Using more objective measures of language proficiency rather than self-reported data would also aid the analysis, and potentially allow for panel data methods, as the large measurement errors make random effects and fixed effects unsuitable.

We have performed this analysis using monthly gross labour earnings when estimating the return to increased language proficiency. This could potentially lead us miss out on a few aspects. Our analysis only estimates the private economic return to improving one's language skills once employed, and not the effect of becoming employed. As unemployed individuals are excluded from the sample, the actual private economic returns to improved language proficiency might be higher than estimated, as some individuals go from unemployment to employment or improve their chances of keeping a job. Therefore, it would also be of interest to analyze the effects of better language skills on employment rates. Additionally, some of the individuals might have other forms of income in combination with their regular income, such as benefits, that in some cases decreases when labour earnings increase, decreasing the incentives to improve their language proficiency in order to increase their labour income. Since the analysis is based on gross income, the effect of taxes is also disregarded. A progressive labour income tax scale, as applied in Germany (Your Europe, 2019), leads to the return in terms of net income being lower than for gross income, decreasing the economic incentives to learn the language.

Additionally, as we have only looked at the private economic return in terms of gross labour earnings, there are most likely several other positive factors apart from economic incentives that may be associated with improved language skills. For instance, as mentioned in the introduction, increased exposure tends to lead to improved language skills. Thus, there may be positive externalities associated with an individual learning the language, as that person will expose others to the language and hence contribute to improving their skills. There are most likely also positive social effects of being able to communicate efficiently with native speakers as well as participating in democratic processes and other parts of society. The positive societal impact of improved language proficiency among immigrants is therefore probably higher than the mere economic return examined in this paper, further emphasizing the importance of improving language proficiency in order to improve labour market integration.

Conclusion

This study shows that there are considerable returns to language proficiency for immigrants in Germany. The results are in line with previous research in the field and suggest that although the demographics of immigrants has changed in recent years, the conclusions are similar. However, the estimates illustrate higher returns in general, potentially due to a larger share of refugees in the sample. With a standard OLS regression, there is an estimated 14.5% return to becoming proficient in German, in terms of labour earnings. For the IV specifications, the estimated effects are higher, between 21.4% to 59.5%, indicating that the true effect may be larger than the OLS regression shows. Improving language proficiency is therefore an important part of immigrant labour market integration, in terms of achieving higher earnings. We find no evidence for different returns between genders. The channel for increased earnings primarily seems to be through switching to positions with higher language skill requirements, and thus higher earnings, rather than through improving productivity within the current occupation. The results are hence consistent with the theory of human capital, indicating that language proficiency is needed in order to be able to utilize other parts of one's human capital more efficiently. Language proficiency is therefore an important complementary to other forms of human capital.

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Appendix

Table A1: Linguistic Distance

	Linguistic Distance
Dutch	48.83
Danish	68.07
Macedonian	88.94
Serbo-Croatian	91.56
Croatian	91.98
Persian	92.89
Albanian	95.68
French	95.73
Greek	96.75
Arabic	98.93
Turkish	99.97
Tigrinya (Eritrea)	100.31

Table A2: People Seeking Protection (2010-2017)

	Total Migration	Seeking Protection	Share Seeking Protection (percent)
Afghanistan	226465	189075	83.49
Albania	41125	15880	38.61
Eritrea	62200	51070	82.11
Iran	74825	47425	63.38
Iraq	191085	141820	74.22
Nigeria	44845	25945	57.85
Pakistan	56245	29305	52.1
Russian Federation	98325	30735	31.26
Somalia	36140	28320	78.36
Syria	678480	495040	73.96