MARRY ONE TO BE ONE:

THE EFFECT OF ASSIMILATION ON IMMIGRANTS' WAGES

by

Aida Odobasic

A dissertation submitted to the Faculty of the University of Delaware in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Economics

Summer 2017

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ACKNOWLEDGEMENTS

I am grateful to be where I am today and I want to thank all the special people in my life who inspired me and supported me along the way with their friendship, love, knowledge, and care. They say it takes a village to raise a PhD.

I would like to express my sincere gratitude to my advisor, Dr. Saul D. Hoffman, for being an inspirational professor and an outstanding mentor. Dr. Hoffman provided guidance, time, and effort throughout the last five years and offered invaluable advice in my research, career, and life. I would also like to thank the members of my dissertation committee, Dr. Evangelos M. Falaris, Dr. Sabrin Beg, and Dr. Jeffrey B. Miller for their time and valuable insight.

A huge thank you to University of Delaware, Hood College, United World College in Mostar, and to Mr. Shelby Davis and Mr. Phil Geier, as well as to Shelby Davis United World College Scholars Program.

I am thankful to all my teachers and professors who supported and inspired me throughout the years. In particular to my Hood College professors, Dr. Joseph E. Dahms, Dr. Sang Kim, and Dr. Ann Stewart, who inspired me to pursue research and graduate school; my United World College in Mostar economics professor, Dr. Peter Gardner and my house-mom, Ivana Knjezevic; and my first mathematics teacher, Milka Sevo.

I have been blessed to be surrounded with caring and supportive friends who became my family: my American families Denton, Manno, Rababe, and Cooper, my friends Sezin Zengin, Suzan Rababe, Ozkan Haykir, Samet Ozturk, Charlene and David Denton, Sandy Manno, Bernadette Kooi, Natallia Cherashneva, Zofia Maka, Genta Menkulasi, Valentine Polii, Christian Arya Winata, Snjezana Barisic Arthur, William Gregory, Harris Smoak, Denisse Guitarra, Zhe Zoe Chen, Atena Sadeghi, Steve Nkurlu,

Blythe Milbury-Steen, Dennis McKinney, John Bockrath, Jenna Toussaint, Ekaterina Karpov, Allyson Blizman, Kawin Thamtanajit, Kievina Haynes, Andra Hiriscau, Dino Sulejmanovic, Nilsa Gonzalez, Young-Eun Kim, Nikolina Talijan, Nermin Zubaca, Yichen Xu, Chao Wu, Tamara Miljatovic, Laura Ashlstorm, Sasiya Supprakit, and Djoshkun Shengjuler.

I also want to mention families Odobasic, Sinanovic, Muftic, Tahirovic, Kovac, Vehabovic, Lovic, Softic, Maglic, Halilovic, Ibrahimbegovic, and Sabic.

My mother, Azra, is my role model in life and she inspires me on a daily basis. She is the one who gave me wings and told me that I can accomplish whatever I set to do in life. I am forever grateful to have her as my mother. My sister, Dijana, is the one person who can always make me laugh. I am happy to have her and her husband, Faruk, as well as my uncle and aunt, Jasmin and Sanda Tahirovic, and their wonderful sons, Ervin and Haris, here in the United States - it is good to have members of your family living on the same continent! I am also thankful for the support, encouragement, and love from Mirsada, Mirsad, and Samir Sinanovic.

I am also thankful to Deborah Sharpley, who is one of the kindest people I know and who provided so much help from the first day I came to Newark's campus. I would also like to thank, Dr. James L. Butkiewicz, the chair of our department for giving me the opportunity to teach as a graduate student and to continue teaching at the UD starting in August of 2017.

During the last five years I lost two important people in my life, my father, Tahir, and Mr. Mark J. Manno whose family accepted me as one of their own. I am happy they were part of my life.

At the end, I would like to dedicate this work to my fiancé, Senad Sinanovic. We are high school sweethearts and we went to Hood College together. For the last five years we were living about 650 miles apart (both getting our PhDs in Economics) and still he was the integral part of my every day. I would not be who I am today without his love and support.

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ABSTRACT

Successful assimilation of immigrants into their host country improves immigrants' labor market outcomes and consequently benefits the host country. I use marriage between an immigrant man and a German woman (intermarriage) as a measure of assimilation. Married immigrant men might benefit even more from intermarriage than either single men or those married to other immigrants through legal benefits, host-country-specific human capital spillovers, network externalities, and improved access to capital markets. I use the German Socio-Economic Panel to estimate the effect of intermarriage on immigrant men's wages. After controlling only for observables, I find that the additional benefit of intermarriage is 4 percentage-points, whereas, this benefit increases to 12.9 percentage-points once I correct for endogeneity, self-selection, and reverse causality using an instrumental variables approach. I also study the determinants of intermarriages, characteristics of partners and assortative matching in both types of marriages. The finding in this paper that increasing immigrants' association with Germans benefits immigrants' wages and consequently the economy is important for policy makers.

Chapter 1

INTRODUCTION

Successful assimilation of immigrants into their host country improves immigrants' labor market outcomes and consequently benefits the host country. In 2015, more than 15 percent of the German population was foreign born and the number increases to 20 percent when children of those foreign born are included (Rietig and Müller, 2016). At the same time there is an increasing trend of immigration to Germany, its net immigration was 1.14 million immigrants in 2015 which is 1.4 percent of the total population[1] (Statistisches Bundesamt, 2016). Thus, immigrant assimilation is becoming more important for policy makers. Measuring assimilation is difficult since assimilation involves the adoption of both formal, i.e. laws and regulations, and informal, i.e. culture, customs, and language, institutions. Previous literature mainly focuses on language as a proxy for assimilation (Chiswick, 1978; Meng and Meurs, 2009), ignoring the multidimensionality of assimilation.

Another approach, adopted recently, is the use of marriage as a vehicle of assimilation (Meng and Gregory, 2005; Furtado and Theodoropoulos, 2009; Chi and Drewianka, 2014). There is ample evidence of benefits associated with marriage for men including the spousal division of labor, joint consumption of goods and services, and higher earnings (Hoffman and Averett, 2010). Furthermore, immigrant men married to German women reap all the traditional benefits of marriage as well as the extra benefits of being married to a native spouse, such as legal benefits, host-country-specific human capital spillovers, network externalities, and improved access to capital markets. For example, receiving permanent legal status in the host country would allow

[1] In 2015, the German population was 82.2 million.

an immigrant to have a stronger bargaining position in wage negotiations because obtaining it allows mobility and opens up more employment opportunities; being fluent in a host-country language is a key feature needed to succeed in the job market, and the native spouse would foster this fluency. Therefore, in this dissertation, I: i) present a comprehensive literature review on theoretical and empirical work on marriages and marriages between a native and an immigrant, from now on defined as intermarriage[2], ii) present new evidence of the effects of intermarriages on immigrant men's wages, and iii) study the factors that increase the odds of intermarriage as well as assortative matching of inter- and intra- married couples by age, education, employment, and wage.

My analysis is based on data from the German Socio-Economic Panel (SOEP), a wide-ranging representative longitudinal study of households from 1984 to 2015, conducted by the German Institute for Economic Research, DIW Berlin. The IAB-SOEP is a household survey conducted jointly by the Institute for Employment Research (IAB) in Nuremberg and the German Socio-Economic Panel (SOEP) at DIW Berlin. Starting in 2013, the special IAB-SOEP Migration Sample was added to the original SOEP, and I have it for years 2013 and 2014. IAB-SOEP includes all standard SOEP questions along with extended migration histories. This is an especially rich source of data on immigrants and assimilation for Germany, a country that is a major European immigrant destination. I use aggregate statistics from the German Federal Statistical Office (Statistisches Bundesamt) to construct instruments.

In Chapter 4, I present my analysis of the effects of intermarriage on immigrant men's wages in Germany. My sample consists of 17,798 person-year observations from 3,120 immigrant men age 20–65 who are full-time employed. About 15 percent of these men are single, 12 percent are married to a German woman, and 73 percent are married to an immigrant woman. Estimating the effects of intermarriage on wages using ordinary least squares (OLS) suffers from endogeneity, self-selection, and reverse

[2] Marriages between immigrants and Germans account for 11.2 percent of the total married population (Lanzieri, 2012).

causality. These problems arise due to the inability to control for unobservable characteristics that might affect both marital status and wages such as physical appearance, communication skills, creativity, diligence, intelligence, loyalty, and dependability, as well as the fact that higher wages might make men more desirable marriage partners and increase the probability of intermarriage. I address these issues using an instrumental variables approach. I use two instruments i) the ratio of immigrant females to native females (the female ratio), and ii) the ratio of immigrant females to immigrant males (the sex ratio). The former is the relative supply of immigrant women from a particular country in a given state and year, and the latter is the level of competition among immigrant males for females from the same country in a given state and year. Additionally, in the regressions, I control for state and year fixed effects to account for possible correlation between wages and instruments arising from immigrants settling in states with higher wages. I employ a modified version of two-stage least squares (2SLS) to estimate the causal effect of the inter- and intra- marriage on wages. Instead of using a non-linear estimator such as a multinomial logit in the first stage and falling into the 'forbidden regression' trap, a term coined by Jerry Hausman in 1975, I use Heckman's (1978) approach that is more efficient than standard 2SLS when endogenous variables are discrete (Wooldridge, 2002; Angrist and Pischke, 2008).

I find that immigrant men married to German women, on average, annually earn € 40,679, while those married to immigrant women, earn, on average, € 33,799, which is € 6,880 or 23.3 percentage-point less - a substantial and statistically significant difference. Even after controlling for observables: education, experience, years since immigration, state and year fixed effects, and accounting for possible self-section, reverse causality, and endogeneity using instrumental variables, I find that the intermarriage premium is 44.4 percent, while the intramarriage premium is 31.5 percent. Hence, the additional benefit associated with intermarriage is a 12.9 percentage-points wage increase. My result is robust because of i) adding controls for geographic regions of origin, immigration cohorts, occupation, and industry; ii) excluding native German speakers from the sample, and iii) redefining the sample to include only those singles who were

never married in the past. Thus, my findings are important for policymakers since I show that strong association with Germans benefits immigrants and subsequently the economy.

In Chapter 5, I study determinants of intermarriage, spouses' characteristics, as well as the level of assortative matching that happens in two types of marriages. Determining the levels of positive or negative assortative matching is a potential way of teasing out the mechanism by which intermarriage affects the wage. For example, if the main reason why immigrants marry Germans is to get legal status in the country, one would expect that spousal characteristics would not matter and that the German spouses would likely be older, less educated, and less involved in the labor market than immigrant spouses, but I find contrary evidence. Another interesting observation is that positive assortative matching by education is more likely in intramarriages than in intermarriages. To my knowledge, there is no work that has linked assortative matching by age, experience, employment, and wage to the potential mechanisms by which intermarriage affects the wage, and I believe this to be an important avenue of further research.

Furthermore, I find that the main determinant of the marriage type is education: better-educated immigrant men and German women are more likely to intermarry than those with lower levels of education. When comparing German and immigrant spouses, I find that German wives are on average younger, better educated, more likely to be in the labor market and earn, on average, € 9,805 more than their immigrant counterparts. Additionally, I find that: i) in both inter- and intra- marriages there is evidence of positive assortative matching by age, ii) positive assortative matching by education is more likely in intramarriages than in intermarriages , iii) negative assortative matching by employment is more likely in intramarriages than in intermarriages, and iv) there is strong negative assortative matching by labor earnings in both intermarriages and intramarriages. This evidence that German women who marry immigrants are in fact superior when it comes to observables (compared to their immigrant counterparts) is contrary to intuition.

The findings in my dissertation contribute to the literature that uses marriage to measure immigrants' assimilation by providing new evidence from Germany that suggests that intermarriage is highly beneficial to immigrant men. The previous literature has studied men's intermarriage premiums in Australia, France, and the U.S. (Meng and Gregory, 2005; Meng and Meurs, 2009; Chi and Drewianka, 2014) but not in Germany. Besides providing evidence of the positive effects of intermarriage on wages, I also contribute to the literature by providing novel evidence on partners' characteristics and on the level of assortative matching in both types of marriages. This is the first step in understanding the mechanisms behind the intermarriage premium. Finally, I contribute to the literature by providing a comprehensive and updated survey of the marriage and intermarriage literature.

The organization of the dissertation is the following: Chapter 2 provides migration trends and legal background, Chapter 3 provides an overview of the theoretical and empirical literature on marriage and intermarriage, Chapter 4 provides the evidence of the effect of intermarriage on wage, Chapter 5 introduces the determinants of intermarriage, and assortative matching and a conclusion is given in Chapter 6.

Chapter 2

MIGRATION AND INSTITUTIONAL BACKGROUND

2.1 Trends of Migration to Germany from 1950s to Present

Figure 2.1 shows immigration, emigration, and net migration in Germany from 1950 to 2014. Over this period, net migration was predominantly positive and it has been constantly increasing since 2010. In 2015 (not shown on the Figure 2.1) Germany experienced the highest historical net immigration, totalling 1.14 million. To put these numbers in perspective, more than 15 percent of the German population is foreign-born and the number increases to 20 percent when children of those foreign born are included (Rietig and Müller, 2016).

Germanys population is aging and its birth rate is declining (1.5 births per woman) and this can lead to a disruption of the economy, slow economic growth, fiscal imbalances, and the breakdown of the social security system. Immigrants can potentially solve some of these issues, if they are well assimilated in the German labor market and German society. In order to better understand migration to Germany since the Second World War, Schmidt and Zimmermann (1992) divide it into four phases: war adjustment (1945–54), manpower recruitment (1955–73), consolidation or restrained migration (1974–1988), and dissolution of socialism and its aftermath (since 1988).

In the first phase, the war adjustment (1945–54), 8 million Germans came to the Federal Republic of Germany because they were either expelled or forced to leave countries of Central and Eastern Europe (CEEC) (Schmidt and Zimmermann, 1992). After this post-war migration, about 4 million ethnic Germans stayed in the countries of (CEEC), most of them in Poland, Romania, and the former Soviet Union. During this

period and before the erection of the Berlin Wall in 1961, about 2.6 million Germans moved from East to West Germany (Bauer, Dietz, Zimmermann and Zwintz, 2005).

In the second phase, the manpower recruitment (1955–73), Germany had a high economic growth, low unemployment rate (2.6 percent in 1959), and a shortage of low-skilled labor, and as a result, Germany started recruiting guest workers. The recruitment treaties were signed with Italy (1955), Greece (1960), Spain (1960), Turkey (1961), Morocco (1963), Portugal (1964), Tunisia (1965), and Yugoslavia (1968) (Bauer et al., 2005). The idea was that these workers will stay and work in Germany temporarily, until they are no longer needed, and that they will return to their home countries afterwards. Their residence and work permits were issued for one year. Over this time period, the foreign population of Germany increased eightfold, from half million to about 4 million in 1973.

The third phase, the consolidation or restrained migration (1974–1988), began in 1973 when the German government ordered the immediate halt of the recruitment of guest workers due to the fear of recession because of the 1973 oil crisis. Thus, the labor recruitment ended in 1973, but chain immigration continued, since guest workers were bringing in their families and children of immigrants were bringing in their future spouses. During this time period, the number of illegal immigrants rose significantly (Zimmermann, 1994).

The fourth phase of migration to Germany was triggered by a political changes in the East and began in the late 1980s. This period is marked by the fall of the Berlin Wall in 1989, East-West migration, and the arrival of refugees and asylum seekers. East-West migration involves migration of people from former socialistic countries. Prior to 1993, asylum seekers and refugees were not allowed to work until their application was approved or denied, which could last several years; since 1993 they have been allowed to work, but their employment possibilities are restricted (Bauer et al., 2005). In recent years, asylum seekers from the Middle East, with Syrians at the forefront, constitute the major group of immigrants to Germany. Thus, prior to 1973 immigrants to Germany were either ethnic Germans or guest workers, while the post-1973 period is marked by

chain migration, East-West migration, refugees and asylum seekers.

2.2 Institutional Background

In this section, I summarize laws and regulations governing German citizenship, residence titles, and the treatment of foreigners. I will summarize the key articles of the Basic Law (the constitution), the Nationality Act and its extension, Residence Act, the Act of the General Freedom of Movement for European Union (EU) Citizens, the European Economic Community (EEC) and Turkey Agreement, and the 2012 Recognition Act. I will focus on temporary and permanent legal ways of living and working in Germany, rights associated with marrying a German national or permanent resident of Germany, integration efforts of the German federal government, and the treatment of children born to immigrant parents. Understanding the institutional background is important since one of the benefits of intermarriage are legal benefits.

The German Constitution is called the Basic Law and in Article 116 it defines that being German means having German citizenship and it also includes a provision for ethnic Germans, their spouses, and their descendants. By German Constitution, lineage is the key in determining ethnicity, not the place of birth. Thus, those who are born outside the country, but are ethnic Germans, and their spouses and descendants, have the right to German citizenship. Unlike the United States, Germany generally does not grant citizenship by birth, unless at least one parent is German or at least one parent had legal residence in Germany for a minimum of eight years, as explained in the reform of Nationality Act that became effective in January of 2000.

The major changes to the citizenship and naturalization laws came into effect in January 2000. The key changes included streamlining long-term residents path to citizenship and granting the claim to German citizenship to the children born in Germany to one German parent or to long-term residents. Under the new law one can become German citizen by birth (conditional on parents status), by naturalization, or by lineage for those born outside Germany, but to ethnic Germans. Ethnic Germans from Eastern Europe and former USSR states can claim citizenship under the Right of

Return. A child born to at least one German parent, or a child under 18 adopted by German citizen is automatically granted German citizenship. Since 2000, children born to foreign parents are also granted German citizenship at birth if at least one parent lived legally in Germany for at least eight years.

Long-term residents can acquire German citizenship, i.e. become naturalized, if they had legal residence in Germany for eight years, if they are proficient in German, and if they accept the law of the country. If they take an integration course, they can get naturalized after seven years of legal residence. Marrying a German reduces the conditional residence time period before getting naturalized to three years. The Residence Act describes this in more detail and I will summarize it in the following paragraphs.

The Residence Act was passed in the German Federal Council in July 2004 and went into effect in January 2005. The purpose of the act is i) to control and restrict the arrival of foreigners into Germany, ii) to organize immigration with the economy and labor market interests in mind, and iii) to fulfill Germanys humanitarian duty. The Residence Act clearly regulates the entry, stay, and economic activity of foreigners and their integration. This Act does not apply to foreigners whose legal status in Germany is regulated by the Act on the General Freedom of movement for EU Citizens (Bundestag, 2016).

There are four different forms of residence titles or legal ways to enter and stay in Germany: a visa, a residence permit, a settlement permit, and a European Countries (EC) long-term residence permit. A settlement permit and EC long-term residence permit allow permanent residence in Germany and allow economic activity, i.e. employment in Germany. The main difference between these two permanent residence titles is that the former is specific to Germany, while the latter is for a number of European Union countries, including Germany. A visa and a residence permit allow temporary stay in Germany, where a visa allows up to a three-month stay, while a residence permit can be for longer periods. Both of these do not automatically grant the right to work in Germany, and if economic activity is allowed, the title needs to

state it. Working without the permit is against the German law. A process to get a permanent settlement permit is long; a foreigner can get the settlement permit after holding a residence permit for five years, conditional on his or her adequate knowledge of the German language and a basic knowledge of the legal and social systems of Germany. In practical terms, the condition to get the permanent settlement permit is holding a residence permit for five years and successfully completing an integration course.

Foreigners can get a residence permit for educational, employment, investment, humanitarian, political, and family reasons. A resident permit for educational purposes allows a holder to work up to 90 days or 180 half-days per year. After completion of studies, the residence permit can be extended by up to one year for the purposes of finding a job in the resident's field of study. Economic immigrants will be accepted based on the needs of German labor market. The Federal Employment Agency needs to grant approval and the residence title is issued only if a concrete job offer exists. Settlement permits might be issued to highly skilled foreigners, in particular scientists, prominent teachers, specialists, and executives with special professional experience. In addition, residence permits can be issued to researchers. Self-employed foreigners may be granted a residence permit if they invest at least € 500,000 and create five jobs and if they are younger than 45 years (unless they have a special provision for old-age). When a residence permit is issued in order to safeguard special German political interests or on humanitarian grounds, the holder gets the right to pursue economic activity. However, if the residence permit is issued for the purpose of temporary protection, employment might not be granted.

An additional way to get a residence permit in Germany is through family reunification. Family chain migration is allowed if a foreigner has either a residence permit, a settlement permit, or EC long-term residence permit. Foreign dependents will get residence permits as well. A child that is born in Germany will get a residence permit if at least one parent possess a residence permit, a settlement permit, and EC long-term residence permit. In cases when foreign dependents are joining a German

national, they will be granted residence permits. Thus, a foreign spouse of a German gets a residence permit via marriage. The permanent settlement permit is issued to a foreign spouse of the German after she or he has had a residence permit for three years, given that the foreigner can communicate in German on a basic level and that family unity continues on the German territory. The residence permit obtained via marriage entitles a holder to pursue economic activity. In the case of a divorce or the death of a spouse, a foreign spouse that entered Germany with a purpose of family reunification can legally reside in Germany for another year, given that the marriage lasted at least two years.

The Residence Act also states that the Federal Employment Agency needs to approve issuing a residence title which permits a foreigner to work in Germany. Employment of the foreigner should not have adverse consequences in the labor market, and foreign workers must be compensated in the same way as a German worker in the same position. In a case in which a German citizen has the same qualifications for the desired job, the German citizen has preferred status over the foreign worker.

Additionally, the Residence Act puts an accent on immigrant integration. The Federal Government through the Federal Office for Migration and Refugees provides support for foreigners in order to help them integrate into economic, cultural, and social life; with an understanding that the foreigner will put efforts into integrating into the host society. In practical terms that means that integration courses will be provided with the aim of imparting the German language, legal system, culture, and history to foreigners. The integration course is obligatory for those who receive benefits from the government and have inadequate German language skills.

The Act of the General Freedom of Movement for EU Citizens of 30 July 2004 was last amended in December of 2015. This Act regulates entry into and residence in Germany by nationals of other European Union member states. EU citizens have the right of entry and up to a three month stay in Germany without any visas. For periods beyond three months, EU citizens need to either be either students, trainees, employed, self-employed, or looking for a job. Additionally, EU citizens have the right

to work in Germany without work permits, i.e. they have the same employment rights as Germans. One exception is for countries that joined the EU in 2004 (Eastern enlargement) and any new member states after that have a seven years delay on the right to work in Germany. As an example, Romania joined the EU in 2007 and its citizens got the unrestrained right to work in Germany only in 2014.

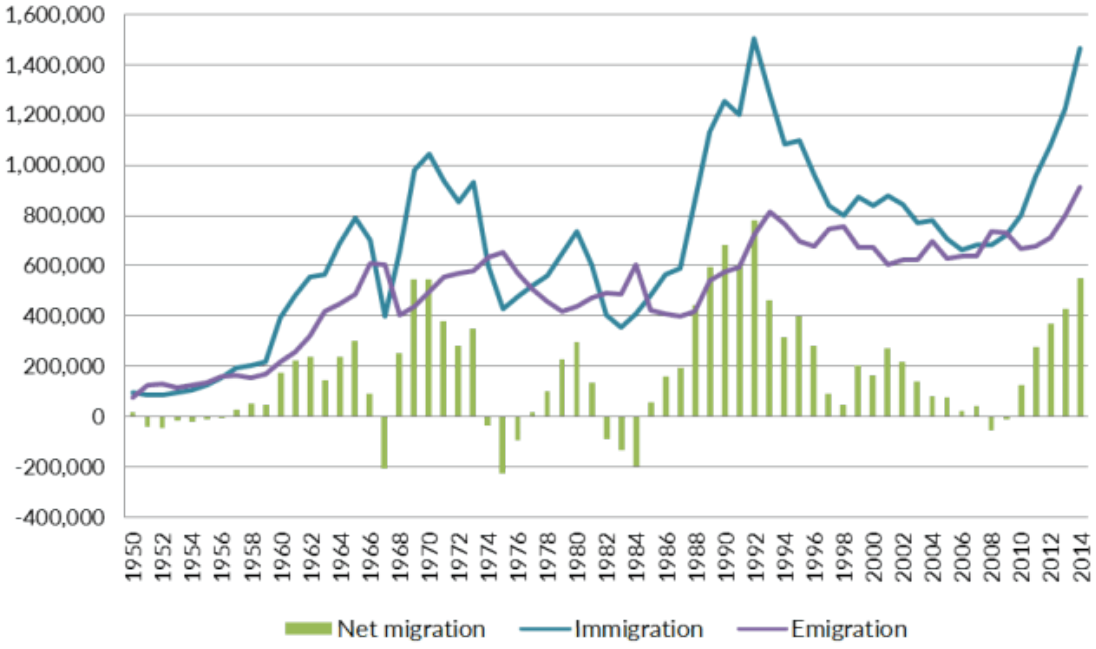
An agreement establishing an association between the European Economic Community and Turkey was signed in Ankara in September 1963. Given that Turks came to Germany in 1960s as guest workers and that they are one of the major immigrant group in Germany, the main goal of this agreement was to improve the status of Turkish workers and give provisions for extending their period of residence in Germany. When a Turkish worker is a registered member of the labor force in Germany, his or her family members have right of employment as well.

In 2009 the EU introduced EU Blue Card, the approved EU-wide work permit, that facilitates high-skilled labor migration from non-EU countries to EU countries. The principles behind the EU Blue Card became a part of German law in 2012 with the passing of the Recognition Act. The Recognition Act is the abbreviated title of the Law to improve the assessment and recognition of professional and vocational education and training qualifications acquired abroad, and it simplifies and streamlines the recognition of degrees obtained outside Germany.

In summary, a foreign-born person can live and work in Germany permanently if he or she obtains a settlement permit, an EC long-term residence permit, or naturalizes. The first two can be obtained after 5 years while naturalization can be obtained after 8 years of legal residence in Germany. Marriage with a German grants a residence permit immediately and a chance to naturalize after two years of marriage given that the spouse had legal residence in Germany for at least three years. Marriage to a foreign-born individual who has a legal residence in Germany will grant his or her spouse the legal residence as well. Lastly, the Residence Act places integration of the foreign-born population as one of the governments priorities, that is practically implemented by integration classes and simplification of the rules and procedures for

obtaining permanent residence. EU citizens have the right to live and work in Germany, with the exception of new members states whose citizens have the seven-year waiting period before getting the full benefits of freedom of work in Germany.

Figure 2.1: Migration Trends in Germany, 1950–2014



Source: Federal Office for Migration and Refugees, *Migrationsbericht 2014* (Berlin: Federal Ministry of the Interior, 2016), 218-19; Federal Statistical Office, *Annual Statistical Yearbook for 1953––1973*(Bonn: Federal Statistical Office, various years)

Chapter 3

LITERATURE REVIEW

I this chapter, I will first present the major findings and contributions from the literature on immigrants' wages in Germany, in particular the existence of the wage gap between immigrants and natives and the speed by which that gap closes over time. Then I will focus on exploring theoretical and empirical literature on marriage and intermarriage. In particular, I focus on: i) explaining the function of marriage, decision making, and resources allocation among married partners, ii) describing theoretical models of marriage, iii) exploring the male marriage premium, and iv) exploring the marriage premium for immigrants who marry natives.

3.1 Immigrants' Wages in Germany

In his seminal article, Chiswick (1978) formalized the topic of immigrants assimilation in the host country society and, in particular, assimilation in the labor market of the receiving country, as one of the key issues in migration. The major focus of this literature since 1978 has been on speed of immigrants assimilation measured by the rate at which their wages approach those of comparable native workers, their employment, and the use of the welfare system (Bauer et al., 2005). Chiswick (1978) points out that the difference in wages of immigrants and natives will depend on the ability of the immigrant to transfer and adapt his pre-immigration skills to the requirements of the job in the host country. The smaller the differences in language, culture, structure, and institutions of labor market, the easier it is to transfer human capital from one country to another (Chiswick, 1986).

Lehmer and Ludsteck (2015) summarize the explanations for the initial wage gap and subsequent wage assimilation of immigrants provided by theory into these

three areas: i) the differences in observed and unobserved endowments of immigrants and natives, ii) rewards for the endowments of immigrants and natives differing, and iii) sample-selection issues.

Immigrant assimilation studies for Germany predominantly employ the German Socio-Economic Panel (GSOEP) that is similar to the US Panel Study of Income Dynamics (PSID). Different immigrant labor market outcomes are studied, however, and I will summarize the literature on immigrant earnings in Germany with relevant references to findings in other countries, since immigrant earnings are directly relevant to my research.

Findings for Australia, Canada, and the United States show that there is an initial gap between earnings of immigrants and natives, and that this gap narrows down considerably as an immigrant spends more time living and working in his new country (Greenwood and McDowell, 1986; Borjas, 1994). However, studies for Germany published in the period from 1992 to 1998 find mixed results. Dustmann (1993), Schmidt (1997), and Constant (1998) do not confirm the results of wage convergence over time. Dustmann (1993) finds that the wage gap between immigrants and natives is between 13 and 19 percent and that there is no earnings assimilation over time. His explanation for the lack of earnings assimilation over time is in the temporary status of German guest worker since non-permanent status gives no incentive to the foreign worker to invest in host-country-specific human capital.

On the contrary, Pischke (1992) uses the first 6 waves of SOEP and finds that guest workers have about 23 percent wage disadvantage when they first come to Germany and that there is no significant growth in earnings over time. However, after he limits the analysis to workers who immigrated after 1976, he finds the typical assimilation pattern found in Australia, Canada, and the United States. Schmidt (1992) focuses solely on blue-collar workers and finds that they initially earn about 12 percent less than comparable natives, but that their earnings rise 0.7 percent faster than those of natives; which means that blue-collar immigrants earnings catch up to those of native workers after about seventeen years of residency. Licht and Steiner (1994) control

for the possible selection bias due to return migration and find positive assimilation rates of about one percent per year.

Keeping in mind that the above studies for Germany used the initial few years of SOEP data, Bauer et al. (2005) explain this mixed evidence by pointing out that at this time period, the majority of guest workers in Germany were low skilled and unable to climb the occupational ladder. In addition, most of these workers lived in Germany for a long time, thus identifying the assimilation effect for them is challenging.

One part of the literature focuses on the earning outcomes of immigrants by their country of origin. Again, there is mixed evidence showing that certain nationals earn more than others, and some that show no considerable difference between immigrant groups. Additionally, issues of language and language acquisition are investigated and Dustmann (1994) finds that German proficiency has a considerable positive effect on immigrants earnings.

In one of the more recent studies Lehmer and Ludsteck (2011) compare the outcomes of male workers from different European countries who joined the German labor market in the period of 1995 to 2000 to those of natives using the employment register data of the German Federal Employment Agency. They find that the immigrant-wage gap varies from minus 8 percent for Spaniards to minus 44 percent for Poles. They firstly measure the wage gap between immigrants from different countries of origin and Germans and then use Oaxaca/Blinder type decomposition to decompose the earnings gap into a characteristics, i.e. endowment effect and an unexplained, i.e. coefficients effect; where the latter can be interpreted as a measure of discrimination. They noted that immigrants tend to sort themselves or be sorted into low-wage industries. In order to assess the contribution of sorting to the gross wage gap, they also perform decomposition for the construction, hotel, and restaurant industries since these have a large share of immigrant workers. These are then compared with the pooled base sample of all industries and the results indicate that foreigners are affected by discrimination within sectors. Another key finding is that unfavorable characteristics of foreign workers compared with German workers significantly contribute to explaining the wage gap

between the two groups. Additionally, results from quantile decomposition show that that wage distributions are more widely dispersed at the lower wage quantiles.

Finally, literature on immigrants wages in Germany shows that immigrants, on average, earn less than natives do and that the wage gap ranges from 9 to 23 percent. The evidence on wage assimilation per year ranges from 0 to 1 percent, i.e. from no evidence of wage assimilation to wage assimilation at a rate of 1 percent per year. I do not compare immigrants wages with those of natives, but rather married immigrants wages to those of single immigrants, since my focus is on the effect of intermarriage on wage. That is why I present the theoretical and empirical literature on marriage and intramarriage in the next section.

3.2 Economics of Marriage: Theory

In Becker's (1973) theory of marriage, individuals are rational agents who enter into marriage if that makes them better off compared to staying single. At the same time, these agents operate in the marriage market, and each agent is substitutable up to a certain degree. Agents also compete against other agents for the most desirable mates. In addition, if relationships are monogamous, the relative supply, the ratio of single females to males, will determine the rate of marriage (Becker, 1973). In order to understand the current theoretical and empirical literature on marriage, the rest of this chapter is organized in the following way: i) explaining the function of marriage, decision making, and resources allocation among married partners, ii) presenting theoretical models of marriage, iii) exploring the male marriage premium, and iv) exploring the marriage premium for immigrants who marry natives.

3.2.1 The Gains to Marriage

As previously noted, rational agents will enter the marriage if that makes them better off than being single. In most Western societies, marriage is a voluntary relationship, and it is initiated by the principals and continues with their mutual consent. Under these conditions, the specific relationship (marriage) that forms should be

for the mutual benefit of both parties. Marriage allows individuals to benefit from joint production and joint consumption. There are four important functions of the marriage: i) increasing the returns by exploiting comparative advantage and dividing the work among partners, ii) extending credit and coordinating investment activities, iii) sharing of collective non-rival goods, and iv) risk pooling (Becker, 1991; Weiss, 1997).

Both the theoretical literature and the empirical literature show that there is a division of labor within the household and of partners making the joint decision on how to allocate their time and resources (Becker, 1991; Baker and Jacobsen, 2007). Partners help each other by teaching each other skills (increasing the human capital) and providing services (such as cooking, advising, encouraging). Based on comparative advantage partners decide how to allocate their time between market and household work. One example of comparative advantage is that women do childbearing and traditionally take a primary role in childrearing and home production. Because of having a woman take up part of the housework and child rearing, men can spend more time in market work and specialize in it. Single men have to allocate their time between market and household work or turn to markets for cooking and housekeeping, i.e. restaurant meals, maid services, etc. Research shows that compared to single men, married men work longer hours in the market and have substantially higher wages; in addition, compared to single women, married women have lower wages and work more at home (Gronau, 1986; Daniel, 1992; Daniel, 1995; Korenman and Neumark, 1992; Weiss, 1997). Thus, married men spend more time in market work and married women spend more time in household work, compared to the single men and women, providing some evidence of the division of labor and specialization that occurs in marriage.

Another function of marriage is to extend credit and coordinate investment activities and there is evidence of implicit credit arrangements within marriage (Borenstein and Courant, 2015; Weiss, 1997). For example, a woman can work and support her husband while he goes to college or graduate school. In this case, she is investing in his education and expecting that she will reap the benefits once he gets a professional job. These implicit credit arrangements become evident at the time of divorce when

the wife claims a share of her ex-husband's earnings on the grounds that she supported him in school (Weiss, 1997).

Another function of marriage is sharing of collective non-rival goods such as children and home. For example, Lazear and Michael (1980) estimate that the purchasing power of two people who form a union is almost twice as high as a purchasing power of these same two people in a case in which they remain single. As a unit, two people can accomplish more than individually, part of it is that together they have more resources, but also they are able to share a number of goods leaving them with more money to spend, for example, no need to buy double appliances, pay double electricity or heating bills. It is not always the case that partners only share consumption goods; they can also share productive inputs. Benham (1974) observes that the wife's schooling enhances her husband's wages since a more educated woman provides better spousal labor, including healthcare, counseling, advising, motivating, problem-solving that enhances her husband's productivity.

Another advantage of marriage is risk pooling. Spouses can have large potential gains from mutual insurance, conditional on the particular risk. When one gets sick or is unable to work, his partner can support him. Wives receive their husband's pensions. Kotlikoff and Spivak (1981) consider the risk of uncertain life and find that, in the absence of an annuity market, the gains that a single person can expect upon marriage are equivalent to 10 to 20 percent of his wealth. Rosenzweig and Stark (1989) also show an example of marriages in rural India that are arranged between partners who are sufficiently distant to significantly reduce the correlation in rainfall, thereby generating gains from insurance.

Finally, the benefits of marriage are numerous including, among others, joint production and consumption, gains from labor division and specialization, risk pooling, and relaxing individual credit constraints. An individual values these marriage incentives and potential benefits and the costs of marriage and decides what will make him better off, staying single or getting married.

3.2.2 Marriage Matching Models

The theory of marriage formation is based on matching models and consists of two parts: i) the pure theory of marriage, the voluntary process of matching under ideal conditions, and ii) the search theory of separation, where the existence of matching costs and uncertainty is introduced to the pure theory of marriage. The pure theory of marriage starts with Gale and Shapley (1962) who introduced the first formal model of the matching equilibrium. The matching algorithm in the marriage market is similar to the way in which graduate medical students in the U.S. are matched with hospitals. The algorithm in the marriage market works in a way that a man makes an offer of marriage to his favorite woman, who either accepts or rejects the offer. If the offer is tentatively accepted, the match is formed, if not, the man makes an offer to the next preferred woman. A woman can either tentatively accept the offer (she can always reject it if a better offer comes) or reject it. The process continues until each man has been accepted by some woman or until he has been rejected by each woman whom he prefers to bachelorhood.

Gale and Shapley (1962) find that the stable match structure is feasible and has these two properties: i) no matched individual prefers the single state, and ii) no pair of two individuals of opposite types prefer a match with each other to their current assignment. They establish that the core of the game always exists. Shapley and Shubik (1972) and Becker (1973) incorporate utility in the form of goods or money that can be used as compensation for participation in the match. For example, a wealthy plain man can marry a poor attractive woman and their match can be stable if they can compensate each other for the missing traits. The principle of compensation introduces the possibility of negotiation in the formal model. In order to be feasible, this match structure with compensation needs to produce a surplus that is then divided among the partners. In the case of transferable utility, if the match structure is to be stable, it has to be feasible and the surplus created should be divided in a way that the matched individuals are better off in a match compared to being single and none of the other feasible matches would be preferable to the current one for the potential partners

(Mortensen, 1998).

The Gale and Shapley (1962) model, the solution concept, and algorithm, along with its generalizations, is not an adequate descriptive theory of marriage because the focus is only on match formation and it does not provide an insight into the separation process, and the theory does not address the cost of match formation or the uncertainty about match quality. A more realistic theory of marriage formation acknowledges the cost of match formation and uncertainty about match quality, among other frictions that exist in the marriage market. Mortensen (1982), Diamond and Maskin (1979), Diamond (1981) use search theory to account for the presence of costs of match formation and uncertainty about match quality. The main implication of these theoretical models is that some acceptable matches will inevitably separate in the future and that the principals are aware of the possibility. In addition, due to the existence of dynamic externalities, the self-interested decisions made by participants do not create socially optimal outcomes.

Becker (1991) introduces the gender-based division of labor in the household grounded on the initial differences in comparative advantage between men and women in the market and household work. Becker argues that, traditionally in our society, we observe that females specialize in household work and that a possible reason lies in the lower opportunity cost of childbearing and childrearing for women. Subsequently, the differences in opportunity costs increase as human capital is being invested in these specific activities. Thus, married men invest more in market-valued human capital than single men and married men can do this because their opportunity cost is lower due to the division of labor. Investment in human capital makes married men more productive and as a result, they earn a higher wage compared to single men. In summary, Becker's hypothesis is that married men are more productive and should earn more than single men.

Becker (1991) predicts negative assortative mating on spouses' wages. Lam's (1988) results contradict Becker's (1991) predictions; Lam (1988) shows that marriage market equilibrium exhibits positive assortative mating on spouses' wealth. Lam (1988)

allows for both partners to work and earn different wages that are later allocated between public goods and leisure. Lam claims that it is possible to extend the results for wealth and show that there will be positive assortative mating on wages in marriage market equilibrium given that the elasticities of demand for household public goods with respect to the two spouses' wages have the same sign.

The theory of marriage began with the pure theory of marriage, the voluntary process of matching under ideal conditions, and expanded to the search theory of separation, where the existence of matching costs and uncertainty is introduced to the pure theory of marriage. In his seminal work, Becker (1991) introduces the gender-based division of labor in the household grounded on the initial differences in comparative advantage between men and women in the market and household work. Theoretical predictions about assortative mating on a spouse's wages go in both directions, negative (Becker, 1991) and positive (Lam, 1988).

3.3 The Male Marriage Premium: Empirical Evidence

The male marriage premium is well established in the literature and the cross-sectional analyses show that married men typically earn 10 to 35 percent more than the statistically comparable single men (Korenman and Neumark, 1991; Schoeni, 1995; Daniel, 1995). There are three main hypotheses explaining the male marriage premium: i) productivity hypothesis, ii) selection hypothesis, and iii) employer discrimination of single men (Becker, 1991). According to the productivity hypothesis, marriage makes men more productive because of the division of labor between partners that lets men specialize and become more productive in the labor market and consequently earn more. The selection hypothesis claims that married men have some unobservable traits that are desirable in both marriage and labor markets, which makes them more likely to be married and earn more without marriage having any impact on men's productivity. For example, married men might be more industrious and more responsible, and since these two characteristics are unobservable, marriage serves as a proxy for them. The third hypothesis claims that employers favor married man over single men

because they perceive them as more responsible and stable. However, the employer discrimination of single men is the least feasible explanation since the workers are ultimately paid according to their productivity and those discriminatory employers would ultimately go out of business if they keep paying married workers more (Hoffman and Averett, 2010). The following studies differ in the evidence and explanations they provide for the presence of the male marriage premium.

Korenman and Neumark (1991) use the National Longitudinal Survey of Young Men from the 1970s (NLSY70) and company personnel data to show how wages are affected by marriage decisions and marriage durations. They find that married white men age 25-35 earn about 11 percent more than single men, controlling for the observables. During the observation years, some men changed marital status, some married and some divorced, which Korenman and Neumark (1991) used to tease out the productivity factor from the selectivity factor. They provide evidence that wages rise after marriage, so the explanation that selection into marriage is based on wages does not receive support. They also find that marriage premiums for those men who changed status fell from 11 to 6 percent, meaning that more than half of the premium came from the productivity effect of marriage while the rest is due to selectivity. By controlling for individual-fixed-effects in longitudinal data, they provide evidence that less than 50 percent of the marriage premium is caused by unobserved individual-specific factors such as physical appearance, communication skills, creativity, diligence, intelligence, loyalty, and dependability that correlate with higher wages.

Furthermore, Korenman and Neumark (1991) include the length of marriage in their estimation to provide additional evidence for the productivity hypothesis; if the marriage premium is the result of selectivity into marriage, each additional year of marriage should have no impact on the marriage premium, but if each additional year of marriage increases the premium that would show evidence for the productivity hypothesis since the gains would accumulate over time. They find that each additional year of marriage increases the wage from 1 to 2 percent and that with the inclusion of years in marriage, marriage status itself loses its effect on wage. They also provide

evidence that married men have a steeper earnings profile than single men and that their probability of promotion is about 10.5 percentage points higher.

Schoeni (1995) uses data from the Luxemburg Income Study for fourteen developed countries: Australia, Canada, France, West Germany, Israel, Italy, Luxembourg, Netherlands, Norway, Poland, Sweden, Switzerland, United Kingdom, and the United States to estimate the wage equation for men who are 25–55 years old and heads of their households. Schoeni includes controls for age, education, race and other relevant observables, when available, with the main focus on the men's marital status variable. Schoeni (1995) finds that male marital premium is common, that it persists over several time-periods under observation, that it ranges from 0 to 30 percent in all fourteen industrialized countries in the study, and that it is quite large and statistically significant in the majority of these countries. Schoeni points out that difference in the sizes of marriage premiums across countries might be due to country-specific institutional factors. In addition, Schoeni finds that there are important differences in earnings between never married, widowed, separated, and divorced men. The marriage premium for Germany was estimated at 25 percent in Schoeni's study. Another interesting finding is that widowed men in Germany earn significantly more than those who were never married, however, this might be due to the small size of the widowed sample.

Loh (1996) uses data from the National Longitudinal Survey of Youth Labor Market Experience (NLSY) to test Becker's hypothesis that married men are more productive by drawing three implications of the hypothesis. The first implication is that married men with working wives or unmarried men should earn less than married men with non-working wives should because there is limited opportunity for specialization for the first two groups. The second implication is that self-employed and salaried workers who are married should both earn a marriage premium. If self-employed men do not earn marriage premium, then employer favoritism might be the driving force in wage differentials and not the differences in productivity. The third is that cohabitation should also affect the wage in the same way as marriage since the labor specialization

will happen in both types of households, regardless of the legal status. Most economists would dispute the last implication since cohabitation provides far less protection and in cohabiting relationships, there is less specialization than in legal marriage. However, the cohabitation question in this data set was retrospective and asked of currently married men, thus showing that those cohabiting relationships were serious and that it is reasonable to assume that division of labor in the household took place even before marriage. Loh uses OLS to estimate the hourly wage equation and finds that married men earn 9.1 percent more than single men, holding everything else constant. In addition, Loh replicates Korenman and Neumark (1991) by including the length of marriage in the wage equation and finds that each additional year of marriage increases the wage by 0.74 percent; however, when years married are added, both the marriage and years married coefficients became statistically insignificant. An interesting finding is that men benefit from marrying better-educated women, regardless of women's labor market involvement, which would suggest that men benefit from human capital transfer in marriage.

Gray (1997) uses National Longitudinal Surveys of Young Men and Youth Cohorts to study the marriage premium decline in the 1980s. He explains that the marriage premium declined at the time when the traditional marriage roles started to change and women became more active in the labor market. Gray concludes that this is largely due to decreased specialization in marriage and increases in wage penalties associated with wives' labor market hours. In other words, with wives working, husbands were spending more time in household work and not specializing as much as before in market work, and as a result, the male marriage premium started to decline. He compares the wages of the men with full-time homemaker wives with the wages of the men with the full-time working wives and finds that the former earn a marriage premium of 17 percent while the latter earn a premium of 9 percent. Gray's main finding is that prior to 1980s, the tenure in a marriage made the wage profile of married men steeper, which would support the argument that marriage had productivity-enhancing effects on men. This evidence is inconsistent with the selection of high-wage men into marriage

because it was the marriage tenure, not just the state of marriage, that impacted the marriage premium over time.

Antonovics and Town (2004) use data from the Minnesota Twins Registry to study marriage premium in monozygotic (identical) twins. Their sample includes 136 pairs of male identical twins that answered questions about their marital status and earnings. In this way, two individuals who have the same family background and genetic endowment (physical appearance, intelligence, etc.) are compared and the unobservables that could affect both marriage and labor markets are controlled for. They find that the marital wage premium is 26 percent for this group and these findings support the productivity hypothesis, that it is the marriage that makes men more productive and subsequently makes them earn more as a result of increased productivity. In addition, this is evidence that shows that unobservable factors do not drive the marriage premium up; rather marriage itself affects men in a positive way. However, these results should be considered with caution due to the small sample size, as well as the concern that twins do not represent well the average individual (Hoffman and Averett, 2010).

3.3.1 The Marriage Premium for Immigrant Men

As discussed above, married men earn more than statistically comparable single men. This premium might be even greater in marriages where immigrant men marry native women. Immigrant men reap all the traditional benefits of marriage, such as labor division in marriage and joint consumption of goods and services, as well as gain extra benefits such as legal benefits, host-country-specific human capital spillovers, network externalities, and improved access to capital markets. For example, legal status would allow an immigrant to have a stronger bargaining position in wage negotiations because obtaining permanent status in the country allows mobility and opens up more employment opportunities; being fluent in a host-country language is a key feature needed to succeed in the job market, and the native spouse would foster this fluency. Thus, the type of marriage between an immigrant and native, termed intermarriage, should improve the labor market outcomes of intermarried immigrants and

make their marriage premium higher than the marriage premium of immigrants marrying other immigrants, intramarried immigrants. I summarize the results of the recent research on intermarriages in Table 3.1 and discuss it in coming paragraphs.

Meng and Gregory (2005) is the seminal paper on intermarriage premiums for immigrant men and women in Australia using the data from 1 percent samples of the 1981, 1986, 1991, and 1996 Australian Census of Population and Housing. They employ the instrumental variables approach to control for endogeneity of marriage and use two different instruments since there are two different variables that need to be accounted for, intermarriage and intramarriage. Their first instrument is the sex ratio, the ratio of a number of males to a number of females from the same age-ethnic-religion group that a given individual belongs to in a given census year. The second instrument is the probability of men to marry someone from his own age-ethnic-religion group in a given census year. They calculate it as a ratio of women from men's own age-ethnic-religion group to the number of all available women of marriageable age in that census year. Both of these instruments use age, ethnicity, religion, geography, and time as their sources of variation; and both instruments predict the type of marriage without affecting the wage.

Meng and Gregory (2005) find that the marriage premium for both inter- and intra-married immigrants is positive and statistically significant, where the OLS results show that intermarried immigrants earn about 4.8 percent more than those who are intramarried. When they treat marriage as endogenous and use instruments to control for it in a 2SLS estimation, they find that the male intermarriage premium raises to 19.9 percent. These results indicate that two-stage least squares (2SLS) estimates are higher than the OLS estimates suggesting that OLS estimates are negatively biased. One potential explanation for this is that there might exist unobservables that both increase the probability of intermarriage and depress earnings. Additionally, Meng and Gregory (2005) find that native men also get an intermarriage premium of 2.2 percent, which is significantly smaller than 19.9 percent premium that immigrants receive, indicating that the intermarriage premium for immigrants captures more than just the special

characteristics of people who intermarry[1].

Meng and Meurs (2009) use the special immigration survey conducted by the National Institute of Statistics and Economic Studies (INSEE) and the National Institute of Demographic Studies (INED) from 1992 to study the male marriage premium in France. They use instruments similar to those introduced by Meng and Gregory (2005), the sex ratio and probability of marrying within one's own ethnic group, where the source of variation for these instruments is ethnicity, age, and region. Their simple OLS results say that the difference in the marriage premiums of immigrants who marry natives and immigrants who marry other immigrants is around 17 percent. After they account for individual characteristics and endogeneity of intermarriage with the instrumental variables approach, they find that the intermarriage premium increased to between 25 to 35 percent, a finding similar to that of Meng and Gregory (2005). Meng and Meurs (2009) pay special attention to proficiency in native language and conclude that French language skill was one of the important mechanisms behind the male intermarriage premium in France.

Furtado and Theodoropoulos (2009) use data from the 2000 U.S census and focus on an alternative labor market outcome of intermarried immigrants - their employment probability. Their main hypothesis is that the native spouse fosters the language proficiency, improves the immigrant's job-search skills, and extends the immigrant's social and business circles. Employing the standard OLS, they find that intermarried immigrants have 4 percentage-points higher probability of being employed than intramarried immigrants. To account for the endogeneity of the intermarriage decision, they use an instrumental variable similar to that in previous intermarriage wage-premium studies. Namely, their instrument for intermarriage is the percentage of women in the immigrant men's age group and metropolitan statistical area (MSA) that is foreign born. The source of variation for their instrument is age and geography. They find that

[1] If the intermarriage premium is a product of special characteristics of people who intermarry, such as tolerance for ambiguity, openness, etc., then there would be no significant difference in the intermarriage premium for natives and immigrants.

after taking into account the endogeneity of the intermarriage decision by instrumental variables approach, marriage to a native increases the probability of employment by about 11 percentage points. Again, just as it was the case with the intermarriage wage premium, the IV estimates are higher than OLS estimates, suggesting that intermarried immigrants have some unobservable characteristics that decrease the probability of employment. These findings of an increased employment probability of intermarried immigrants support the hypothesis that the marriage to a native has benefits that extend past the benefits of being married; otherwise, the employment outcomes of married immigrants, regardless of the type of marriage, would not be statistically different.

Chi and Drewianka (2014) use the five percent sample of the 2000 U.S. Census to study the worth of green card or permanent legal residence to Mexican-born men in the U.S. They use intermarriages between Mexican-born men and U.S. natives as a proxy for benefits associated with permanent U.S. legal residence. They first estimate the intermarriage premium and then tease out one of the mechanisms they consider crucial, legal rights that come with marrying a native. They find that intermarried Mexican men earn intermarriage wage premiums of 40 percent, and that the premium is even larger for the most mobile subgroups. They attribute 30 percent of this to the effect of getting a green card and the other 10 percent to other mechanisms. Chi and Drewianka (2014) reason that not having a green card in the U.S. makes immigrants unable to secure the wage growth because they are tied to an employer and unable to move and find a better job match or get leverage when negotiating a wage increase. Chi and Drewianka (2014) employ the instrumental variables approach where the instruments are the ratio of immigrants to natives among the local population of unmarried Hispanic women and the share of local women who are not married. The source of the variation of the instrument is demography.

Chi (2017) exploits a natural experiment, namely the 1986 Immigration Reform and Control Act (IRCA) amnesty in the U.S., to study the major mechanism through which intermarriage affects the wage using the 1990 U.S. Census data. Chi compares

the intermarriage premiums of Mexican men who married the U.S. women before and after 1982 since those who came to the country illegally before 1982 were granted legal status by IRCA, while those who came post-1982 could only get legal status through marriage. Thus, the former group had legal rights even before the marriage, while the latter received legal rights via intermarriage. Chi's hypothesis is that those men who came to the country post-1982 should have a much higher intermarriage premium due to the permanent legal residence that came with the marriage. Chi employs instrumental variables that involve the demographic composition of the Mexican population across locations, parallel to those used in Chi and Drewianka (2014). Chi finds that intermarriage premiums for Mexican men who came to the U.S. before 1982 is 9.4 percent, but that it is insignificant, while for those who came after 1982 the premium is significant and large at 44.8 percent. The difference in these two premiums is statistically significant, 35.4 percent providing evidence that legal rights are the main mechanism of the intermarriage effect on wages for Mexican men in the U.S. who did not benefit from IRCA amnesty.

Table 3.1: Summary of Empirical Results on Male Intermarriage Premium

Paper	Country	Intermarriage premium (percent)
Meng and Gregory (2005)	Australia	19.9
Meng and Meurs (2009)	France	30
Chi and Drewianka (2014)	United States	40
Chi (2015)	United States	35

Chapter 4

THE EFFECT OF INTERMARRIAGE ON WAGE

4.1 Introduction

In this Chapter, I explore the effect of intermarriage on wages of immigrant men in Germany. The existing literature shows that married men earn more than statistically comparable single men, as well as that immigrant men in marriages with natives earn more than immigrant men in marriages with other immigrants in Australia, France, and the United States. This chapter seeks to shed light on the additional benefit of intermarriage in Germany. My hypothesis is that the additional intermarriage premium is the result of native-partner specific characteristics that speed up immigrant's assimilation process. Given that Germany is a major European immigrant-receiving country, the issue of immigrant assimilation is an important one and my aim is to contribute to the study of assimilation through intermarriage.

I start with Section 4.2 where I introduce the data and preliminary analysis. In Section 4.3 I continue with the description of the methodology that accounts for endogeneity, self-section, and reverse causality. Finally, in Section 4.4 I present the main results, and finally in Section 4.5 I perform robustness checks using alternative samples and an extended set of explanatory variables.

4.2 Data

My data comes from the German Socio-Economic Panel (SOEP), a wide-ranging representative longitudinal study of households from 1984 to 2015, conducted by the German Institute for Economic Research, DIW Berlin. Additionally, starting in 2013, the special IAB-SOEP Migration Sample was added to the original SOEP, and I have it for years 2013 and 2014. The IAB-SOEP is a household survey conducted jointly by

the Institute for Employment Research (IAB) in Nuremberg and the German Socio-Economic Panel (SOEP) at DIW Berlin. IAB-SOEP includes all standard SOEP questions along with extended migration histories. I use aggregate statistics from the German Federal Statistical Office to construct instruments.

My sample of interest is restricted to immigrant men age 20 to 65 who are full-time employed (working 35 hours or more per week) with non-missing wage for whom I can determine whether they are single or married. In case of marriage, I further refine the sample to individuals for whom I have data on their partner, in particular, their partner's country of origin since this is a key variable in the study that lets me distinguish whether the immigrant is in an intermarriage (married to a German) or in an intramarriage (married to another immigrant). In this paper, an individual is an immigrant if born outside of Germany, while an individual is a native if born in Germany and has had German citizenship since birth. Intermarriage is defined as a marriage between an immigrant and a native. I use the strict legal definition of marriage, where the registered partner is a spouse. About 85 percent of immigrants in my sample who are in a relationship with a German are legally married, while over 98 percent of immigrants in a relationship with another immigrant are legally married.

The sample was further refined by including only those for whom I know the number of years since migration, if an immigrant, and age, experience, and education for immigrants and Germans. I also drop individuals with income from the bottom one percent of the distribution because the wages recorded are unlikely and probably the result of a reporting or a recording error. I further limit my sample to immigrant men from the following 10 countries: Austria, Ex-Yugoslavia (Bosnia and Herzegovina Croatia, Serbia, Slovenia, Montenegro, Macedonia, and Kosovo), Italy, Poland, Romania, Russia, Turkey, Greece, Kazakhstan, and Spain[1]. I limit the sample to immigrants from these ten countries for several reasons: i) these constitute major immigrant groups

[1] Ex-Yugoslavia consisted of 6 republics and 2 autonomous provinces. After its break-up in early 1990s, SOEP recorded the separate republics and previous data on Yugoslavia was labeled as Ex-Yugoslavia. Due to language and cultural similarities, I place data on Bosnia and Herzegovina, Croatia, Serbia, Slovenia, Montenegro, Macedonia, and Kosovo under the category name of Ex-Yugoslavia.

in Germany (Statistisches Bundesamt, 2017); ii) the number of observations in other immigrant groups is very small and these immigrants from small groups might have considerably different behavior and outcomes than those from the major immigrant groups (Evans, 1989). Table 4.1 shows the number of observations by the country of origin in my sample. Turks make up 29.8 percent of the sample, Italians 15.6 percent, Ex-Yugoslavians 16.9 percent and Greeks 9 percent. Thus, 71.3 percent of the sample comes from these 4 countries, while the rest comes from 6 other countries. Thus, my final sample consists of 17,798 person-year observations from 3,120 immigrant men age 20-65 who are full-time employed. About 15 percent of these men are single, 12 percent are married to a German woman, and 73 percent are married to an immigrant woman.

In Table 4.2, I report the mean annual wage in Euros (€) by marital status. The annual wage (labor earnings of an individual) includes wages and salary from all employment including training, primary and secondary jobs, and self-employment, plus income from bonuses, overtime, and profit sharing (SOEP, 2015). Single immigrant men earn on average € 29,517, column 1. Immigrant men married to German women on average, annually earn € 40,679, column 2, while those married to immigrant women earn on average € 33,799, column 3. Thus, intermarried immigrant men on average earn € 11,162 more than singles, column 4, while intramarried immigrant men on average earn € 4,283 more than singles, column 5. These differences are statistically significant and provide preliminary evidence for the existence of a marriage premium regardless of type of marriage. Furthermore, the average difference in wages between immigrant men in inter- and intra- marriages is € 6,880, or 23.3 percentage-point. This is a substantial and statistically significant difference and a clear indicator that being married to a native might have a positive effect on wages. However, this difference does not account for possible differences in other observables, such as education or work experience.

Furthermore, I estimate wage density functions non-parametrically for the three marital statuses using a kernel density estimator. This is a more robust statistic of differences in wages between the groups than a simple mean. In Figures 4.1 to 4.4, I plot the probability density functions of log wages for my sample for three different

marital statuses: intermarried, intramarried, and single. In Figure 4.1, I plot all three probability density functions and note that married individuals have higher probabilities of being in the right tails of distribution, as well as that immigrants married to immigrants tend to have lower variance than singles or intermarried individuals. By comparing the density functions of log wage of single and intermarried men in Figure 4.2 and log wage of single and intramarried men in Figure 4.3, I find that the earnings distribution of married men is shifted to the right when compared with single men, which is consistent with a marriage premium. Additionally, by exclusively comparing the density functions of log wage of intramarried and intermarried men in Figure 4.4, I note that the differences in wages between intermarried and intermarried are driven by the tails of the distribution, i.e., intermarried individuals have higher chances of earning wages above the mean wage than intramarried men, and lower chances of earning wages below the mean wage than intramarried men.

In Table 4.3, I provide summary statistics of my sample across demographics. As expected, single immigrant men are on average five to seven years younger and have four to seven years less full-time work experience than married ones. Those with German spouses are, on average, two years younger and have three years less full-time work experience than those with the immigrant spouses. The majority of immigrant men in my sample have only completed primary school or less. Approximately 9.6 percent of immigrant men who have a German spouse and 14.3 percent of those with an immigrant spouse received less than nine years of schooling. In addition, there is a significant difference across marital statuses when it comes to higher education, about 16 percent of those with a German spouse are college graduates. In contrast, only seven percent of immigrant men with an immigrant spouse have completed more than 12 years of education. In summary, the singles are younger and have less human capital than married men, which suggests the need for controls. In addition, on average, immigrant men with immigrant spouses are less likely to obtain higher education than those with German spouses. Thus, this offers preliminary evidence of self-selection.

In addition, approximately 54 percent of these men with German spouses arrived in Germany at age 19 or less, while only 32 percent of those with immigrant spouses arrived at that age. As for the average years an immigrant has lived in Germany, those with German spouses spent about 25 years in the country, which is five years more compared to those married to an immigrant. This is additional evidence of possible self-selection. Table 3 also shows that more that 85 percent of the sample is concentrated in 5 out of 16 German states: North-Rhine-Westfalia, Hessen, Baden-Wuerttemberg, Bavaria, and Lower Saxony[2]. These 5 states are the most populous states in Germany and account for about 67 percent of the German population. This concentration of immigrants might be due to the size of these states, but it could also indicate that certain states might be more attractive to immigrants because they are more prosperous.

Table 4.4 presents the information on the nationalities of wives of immigrants, according to whether they are German, have a same nationality as their husband, or have some other nationality. Men from Turkey, Romania, Poland, Ex-Yugoslavia, Greece, and Spain mostly marry women who have the same nationality; Turkish men do so in 88 percent, Romanian men in 88.2 percent, and Polish men in 81.9 percent of the cases. In 66.3 percent of marriages, Austrian men marry German women. Approximately 31 percent of men from Italy have German spouses. Only 2.6 percent of Russian and 3.2 percent of Kazakh men have German spouses. Thus, this presents some evidence that immigrants are significantly more likely to marry a partner from the same country of origin than either a German or other immigrant.

In summary, there is preliminary evidence of a marriage premium, as well as of an intermarriage premium, i.e. immigrants in intermarriages on average earn more than both singles and immigrants in intramarriages. However, these differences might be driven by the lack of controls and possible self-selection. Thus, a multivariate analysis

[2] Germany consists of 16 federal states: Schleswig-Holstein, Hamburg, Lower Saxony, Bremen, North-Rhine-Westfalia, Hessen, Rheinland-Pfalz, Baden-Wuerttemberg, Bavaria, Saarland, Berlin, Brandenburg, Mecklenburg-Vorpommern, Saxony, Saxony-Anhalt, and Thuringia.

immune to possible self-selection is needed to provide a more robust evidence of benefits received by immigrants in intermarriages.

4.3 Methodology

4.3.1 Empirical Model

My goal is to estimate the effects of intermarriage ($MarryGer$) and intramarriage ($MarryImm$) on wages of immigrant men. My econometric model is the expanded version of wage equation proposed by Mincer (1974):

$$lnW_{it} = \beta_1 \, MarryGer +_{it} \beta_2 \, MarryImm_{it} + X_{it} \, \alpha + \epsilon_{it} \tag{4.1}$$

where lnW_{it} is a log-wage of an individual i at time t; $MarryGer_{it}$ is a binary variable equal to 1 if an immigrant is intermarried, 0 otherwise; $MarryImm_{it}$ is a binary variable equal to 1 if an immigrant is intramarried and 0 otherwise; X_{it} is a vector of controls including education, experience and its square, a binary variable indicating if an immigrant arrived in Germany before age 19, years since immigration, state and year fixed effects. The coefficients on $MarryGer_{it}$ and $MarryImm_{it}$ capture the average marriage premium by the type of marriage, while the difference between these coefficients is the additional premium beyond the general male marriage premium that immigrants receive due to marriages with German wives. I expect immigrants in intermarriages to earn more than single immigrants or those married to other immigrants because of legal benefits, human capital spillovers, network externalities, and improved access to capital markets. In this paper, I do not attempt to distinguish between the possible mechanisms through which immigrants in intermarriage earn higher wages.

The specified wage earnings Equation 4.1 might suffer from potential endogeneity of marriage self-selection, and reverse causality. The principal cause of endogeneity in Equation 4.1 comes due to an inability to control for unobservable characteristics that might affect both marital status and wages such as physical appearance, communication skills, creativity, diligence, intelligence, loyalty, and dependability (Daniel,

1995; Meng and Meurs, 2009). If marriage and type of marriage were completely exogenous or randomly assigned, this would not be an issue. Additionally, there might be a selection into type of marriage by unobservables. For example, I do not observe the legal status of an immigrant, and an illegal immigrant or one whose legal status is expiring would receive permanent legal status if he marries German. Thus, the benefit of intermarriage is significantly higher for him than for an immigrant with a legal status which implies self-selection into intermarriage. The existing literature suggests that there might be positive self-selection into marriage (Lam, 1988), while the literature on intermarriage shows evidence of negative self-selection (Meng and Gregory, 2005; Furtado and Theodoropoulos, 2009; Meng and Meurs, 2009). Thus, I could have either upward- or downward-biased estimates when I estimate Equation 4.1 using Ordinary Least Squares (OLS).

Another potential issue is that of reverse causality; for example, higher earners might have a higher probability to marry a native spouse, while at the same time marrying a native might increase the wages due to, for example, permanent legal status which allows them to get better-paying jobs. Natives are more likely to be employed and tend to earn higher wages (Larsen, 2004), thus those immigrants that earn more are more likely to marry natives if there is assortative matching by wages. However, empirical studies find a marriage premium of about 15 percent even when accounting for the possibility that high-earning men are more likely to marry (Daniel, 1995), indicating that more productive men are likely to be married, but that it accounts for only a part of their marriage premium. There is evidence for reverse causality, but it cannot explain the whole marriage premium.

4.3.2 Identification Strategy

To overcome possible endogeneity and reverse causality in Equation 4.1, I use the instrumental variables approach. To do that, I need variables that predict the type of marriage but do not have a direct effect on wages. Since both intermarriage and

intramarriage are potentially endogenous, I need two instruments, one that predicts intermarriage and another that predicts intramarriage.

In Section 4.2, I show that immigrants are significantly more likely to marry a partner from their country of origin than either a German or an immigrant from another country of origin. The economics and sociology literature suggest that forming bonds with individuals who are of similar age, religion, or ethnicity is easier than forming bonds with those who are different. Thus, it is reasonable to assume that immigrants will have a higher probability of marrying someone from the same country if they have a higher probability of meeting them (Borjas, 1995; Bisin and Verdier, 2000; Meng and Gregory, 2005;). This can be captured as a ratio of immigrant females to native females; an increase in the ratio increases the probability to meet and marry someone from the same country.

Another important factor determining types of marriages in the marriage market is the intensity of competition for culturally similar mates among the men from the same country (Freiden, 1974; Angrist, 2002; Meng and Gregory, 2005). For example, if there are fewer Turkish women than Turkish men, there will be more competition for the available Turkish women and some of these men will be forced to marry outside the cultural cluster. This can be captured with a ratio of immigrant females to immigrant men.

More formally, I define immigrant female ratio and the sex ratio as:

$$FemaleRatio_{it}^{m} = \frac{n_{tgs}^{f}}{N_{ts}^{f}} \tag{4.2}$$

$$SexRatio_{it}^{m} = \frac{n_{tgs}^{f}}{n_{tgs}^{m}} \tag{4.3}$$

where n_{tgs}^{f} is the number of immigrant females in year t from country g living in state s and n_{tgs}^{m} is the equivalent measure for the number of immigrant males; N_{ts}^{f} is the total number of women in a given year t living in the state. Hence, the female ratio is the number of women from the same country an immigrant man comes from, divided

by the total number of women, both immigrant and native, in a given year t and state s. Sex ratio is the number of women from the same country per each immigrant man from the same country in a given year and state.

I use data from the Statistisches Bundesamt (Federal Statistics Office) to build my instruments. Under ideal conditions, I would build instruments using data on singles of marriageable age at metro-level. Due to data constraints, I use aggregated state level data that does not distinguish between age groups or marital status, but I believe that this data is still a good proxy for the size of different immigrant groups, which is a key component of my instruments[3]. Additionally, in general the marriage market tends to be localized except in the cases where immigrants have strong preferences for a partner from the same country of origin, i.e. he might be willing to search for a partner across city, state, and country boundaries.

I provide summary statistics for the instruments in Table 4.5. In columns 1 to 3 of Table 4.5, I report by country of immigrant origin the mean, minimum, and maximum over years and states for the sex ratio, while in columns 4 to 6, I present equivalent statistics for the female ratio. Russia with 1.5 Russian females per one Russian male has highest mean for the sex ratio, while Italy with 0.6 Italian females per one Italian male has the lowest mean for the sex ratio. On the other hand, Turkey with 0.0172 Turkish females per one German female has the highest mean for the female ratio while Kazakhsatn with 0.0004 Kazakhsatnian female per one German female has the lowest female ratio. When the female ratio is low, the immigrant women from the men's country of origin are relatively scarce and there is a higher chance that the man will stay single or marry a German woman. The higher the value of the female ratio, the higher is an immigrant's chance to marry a woman from his own country. Thus, the female ratio is positively related to the probability of marrying an immigrant and it is at the same time negatively related with the probability to marry a German. The sex ratio is positively related to the probability to marry an immigrant and negatively

[3] It is reasonable to expect that an immigrant from a larger immigrant community is more likely to be intramarried

related with the probability to marry a German. In addition, a highly unbalanced sex ratio might increase the probability of staying single for the men who strongly prefer partners from the same country.

These instruments are inspired by Angrist (2002) who uses this for the purpose of studying the effect of relative supply in the marriage market using sex ratios, and Meng and Gregory (2005) who study intermarriage wage premium in Australia. My instruments are a refined version of these and are intended to capture the relative supply of immigrant women from a particular country and the level of competition among males from the same country for the available females from that country. I further refine instruments by geographic units, in this case, German states, since the marriage market tends to be local.

Although there is no reason to believe that these instruments affect wages directly, there is some fear that instruments might be correlated with immigrants' wages if immigrants are systematically choosing to go to certain states because of better local economic conditions. However, I can control for state fixed effects that will capture the time invariant state-specific effects such as institutional differences, industry structure, or attitudes towards immigrants, and the year fixed effects which will capture potential differences across years such as macroeconomic shocks. Thus, conditional on fixed effects, I expect the instruments to be uncorrelated with wages. Additionally, variations of these instruments have been used by Meng and Gregory (2005), Meng and Meurs (2009), Furtado and Theodoropoulos (2009), Chi and Drewianka (2014) in a similar context.

An alternative methodology to IV approach is the use of individual fixed effects if and only if panel data are available together with strong assumption that the endogeneity is caused by time-invariant variables. Although I have panel data, the assumption of time-invariant endogenity is too restrictive in immigrant studies such as mine. For example, it is hard to imagine that German language proficiency, which affects both intermarriage and wages, does not change over time. In addition, individual fixed effects would not correct for the possible presence of self-selection into

the marriage or reverse causality. Finally, an individual fixed approach requires the identification of marriage premium to come from change in marital status, which is not a frequent event in the data.

4.3.3 Estimation

I employ a modified version of two-stage least squares (2SLS) to estimate the causal effect of the inter- and intra-marriage on wage (Heckman, 1978; Wooldridge, 2002; Angrist and Pischke, 2008). When the endogenous variable is a binary variable or a nonlinear function, then the conditional expected function in the first stage is probably nonlinear and the usual OLS first-stage would be a mere approximation of the underlying nonlinear conditional expected functions. The performance of this approximation and the precision of the instrument would in large part depend on the data on hand. In case of data that is concentrated around the mean, the linear probability model in the first stage would be a good approximation. In my case, only 11 percent of marriages are intermarriages which implies that intermarriage is a rare event and the data is skewed. Thus, using the usual OLS estimator in the first stage regression would fit poorly and provide very imprecise estimates of the second stage. Furthermore, a practical problem might be a considerable number of predicted values of endogenous variable out of 0-1 range, and it is not clear how one should adjust them.

In order to better approximate the conditional expected function of the first stage, and to avoid possible inconsistencies associated with using a nonlinear estimator such as multinomial logit in the first stage, I employ Heckman's (1978) approach that is more efficient than the standard 2SLS when endogenous variables are discrete. The approach involves three-step estimation. In the first step, I estimate a multinomial logit model of marital status, M_{it}, of an individual i in year t,

$$Pr(M_{it} = j) = \frac{\exp(X_{it}\ \delta^j + Z_{it}\ \gamma^j)}{\sum_{j \in J} \exp(X_{it}\ \delta^j + Z_{it}\ \gamma^j)}, \tag{4.4}$$

where $J \in \{single, MarryGer, MarryImm\}$; X_{it} is vector of controls including education, experience and its square; a binary variable equal to 1 if an immigrant arrived in Germany before they were 19 years old and 0 otherwise; years since immigration, state and year fixed effects; and, the vector Z_{it} includes the sex ratio and the female ratio. Then I compute the fitted values of $\widetilde{MarryGer_{it}}$and $\widetilde{MarryImm_{it}}$ which I use as the instruments for endogenous variables in the standard first stage of the 2SLS,

$$MarryGer_{it} = \rho_0^1 \, \widetilde{MarryGer_{it}} + \rho_1^1 \, \widetilde{MarryImm_{it}} + X_{it} \, \pi^1 + \upsilon_{it}^1, \tag{4.5}$$

$$MarryImm_{it} = \rho_0^2 \, \widetilde{MarryGer_{it}} + \rho_1^2 \, \widetilde{MarryImm_{it}} + X_{it} \, \pi^2 + \upsilon_{it}^2. \tag{4.6}$$

In the third step, I estimate the wage regression from Equation 4.1, the second stage of 2SLS, by plugging fitted values for $\widehat{MarryGer_{it}}$ and $\widehat{MarryImm_{it}}$ from equations 4.5 and 4.6, i.e.

$$lnW_{it} = \beta_1 \, \widehat{MarryGer_{it}} + \beta_2 \, \widehat{MarryImm_{it}} + X_{it} \, \alpha + \epsilon_{it}. \tag{4.7}$$

The coefficients on the type of marriage in the second stage regression, Equation 4.7, is identified from the variation in the instruments since I include the controls, X_{it}, in all three steps. Using the non-linear fitted values as instruments in the first stage yields more efficient 2SLS since the nonlinear model in Equation 4.4 gives a better approximation of the first-stage conditional expected function than would be given by the linear model (Newey, 1990). More importantly, this approach yields consistent estimates of the 2SLS (Wooldridge, 2002, p. 230–237; Angrist and Pischke, 2008, p. 190–192) and precludes potential problems of "forbidden regression", i.e. plugging in fitted values from Equation 4.4 directly into the second stage regression, Equation 4.7.

4.4 Results

Table 4.6 presents estimates of the intermarriage and intramarriage premiums for my main sample. I estimate a standard wage equation, including dummy variables

for levels of education, plus measures of immigration history, years of work experience, and controls for year and state of residence. I firstly estimate the intermarriage and intramarriage premiums using OLS, column 1, and find that intermarried and intramarried immigrant men on average earn 13.8 percent and 9.8 percent more than comparable single immigrant men, which confirms the existence of a marriage premium. Thus, the additional benefit of marriage associated with marrying German women is four percentage-points after including controls. This is substantially lower than the mean differences in Section 4.2 where inter- and intra-marriage premiums are 37.8 and 14.5 percent (see Table 4.2), respectively. Thus, one can conclude that, as expected, the differences in observables explain a considerable part of the male intermarriage premium. The remaining part of the marriage premium, after controlling for observables, could be attributed to the productivity hypothesis if there were no endogenity, self-selection, or reverse causality.

However, due to possible self-selection, reverse causality, and endogeneity, the OLS estimates might be biased and the direction of the bias is ambiguous. This is why I employ the instrumental variables approach and the two-stage least squares (2SLS) estimator. I instrument intermarriage and intermarriage using the sex ratio and the female ratio, which represent competition in the marriage market and the relative supply of women from an immigrant's own country of origin. In this specification, column 2, I find that the intermarriage premium increases to 44.4 percent, a 30 percentage-point increase compared to the OLS results in column 1, while the intermarriage premium increases to 31.5 percent, a 21 percentage-point increase compared to the OLS results in column 1.

Finding that the IV estimates are significantly greater than the OLS estimates indicate large downward bias in the OLS estimates that comes as a result of not controlling for the endogeneity of marriage. One explanation for why the IV estimates are larger than the OLS is that there is a negative self-selection into intermarriage, i.e. there exist unobservables that at the same time increase the probability of intermarriage and depress wages. One example of this is that immigrants that have the most

to gain from intermarriage, e.g. those who are not in the country legally, are the ones that will be the most proactive in finding a German wife and at the same time have the most depressed wages because of lack of bargaining power. What is important to note is that the literature on traditional male marriage premium finds evidence of both negative (Becker, 1991) and positive self-selection in marriage (Lam, 1988), while inter-marriage literature almost unanimously finds evidence of negative-self selection (Meng and Gregory, 2005; Furtado and Theodoropoulos, 2009; Meng and Meurs, 2009). Thus, selection into (inter)marriage explains part of the (inter)marriage premium, but there is a significant part of the premium that remains and that can be attributed to the increased men's productivity that comes with marriage.

Most importantly, the additional benefit of marriage associated with marrying German women rises to 12.9 percentage-points, an 8.9 percentage-point increase. To put these findings in the context of existing literature, my findings for Germany are lower than Meng and Gregory (2005), Meng and Meurs (2009), and Chi and Drewianka (2014) who find that benefits of marrying an Australian, French, or American, are a 20, 30, and 40 percent wage increase, respectively.

The validity of the IV results in column 2 critically depend on the exogeneity and strength of my instruments. Although the exogeneity of the instruments cannot be tested and relies on an economic argument, the strength of the instruments is testable. I perform weak instruments tests using methodology proposed by Angrist and Pischke (2008) and modified by Sanderson and Windmeijer (2016) because an ordinary F-test is not appropriate in cases with multiple endogenous variables. In addition, I test the identification of the equation as a whole using the Kleibergen-Paap Wald test (Kleibergen and Paap, 2006). The ordinary F-statistic is 54.82, Sanderson and Windmeijer F-test statistic is 106.56, and Kleibergen-Paap Wald rk-F statistic is 51.65. Stock, Yogo and Wright's (2002) rule of thumb for strong instruments is 10 in case of single endogenous variable, and 7.03 in a case of two endogenous variables with two instruments. Thus, I reject the hypothesis that my instruments are weak which

means that the bias in the second stage is negligible[4].

I additionally check the strength of my instruments, the female ratio and the sex ratio, by using the standard 2SLS methodology, where instruments are used directly in the first stage of linear probability model. I find that the sex ratio and the female ratio are statistically significant predictors of intermarriage and intramarriage and have the expected signs. I find that the sex ratio and the female ratio are positively correlated with intramarriage and inversely correlated with intermarriage. I find that Sanderson and Windmeijer F-statistic are 12.11 and 14.25, well above critical value suggested by Stock and Yogo (2002). I also note that 3,286 or 18 percent of predicted values of intermarriage and intermarriage are outside of 0–1 range when using the standard 2SLS approach, which clearly indicates a poor fit induced by non-linearity of the conditional expected function from the first stage. Thus, estimating the second stage of standard 2SLS model is a challenge because there is large number of predicted values out of range 0–1 and there is no sensible way of adjusting these values[5]. In contrast, the approach I use has zero predicted values of intermarriage and intermarriage that are outside of 0–1 range.

A caveat of my approach is that non-linearity of the multinomial logit used to transform the instruments might be driving the results, i.e. the results are driven by the functional form rather than the intended sources of variation. In order to assure that the results are driven by the intended sources of variation, instruments, I include the instruments together with other exogenous variables in all three stages. In the case that the non-linearity at the initial stage, the multinomial logit, is the source of identification, the estimates when instruments are included in all three stages should not be very different from the main results. However, if the source of identification is coming from the instruments, then including the instruments in all three stages should change the results significantly and make them less precise. I find that indeed

[4] Multinomial estimates of intermarriage and intrammariage are reported in Appendix Table A.1 while the first stage results are reported in Appendix Table A.2.

[5] I report these first stage results in Appendix Table A.3

the source of identification is coming from the instruments since the difference between intermarriage and intramarriage premium falls from 12.9 to 5.6 percentage-points and the standard errors on intermarriage and intermarriage premiums increase[6].

Finally, I find that the estimated coefficients for human capital variables, education level and experience, have the expected sign and are statistically significant except for the coefficient on Primary school. The omitted group is single immigrant men who completed less than 9 years of education (incomplete primary education). Completing apprenticeship degree results in a 5.4 percent increase in wage, completing high school degree years results in an 11 percent increase in wage, and completing more than high school results in a 39.9 percent increase in wage, as expected. The estimate for the highest level of education is statistically significant on all conventional levels. As for years of work experience, I find a typical concave earning profile since the squared term is consistently negative, and both are statistically significant.

Immigration history controls, years lived in Germany and a binary variable indicating whether an immigrant arrived at age 19 or younger, have the expected positive signs, but only years lived in Germany have statistical significance. Each additional year in Germany increases the immigrants' wage by 0.8 percent. Immigrants who come from Austria, the only German speaking country in the sample, have a 39.3 percent higher wage than those coming from other countries and the result is highly statistically significant indicating the importance of mastering the language of the host country. Lastly, the year and state fixed effects are included to control for possible correlation between instruments and wages which could be induced if immigrants are systematically choosing some states over others because of the potentially higher wages and better opportunities[7].

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[6] I report these results in the Appendix Table A.4.

[7] The estimates of the state and year fixed effects are available on request.

4.5 Robustness

In Table 4.7, I present OLS and IV estimates of inter- and intra-marriage premiums for alternative samples and additional controls. In the first specification, I use binary variables for the year of immigration to Germany instead of a variable that measures duration of stay in Germany. In the second specification, I include additional dummies for the region of origin. In the third specification, I exclude immigrants who are native German speakers. In the fourth specification, I exclude individuals who are presently single but were married before. In final specification, I add one digit dummy variables for occupation and industry[8]. Across these specifications, I find that additional intermarriage premiums vary between 6 and 13 percentage-points after correcting for endogenity, self-section, and reverse causality, compared to 12.9 percentage-points in main results.

In my main specification, I use control for the length of time an individual spent in Germany since immigration ($yearsInGerm$) but not the year of immigration, $immYear$. Using $yearsInGerm$ as a control in the main regression, I control for the unobservable factors that are affecting both wages and likelihood of intermarriage. For example, it is reasonable to expect that individuals who have spent more time in Germany have better language skills and better knowledge of the culture, which makes them more attractive in both marriage and labor markets in the host country. A possible concern with using $yearsInGerm$ instead of $immYear$ is that the former will not account for possible cohort effects and that might bias the premium. For example, there might exist differences in quality and willingness to assimilate between immigrants coming as refugees and those coming for better economic opportunities. This is why I include binary variables for the year of immigration instead of the variable for the duration of stay in Germany. In columns 1 and 2 of Table 4.7, I find that the effects of intermarriage and intramarriage estimated using OLS are similar to the main OLS results in Table 4.6 while the estimates obtained with the IV fall to 37.2 percent and

[8] Appendix B contains complete results.

27.8 percent compared to 44.4 percent and 31.5 percent in Table 4.6, respectively. The intermarriage premium is 4.6 percentage points when I use OLS while it rises to 9.4 percentage points after I employ instrumental variable approach. Thus, the intermarriage premium is three percentage points lower than in the main specification after controlling for possible cohort effects. I prefer the main specification to the specification with cohort effects because it allows me to account for the value from an extra year in Germany which proxies for other important variables that affect both wages and likelihood of intermarriage such as language skills or familiarity with informal (e.g. culture and customs) and formal (e.g laws and regulations) institutions in Germany.

Another concern with my main specification is the absence of controls for countries of origin because it is possible that intermarriage premium is different across countries. For example, the intermarriage premium for immigrant men from the European Union (EU) might be significantly lower than for those from non-EU countries because of freedom of movement of labor across borders in the EU. EU-men do not benefit from the legal benefits that non-EU men get when they marry Germans because the EU men already had those benefits even without the marriage. I do not include binary variables for the country of origin in the main specification because my instruments have three sources of variation: i) state, ii) year, and iii) country of origin. Thus, accounting for the state, year, and country of origin fixed effects would eliminate all variation in my instrument. A solution to this problem would be to use even more granular geographic units instead of states in the construction of the instrument, but due to data limitation, this is not possible at this time. However, I control for possible bias in the intermarriage premium associated with the country of origin by including three dummy variables indicating if the individual is coming from one of the original 15 EU countries (EU15), other countries that entered the EU in the late 1990s and early 2000s, other European countries, or rest of the world. In columns 3 and 4 of Table 4.7, I find that coefficients on intermarriage and intermarriage increase from 44.4 percent and 31.5 percent in OLS estimation (column 3) to 51.8 percent and 40.4 percent in IV estimation (column 4), respectively. I also find that an additional

intermarriage premium is 11.4 percentage points when I control for regions of origin and after correcting for endogenity, self-selection, and reverse causality, compared to 12.9 percentage points in the main results (Table 4.6) where there are no controls for country or region of origin. This evidence suggests that although the country of origin is important, the effects of the region-of-origin do not significantly affect the difference in additional benefits of marrying a German. These findings suggest that the legal benefits that come with intermarriage are not driving the premium.

Additionally, in my main specification, I am unable to control for language skills due to data limitations although the literature has pointed out the importance of language skills in both marriage and labor markets. I expect that the coefficient on intermarriage in my main regression is upward biased since better language skills are positively correlated to both the probabilities of marrying a German woman and earning higher wages. In the main results (Table 4.6), I include a dummy variable indicating if the individual is coming from a German-speaking country to control for possible effects of language on both wages and intermarriages. Additionally, some of the language abilities are proxied with the variable lengths of time since immigrating to Germany and dummy variable for those who immigrated before age 19. Both of these variables are positively correlated with language skills. Finally, I perform an additional robustness check by excluding Austrian men, the only native German speakers. I find that the additional intermarriage premium is 11.1 percentage points, column 6 of Table 4.7. Thus, these results indicate that my main results are not driven by the presence of Austrian men.

In my main results, a partner's status is contemporaneous to the year of the survey which might bias the results. For example, there will be a downward bias if there is a large number of individuals who switch from intermarriage to intra-marriage, provided that the intermarriage benefits last beyond the legal ending of the marriage. However, due to the low probability of dissolution of marriage in my sample, I do not believe that there is much of a downward bias introduced by switching from intermarriage to

intramarriage. Another concern that might decrease both marriage premiums is misclassification of singles who used to be married if marriage benefits last beyond the end of marriage. I check the robustness of my results to this by excluding singles who are reported to be widowed or divorced. In columns 8 of Table 4.7, I find that the IV estimates of intermarriage increases to 46 percent compared to 44.4 percent in my main results and that the effect of intramarriage changes to 33 percent from 31.5 percent. Thus, the additional intermarriage premium rises to 13 percentage points from 12.9 percentage points in the main results.

Finally, I examine the robustness of the results to inclusion of 1-digit occupation and industry binary variables. Note that this is a crude measure since 1-digit occupation and industry dummies account for 9 different occupations and 9 different industries.For example, one can be in a 'Service and Sale Workers' occupation, but we do not know whether he is a managing director or a sales clerk. Although I control for education in my main specification, which in part controls for possible differences in earnings due to differences in human capital, I include dummies for occupation and industry to further increase the efficiency of my estimates for intermarriage and intarmarriage premiums. In columns 9 and 10 of Table 4.7, I find that the additional intermarriage premium is 6 percent after controlling for industry and occupation dummies. It should be noted that the standard errors on the estimates of intermarriage and intramarriage do not change compared to the main IV results. Also, the sample size decreases by 2,081 observations due to lack of information on occupation and industry for certain individuals. The significant decrease in the additional intermarriage premium after including dummies for industry and occupation might be due to the smaller sample. It is also plausible that intermarriage opens up access to better jobs for immigrants who are now part of the native social and business network and I intend to investigate this possibility in my future work.

Table 4.1: Immigrants' Countries of Origin, 1984–2015

Country of Origin	Frequency	Percent
Turkey	5,300	29.8
Ex-Yugoslavia	3,006	16.9
Italy	2,777	15.6
Greece	1,601	9
Spain	1,281	7.2
Poland	1,108	6.2
Russia	1,052	5.9
Kazakhstan	1,012	5.7
Romania	418	2.3
Austria	243	1.4
Total	17,798	100

Note: Author's calculations from the German Socio-Economic Panel

Table 4.2: Average Annual Wage and Marriage Premiums for Immigrants, 1984–2015

	Single	German Spouse	Immigrant Spouse	Intermarriage Premium	Intramarriage Premium
	(1)	(2)	(3)	(2) – (1)	(3) – (1)
Mean	29,517	40,679	33,799	11,162 (or 37.8 %)	4,283 (or 14.5 %)
Standard Deviation or Error	(14,223)	(23,628)	(16,520)	(555.5)	(345.6)

Note: Annual Wages are in real €. Author's calculations from the German Socio-Economic Panel

Table 4.3: Descriptive Statistics for Immigrant Men by Marital Status, 1984–2015

	Single	Intermarried	Intramarried
Age	36	41	43
Experience	15	19	22
Education			
Incomplete	14.6	9.6	14.3
Primary school	61.5	56.4	62
Apprenticeship	12.6	14	15.6
High School	3.9	4	1.2
College or Higher	7.4	15.9	6.9
Immigration Background			
Years in Germany	19	25	20
Arrived before age 19	53.87	53.79	32.2
Residence in Germany (in percent)			
North-Rhine-Westfalia	27	33	26
Hessen	12	10	12
Baden-Wuerttemberg	29	23	25
Bavaria	13	16	15
Lower Saxony	7	6	8
Other 11 States	12	12	14
Number of Observations	2,625	2,110	13,063

Note: Author's calculations from the German Socio-Economic Panel

Table 4.4: Immigrant Men's Spouse's Nationality, 1984–2015

Nationality of Husband	Nationality of Wife		
	German	Same	Other
Austria	66.3	24.6	9
Ex-Yugoslavia	10.4	72.7	16.9
Italy	31	64.7	4.3
Poland	13.7	81.9	4.4
Romania	5.6	88.2	6.2
Turkey	9.6	88	2.4
Greece	13.6	78.8	7.5
Kazakhstan	3.2	69.9	26.9
Russia	2.6	66.8	30.6
Spain	17.1	77.6	5.3

Note: Author's calculations from the German Socio-Economic Panel

Table 4.5: Summary Statistics for Instruments, 1984–2015

Country	Sex Ratio			Female Ratio		
	Mean	Minimum	Maximum	Mean	Minimum	Maximum
Austria	0.8	0.2	1.0	0.0015	2.3×10^{-5}	0.0064
Ex-Yugoslavia	0.8	0.3	1.5	0.0069	0	0.0245
Greece	0.7	0.2	0.9	0.0024	2.2×10^{-6}	0.0075
Italy	0.6	0.2	0.8	0.0044	2.1×10^{-6}	0.0162
Kazakhstan	1.2	1.0	1.4	0.0004	0	0.0012
Poland	1.0	0.3	1.8	0.0029	0	0.0139
Romania	0.9	0.3	2.0	0.0008	0	0.0082
Russia	1.5	1.0	1.9	0.0017	0	0.0079
Spain	0.9	0.3	3.0	0.0012	0	0.0049
Turkey	0.7	0.0	1.0	0.0172	5.2×10^{-6}	0.0524

Note: The reported statistics are taken over years and states. Author's calculations from the Statistisches Bundesamt (Federal Statistics Office).

Table 4.6: Estimates of the log Annual Wage Equation for Immigrant Men, 1984–2015

Variables	OLS (1)	IV (2)
Marriage		
Intermarried	0.138* (0.024)	0.444* (0.106)
Intramarried	0.098* (0.014)	0.315* (0.083)
Education		
Primary school	0.018 (0.015)	0.019 (0.016)
Apprenticeship	0.060* (0.021)	0.054** (0.022)
High School	0.095** (0.047)	0.110** (0.050)
College or Higher	0.411* (0.036)	0.399* (0.038)
Immigration Background		
Years since arrival	0.009* (0.001)	0.008* (0.001)
Native German speaker	0.406* (0.077)	0.393* (0.082)
Arrived before age 19	0.011 (0.017)	0.012 (0.017)
Experience	0.021* (0.002)	0.013* (0.004)
Experience Squared	-0.0005 (0.00004)	-0.0003 (0.00007)
Constant	9.713* (0.052)	9.611* (0.065)
Observations	17,798	17,798
R-squared	0.242	
First Stage	**F-statistic**	**SW F-statistic**
Intermarried	54.82	109.59
Intramarried	72.83	106.56

* p<0.01, ** p<0.05

Note: Dependent variable is log wage and the reported standard errors are clustered at individual level. The state and year fixed effects are included in both regressions and available at request together with first stage results. SW F-statistic refers to Sanderson and Windmeijer (2016) F-statistics which is appropriate when there are multiple endogenous variables. The Kleibergen-Paap Wald rk F statistic for weak identification is 51.65. Stock, Yogo and Wright (2002) rule of thumb for strong instruments is 7.03 in case of two endogenous variables with two instruments.

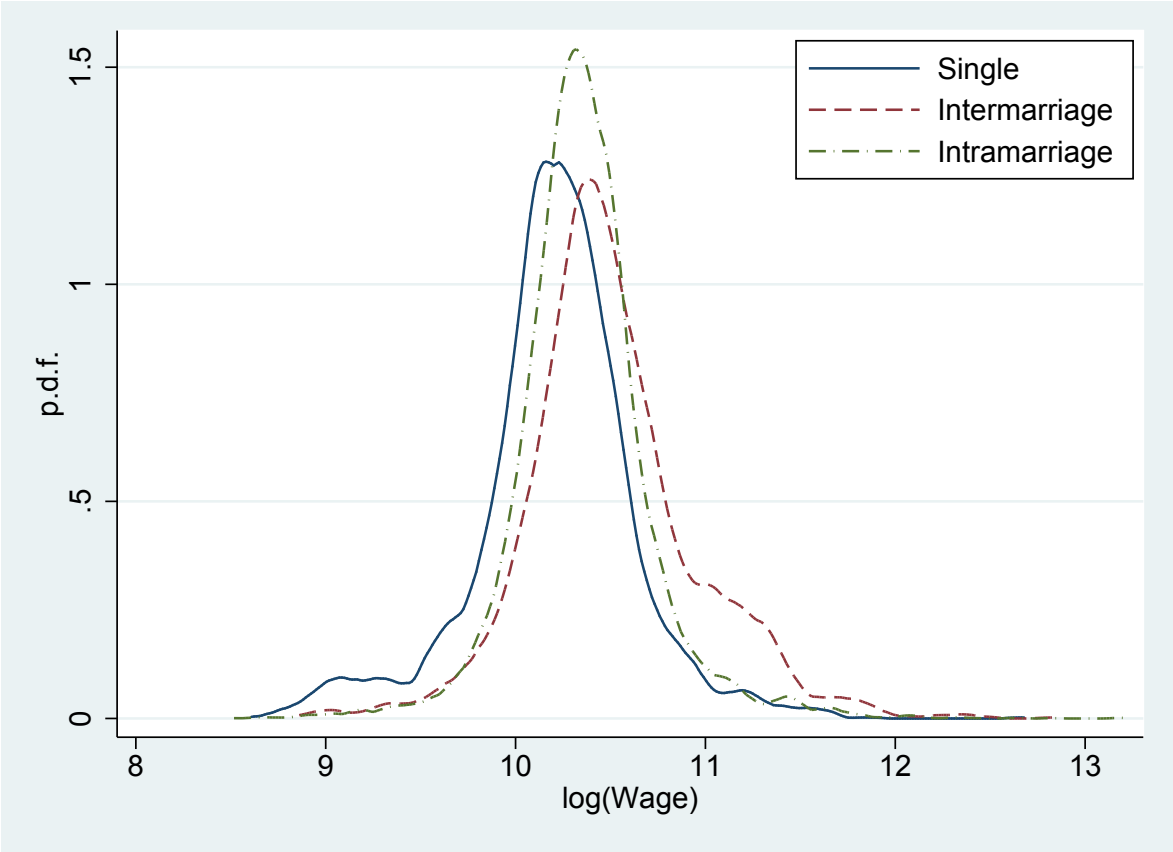
Table 4.7: Estimates of the log Annual Wage Equation for Immigrant Men with Alternative Samples and Extended Controls, 1984–2015

Variables	Specification 1		Specification 2		Specification 3		Specification 4		Specification 5	
	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Marriage										
Intermarried	0.143*	0.372*	0.138*	0.518*	0.142*	0.423*	0.151*	0.460*	0.113*	0.368*
	(0.024)	(0.096)	(0.024)	(0.116)	(0.024)	(0.104)	(0.025)	(0.099)	(0.024)	(0.100)
Intramarried	0.097*	0.278*	0.101*	0.404*	0.095*	0.312*	0.112*	0.330*	0.084*	0.308*
	(0.014)	(0.079)	(0.015)	(0.085)	(0.014)	(0.083)	(0.015)	(0.078)	(0.014)	(0.081)
Observations	17,798	17,798	17,798	17,798	17,555	17,555	17,168	17,168	15,717	15,717
R-squared	0.25		0.246		0.213		0.248		0.305	

* p<0.01

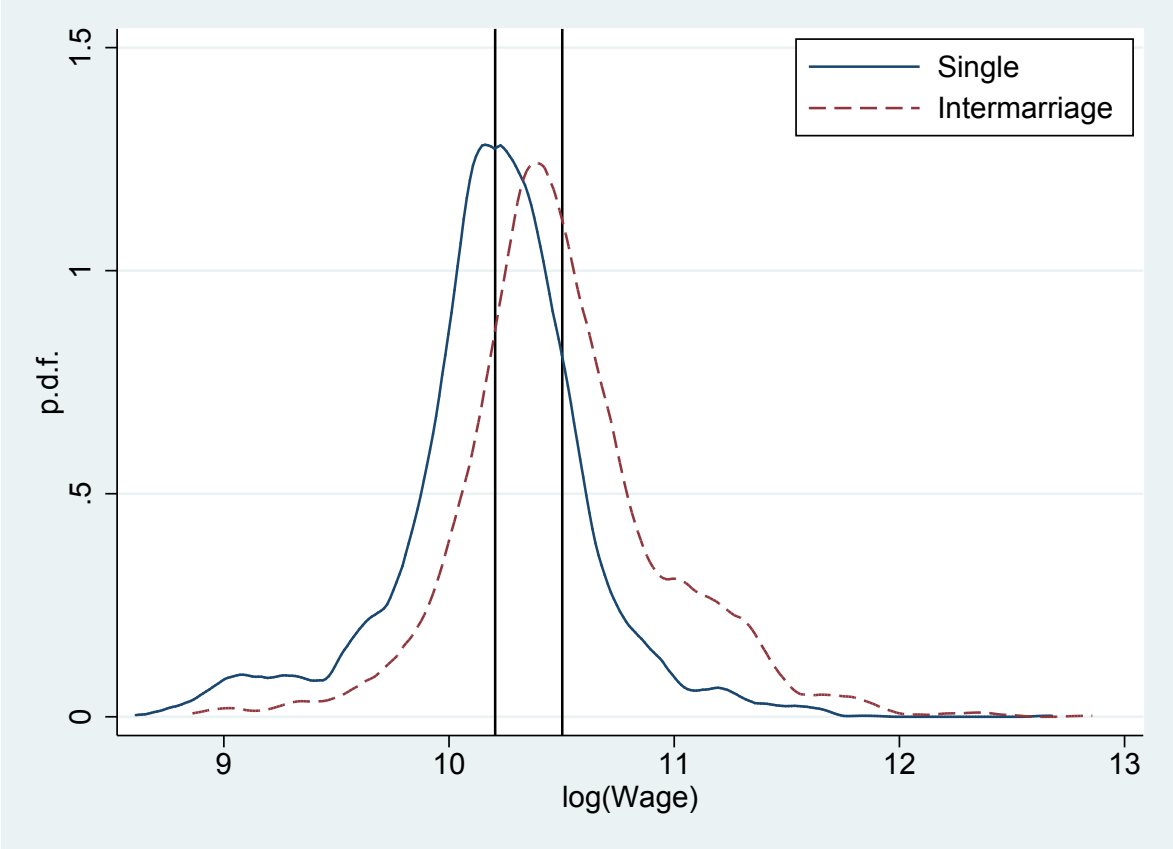
Note: Dependent variable is log wage and the reported standard errors are clustered at individual level. The state and year fixed effects are included in all regressions and available at request. Specification 1 includes dummy variables for immigration cohorts. Specification 2 includes dummy variables for regions of origin. Specification 3 excludes native German speakers. Specification 4 excludes individuals presently single but who were married before. Specification 5 includes dummy variables for occupation and industry at 1-digit level. In each specifications 1–5, I reject hypothesis that the instruments are weak.

Figure 4.1: Density Function of Log Wage by Partnership Status, 1984–2015



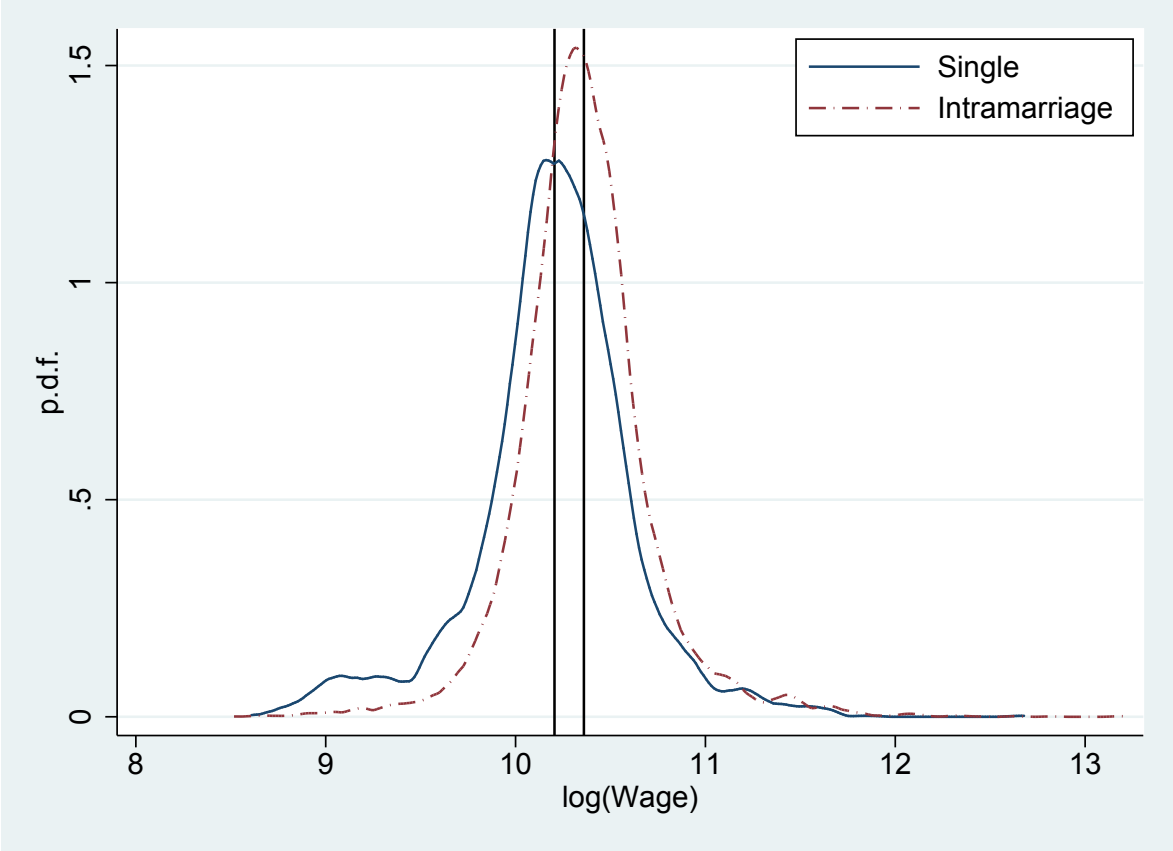
Note: Estimated using kernel regressions.

Figure 4.2: Density Function of Log Wage of Singles and Intermarried Individuals, 1984–2015



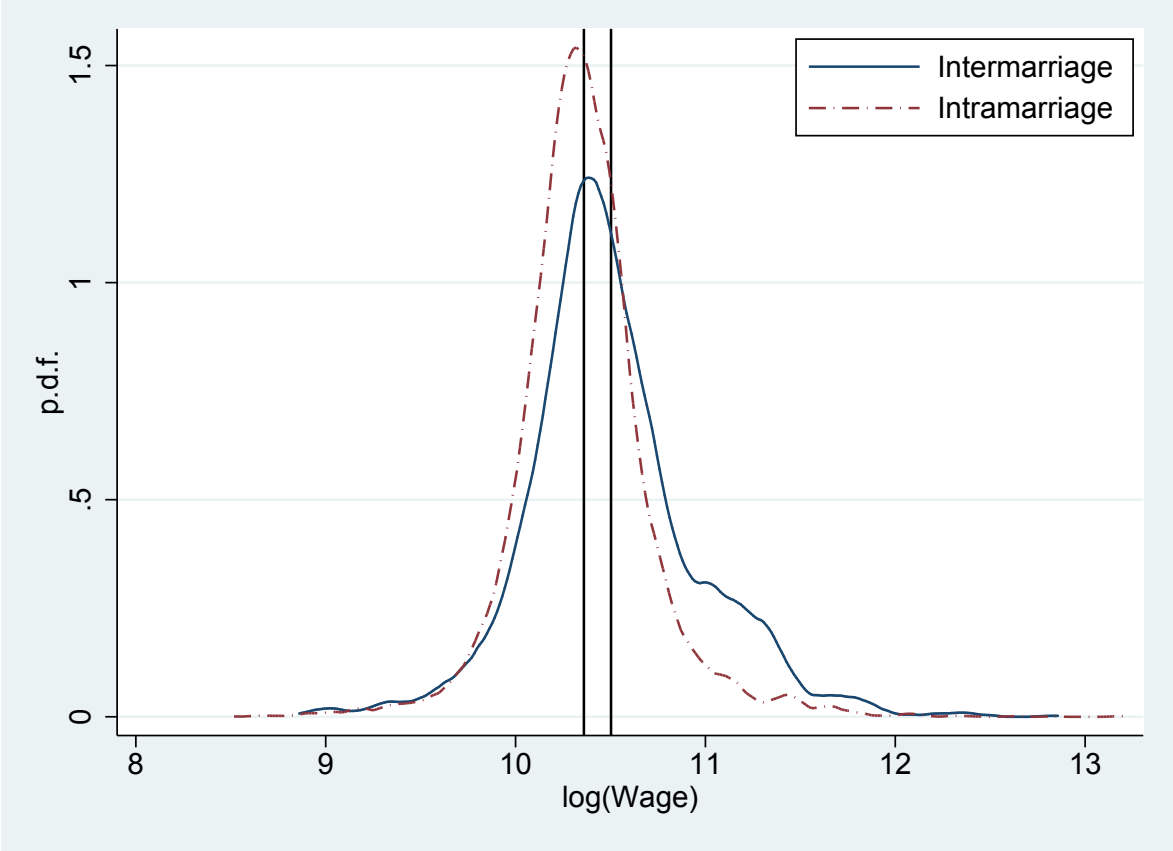
Note: Estimated using kernel regressions. Left and right vertical lines are the mean wages for singles and intermarried, respectively.

Figure 4.3: Density Function of Log Wage of Singles and Intramarried Individuals, 1984–2015



Note: Estimated using kernel regressions. Left and right vertical lines are the mean wages for singles and intramarried, respectively.

Figure 4.4: Density Function of Log Wage of Intermarried and Intramarried Individuals, 1984–2015



Note: Estimated using kernel regressions. Left and right vertical lines are the mean wages for intramarried and intermarried , respectively.

Chapter 5

DETERMINANTS OF MARRIAGE TYPE AND ASSORTATIVE MATCHING

In this chapter, I study determinants of inter- and intra-marriages, and I summarize how well matched the marriage partners are according to their demographic characteristics. Studying the determinants of inter- and intra-marriages informs about the key factors that influence the choice of an immigrant partner over a German partner, while the characterization of matches by demographic characteristics shows whether there is positive or negative assortative matching.

The choice of a marriage partner is determined by supply and demand, which are influenced by i) personal preferences, ii) influences from third parties such as family, church or state, and iii) the constraints of the marriage market (Kalmijn, 1991). There are a number of different sociological, physiological and economic theories on partner choice such as positive assortative mating theory (Kalmijn, 1998), structural opportunity theory (Blau, 1977), exchange theory (Merton, 1941), and assimilation-adaptation-socialization theory (Hervitz, 1985). Additionally, the choice of a marriage partner is influenced by expected division of labor in household (Becker, 1991), as well as by the expected taste for consumption (Lam, 1988)[1]. The empirical work on partner choice focuses on matching by race, ethnicity, religion, and socioeconomic status.

Positive assortative mating is the dominant explanation of marital endogamy where one will search for a partner that is similar to him or her because similarity leads to personal attraction, i.e. positive assortative matching is the matching of likes (Byrne, 1997). The similarity can be socio-economic or cultural. One of the major factors

[1] For detailed exposition see Chapter 3.

for partner selection is the level of human capital or education because it relates to income, status, taste, values, and lifestyles. The idea is that group identity decreases as educational level increases because higher education focuses on individual achievements and universalistic principles (Hwang, Saenz and Aguirre, 1995). Thus, higher educated Germans and immigrants would be more open to marrying someone outside their ethnic circles, and they would focus on finding a partner who matches them in terms of education. In addition, marrying a German woman would open numerous opportunities for a highly educated immigrant man, because he would get permanent status in the country and access to native cultural and social circles, which would, in turn, improve his labor market outcomes. Thus, I expect individuals with higher levels of education to be more likely to intermarry compared to those with low levels of education since highly educated ones are more open and have the most to gain from intermarriage.

The rest of this chapter is structured as following: in Section 5.1 I explore determinants of inter- and intra-marriage, and in Section 5.2 I examine spouse's characteristics as well as levels of assortative matching.

5.1 Determinants of Intermarriage and Intramarriage

5.1.1 Model and Estimation

I study determinants of intermarriage and intermarriage using the additive random utility model. I assume that an immigrant's utility of marital status j can be defined as

$$U_{ij} = V_{ij} + \epsilon_{ij}, \qquad j = \{Single, German, Immigrant\} \tag{5.1}$$

where V_{ij} is the deterministic component of utility and ϵ_{ij} is random component of utility. For notational simplicity, I suppress the immigrant's subscript i in the following.

An immigrant chooses the marital status j that produces the highest utility, so that

$$\begin{aligned} Pr[M = j] &= Pr\left[U_j \geq U_k, \text{ all } k \neq j\right] \\ &= Pr\left[U_j - U_k \geq 0, \text{ all } k \neq j\right] \\ &= Pr\left[\epsilon_k - \epsilon_j \leq V_j - V_k, \text{ all } k \neq j\right] \end{aligned} \tag{5.2}$$

I further assume that V_j can be parameterized as $V_j = X\beta_j$ and that errors ϵ_j are iid type 1 extreme value. Given these assumptions, it can be shown that (5.2) yields

$$Pr(M = j) = \frac{\exp(X\ \beta_j)}{\sum_{j \in J} \exp(X\ \beta_j)}.^{2} \tag{5.3}$$

In addition, let M be a binary variable indicating choice of marital status, so that

$$M_j = \begin{cases} 1 & \text{if } M = j \\ 0 & \text{if } M \neq j \end{cases} \tag{5.4}$$

Thus, the M_j equals one if alternative j is the observed outcome and renaming M_k equal zero. Given Equation 5.3, one can write the log-likelihood function for a sample of N immigrants with three martial status as

$$L = \sum_{i=1}^{N} \sum_{j=1}^{3} M_{ij} ln\left(Pr_{ij}\right). \tag{5.5}$$

I estimate Equation 5.5 using maximum likelihood and cluster standard errors at individual level to account for observing the same individual multiple times.

5.1.2 Results

In Table 5.1, I present coefficients of estimates for determinants of marital status where estimates in column 1 and 2 are coefficients for intermarriage and intermarriage determinants, respectively. Thus, the base group are single immigrants. One can interpret these estimates using the approach of Ben-Akiva and Lerman (1985). For

example, a decrease in competition between immigrant men for immigrant women, i.e. an increase in sex ratio, by 0.298 (one standard deviation) increases the probability of intermarriage compared to being single by 3.2 percent, *ceteris paribus*. Similarly, the same increase in the sex ratio increases the probability of intramarriage compared to being single by 203.7 percent, *ceteris paribus*. In addition, an increase in a relative supply of immigrant women, i.e. an increase in the female ratio, by 0.007 (one standard deviation) increases the probability of intermarriage by 11.1 percent, and increases the probability of intramarriage by 80.9 percent *ceteris paribus*.

These findings are consistent with the Blau's (1977) structural opportunity theory that explores the constraints of the marriage market in terms of limited partner availability and unbalanced sex ratios. For example, as the number of female immigrants from Turkey increases so does their sex ratio and the female ratio, and as these ratios increase, the odds of marrying a Turkish woman increase as well. Thus, from a Turkish man's perspective, an increase in the sex ratio and the female ratio increase his probability of marrying a Turkish woman. To summarize, as the relative number and the relative supply of females from an immigrant's country of origin increase so does the probability of marrying them. Increases in the sex ratio and the female ratio is positively correlated with the probability of intramarriage.

The coefficients on education are not statistically significant but have expected sign with better educated immigrant men being more likely to enter intermarriages. For example, obtaining a college degree as opposed to having an incomplete primary education increases the probability of intermarriage by 19.7 percent and the probability of intramarriage by 44.7 percent. Note that the coefficients on high school should be taken with caution since only 4 percent of intermarried and 1.2 percent of intramarried immigrants in my sample have high school as their terminal education (see Table 4.3).

When it comes to immigration background, I find that every additional year spent in Germany since immigration significantly increases the relative probability of intermarriage compared to intramarriage by 6.8 percent. Also, native German speaking immigrant men are significantly more likely to intermarry than intramarry with a

relative ratio of 11.41. Interestingly, I find that immigrant men who came to Germany before age 19 are 25 percent less likely to enter intermarriage compared to intramariage, but this result is not statistically significant.

5.2 Spouse's Characteristics and Assortative Matching

Exchange theory (Merton, 1941) explains why assortative matching sometimes does not happen, and individuals with different sets of resources and characteristics get married. When a highly educated immigrant marries a native who is less educated, the immigrant is getting access to native social and cultural capital that he would not be able to access if he married another immigrant. In return, the native gets economic stability. In these marriages, partners compensate each other. Thus, exploring differences in education, employment status, and earnings among inter- and intra-married couples is of interest and I explore them in detail below. I place special focus on the differences in the spousal characteristics.

In Table 5.2, I summarize spouses' demographic characteristics by the type of marriage. Wives in intermarriages are on average 37.9 years old while wives in intramarriages are on average 39.7 years old (current age, not age at marriage). Approximately 13.2 percent of German women married to immigrants graduated college or higher, while only 6.9 percent of the immigrant women did. I also find that 1.9 percent of German wives are at the bottom of the educational hierarchy with only first four grades completed, while the same is true for 24.1 percent of immigrant wives. In summary, German wives are on average younger and better educated than the immigrant wives married to immigrant men.

Moreover, I find that German wives are more likely to be attached to the labor force than immigrant wives. I find that 64 percent of German wives are either working full-time or part-time while the same is true for 55.6 percent of immigrant wives. The full-time employed German wives on average earn € 34,693 annually, while their immigrant counterparts on average earn € 24,888 annually. The part-time employed German

wives on average earn € 12,458 annually, while their immigrant counterparts on average earn € 10,512 annually. Thus, German wives are more likely to be in the labor market and those that are full-time employed earn on average € 9,805 more than their immigrant counterparts. This is not surprising given that German wives on average have more education than the immigrant wives.

Table 5.2 also shows matching by employment status, and in 24.1 percent of the intramarriages and in 22 percent of intermarriages both partners are full-time employed. In 31.5 percent of intramarriages and 41.9 percent of intermarriages, the full-time employed men marry part-time employed women[3]. It is interesting to note that in 44.4 percent of intramarriages wife does not work while that is the case in 36.1 percent of intermarriages. Thus, both partners are full-time employed in less than quarter of inter- and intra-marriages. In the 36.1 percent of intermarriages and 44.4 percent of intramarriages, there is evidence of negative assortative matching where full-time workers marry women who do not work.

In tables 5.3 to 5.8, I examine if there is evidence of assortative matching (matching of likes), in inter- and intra-marriages by age, education, employment status, and wage. The principle diagonal and cells near the principle diagonal in these tables represent positive assortative matching, whereas cells on diagonals above and below the principle diagonal and towards the north-east and south-west corners of the tables represent different levels of negative assortative matching with the corners being the highest level of negative assortative matching. Table 5.3 indicates that 38.5 percent of partners in intermarriage are in the same age group (sum of cells across the principle diagonal) and Table 5.4 indicates that 38.4 percent of partners in intramarriages[4]. In 6.7 percent of the cases in intramarriages the woman is in one age group above her husband, while in intermarriage that happens in 8.9 percent of the cases. In 39.4 percent

[3] Husbands in my sample are full-time employed while their wives can be full-time employed, part-time employed, or not working.

[4] Men who are 20-25 are in the first age group, 26–30 are in the second and so on. For women, the age groups are formed in the same way, with the only exception being that the first age group is 18–25.

of intramarriages the husband is in one age group above his wife, while in intermarriage that happens in 37.8 percent of the cases. In 84.5 percent of intramarriages and 85.1 percent of intermarriages, partners are either in the same age group or one partner is only one age group above the other partner. Thus, in both types of marriages there is some evidence of negative negative assortative matching but its level is mild (closer to principle diagonal than to the corners). It is interesting to mention that the largest difference between two types of marriage comes from German women being four percentage points more likely to be in marriages with younger immigrant men.

Tables 5.5 and 5.6 indicate that in 44.9 percent of intermarriages and 56.5 percent of intramarriages partners have the same level of education (sum of cells across diagonal). In 4.5 percent of intramarriages and 3.5 percent of intermarriages the wife has a primary education while her husband has an incomplete primary education. In 18.6 percent of intramarriages and 8.3 percent of intermarriages the wife has an apprenticeship while her husband has a primary education. It is interesting to note that in 37.6 percent of intermarriages wife has the higher level of education than the husband, while in intramarriages this is the case in 18.2 percent of the couples. Finally, in 25.3 percent of intramarriages the man has a higher education than his wife, while this is the case in only 17.5 percent of intermarriages. Thus, I find that there is more positive assortative matching by education in intramarriages than in intermarriages. For immigrant couples, it is less probable that a higher educated woman will marry a lower educated men than it is the case in immigrant-German couples. This provides some evidence against the Merton's (1941) exchange theory since only in 17.5 percent of intermarriages does the husband have a higher level of education than his wife.

Tables 5.7 and 5.8 show matching of the partner according to labor earnings that are presented by four wage percentiles. In 24.2 percent of intermarriages and 26.2 percent of intramarriages, partners earn the wage in the same percentile of the wage distribution. In 65.2 percent of intermarriages and 64.1 percent of intramarriages, the men's earnings are in the higher percentile of the wage distribution than their wives's. Lastly, in 10.6 percent of intermarriages and 9.7 percent of intramarriages, men's earnings are

in the lower percentile of the wage distribution than their wives. It is interesting to note that in 30.9 percent of intermarriages and 20.8 percent of intramarriages there is evidence of negative assortative matching by labor earning since men from the highest wage percentile marry women from the lowest wage percentile. In addition, in 16.8 percent of intermarriages and 19 percent of intramarriages men from the second highest wage percentile marry women from the lowest wage percentile.

In summary, one of the main determinants of the type of marriage chosen is the education. Better-educated immigrant men are more likely to be intermarried. The relative number of available females from the immigrant's country of origin represents the constraints of the marriage market and is positively correlated with the probability of intramarriage and negatively correlated with the probability of intermarriage. When comparing German and immigrant spouses, I find that German wives are on average younger, better educated, more likely to be in the labor market and earn, on average, € 9,805 more than their immigrant counterparts. Additionally, I study assortative matching by age, education, employment status, and wage, I find that: i) in both inter- and intra- marriages there is evidence of positive assortative matching by age, ii) positive assortative matching by education is more likely in intermarriages than in intramarriages, iii) negative assortative matching by employment is more likely in intramarriages than in intermarriages, and iv) there is strong negative assortative matching by labor earnings in both intermarriages and intramarriages.

Table 5.1: Estimates for Determinants of Inter- and Intra-Marriage, 1984–2015

Variables	Intermarriage	Intramarriage
	(1)	(2)
Marriage Market		
Sex Ratio	-4.673*	1.418*
	(0.694)	(0.334)
Female Ratio	-8.280	33.351*
	(10.292)	(6.982)
Education		
Primary school	0.012	0.079
	(0.291)	(0.191)
Apprenticeship	0.316	0.321
	(0.363)	(0.217)
High School	-0.223	-0.590
	(0.528)	(0.386)
College or Higher	0.674	0.291
	(0.433)	(0.295)
Immigration Background		
Years in Germany	0.033**	-0.033*
	(0.016)	(0.011)
Native German speaker	0.985***	-1.450*
	(0.549)	(0.492)
Arrived to Germany before age 19	-0.258	0.042
	(0.271)	(0.169)
Constant	0.025	-1.769*
	(0.806)	(0.519)
Observations	17,798	17,798
ln(L)	-11054.347	

* p<0.01, ** p<0.05, *** p<0.1

Note: Multinomial logit is used to estimate coefficients on determinants of marriage type, and coefficients are reported. The base group are single individuals. The reported standard errors are clustered at the individual level. The state and year fixed effects are also included.

Table 5.2: Descriptive Statistics for Wives of Immigrant Men by Marriage Type, 1984–2015

	Intermarried	Intramarried
Age	37.9	39.7
Education		
Incomplete (4 years or less)	1.9	24.1
Primary	42.9	50.0
Apprenticeship	31.9	17.1
High School	10.1	1.9
College or Higher	13.2	6.9
Employment Status		
Full-Time	22	24.1
Part-Time	41.9	31.5
Not Working	36.1	44.4
Wage		
All	13,373	9,478
Full-Time	34,693	24,888
Part-Time	12,458	10,512

Note:Author's calculations from the German Socio-Economic Panel

Table 5.3: Assortative Matching by Age in Intermarriages, 1984–2015

		Wife's Age											
		18– 25	26–30	31–35	36– 40	41–45	46– 50	51– 55	56–60	61– 65	66– 70	71– 75	Total
Husband's Age	20–25	2.8	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2
	26–30	5.1	6.6	1.4	0.2	0.0	0.0	0.0	0.0	0.1	0.0	0.0	13.6
	31–35	1.0	7.4	7.7	2.2	0.4	0.0	0.0	0.0	0.0	0.0	0.0	18.8
	36–40	0.1	0.9	7.8	7.6	1.8	0.3	0.1	0.0	0.0	0.0	0.0	18.6
	41–45	0.0	0.2	1.4	6.4	4.4	1.3	0.3	0.0	0.1	0.0	0.0	14.1
	46–50	0.0	0.2	1.0	1.7	4.7	4.6	1.2	0.3	0.1	0.1	0.0	13.9
	51–55	0.0	0.0	0.2	0.6	1.6	3.5	2.9	0.4	0.2	0.1	0.0	9.5
	56–60	0.0	0.0	0.0	0.2	0.7	1.1	1.8	1.5	0.2	0.0	0.0	5.6
	61–65	0.0	0.0	0.0	0.0	0.1	0.3	0.7	1.1	0.3	0.1	0.0	2.7
	Total	6.7	18.2	19.5	18.8	13.8	11.1	6.9	3.3	1.2	0.4	0.1	100.0

Note: Author's calculations from the German Socio-Economic Panel. In the main sample of interest age of immigrant men is restricted to 20–65 but their wives' age is 18–75.

Table 5.4: Assortative Matching by Age in Intramarriages, 1984–2015

		Wife's Age											
		18– 25	26–30	31–35	36– 40	41–45	46– 50	51– 55	56–60	61– 65	66– 70	71– 75	Total
Husband's Age	20–25	2.7	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.22
	26--30	3.6	4.6	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	13.55
	31--35	1.0	5.4	5.8	0.9	0.1	0.0	0.0	0.0	0.0	0.0	0.0	18.77
	36--40	0.1	1.7	7.0	6.9	1.1	0.1	0.0	0.0	0.0	0.0	0.0	18.63
	41--45	0.1	0.2	2.5	7.3	5.6	1.2	0.2	0.0	0.0	0.0	0.0	14.08
	46--50	0.0	0.1	0.4	3.0	6.3	5.3	1.0	0.2	0.0	0.0	0.0	13.93
	51--55	0.0	0.0	0.1	0.4	2.4	5.1	4.1	0.8	0.1	0.0	0.0	9.53
	56--60	0.0	0.0	0.0	0.0	0.3	1.5	3.4	2.6	0.6	0.0	0.01	5.59
	61–65	0.0	0.0	0.0	0.0	0.0	0.1	0.6	1.3	0.8	0.1	0.05	2.70
	Total	7.4	12.4	16.6	18.6	15.7	13.3	9.4	4.9	1.5	0.2	0.1	100.00

Note: Author's calculations from the German Socio-Economic Panel. In the main sample of interest age of immigrant men is restricted to 20–65 but their wives' age is 18–75.

Table 5.5: Assortative Matching by Education in Intermarriages, 1984–2015

		Wife's Age						
		In School	Incomplete	Primary	Apprenticeship	High School	College or Higher	Total
Husband's Age	Incomplete	0.0	0.3	4.5	2.7	1.1	0.3	8.9
	Primary	0.1	1.4	30.2	18.6	3.3	2.9	56.4
	Apprenticeship	0.0	0.1	4.1	6.5	1.2	2.3	14.1
	High School	0.0	0.0	1.4	0.9	1.1	0.7	4.1
	College or Higher	0.0	0.0	2.7	3.3	3.5	6.9	16.4
	Total	0.1	1.9	42.9	31.9	10.1	13.2	100.0

Note: Author's calculations from the German Socio-Economic Panel

Table 5.6: Assortative Matching by Education in Intramarriages, 1984–2015

		Wife's Age					
		Incomplete	Primary	Apprenticeship	High School	College or Higher	Total
Husband's Age	Incomplete	9.7	3.5	0.8	0.1	0.3	14.3
	Primary	12.6	38.1	8.3	0.8	2.3	62.1
	Apprenticeship	1.5	5.9	6.0	0.5	1.6	15.4
	High School	0.0	0.4	0.5	0.1	0.1	1.2
	College or Higher	0.3	2.1	1.5	0.4	2.6	6.9
	Total	24.1	50.0	17.1	1.9	6.9	100.0

Note: Author's calculations from the German Socio-Economic Panel

Table 5.7: Assortative Matching by Wage Percentiles in Intermarriages, 1984-2015

		Wife's Labor Income				
		1-25	25-50	50-75	75-100	Total
Husband's Labor Income	1-25	12.2	2.1	1.1	1.9	17.4
	25-50	12.0	2.1	1.4	1.4	17.0
	50-75	16.8	1.5	1.6	2.6	22.5
	75-100	30.9	2.0	1.9	8.3	43.2
	Total	71.9	7.8	6.1	14.2	100.0

Note: Author's calculations from theGerman Socio-Economic Panel

Table 5.8: Assortative Matching by Wage Percentiles in Intramarriages, 1984–2015

		Wife's Labor Income				
		1-25	25-50	50-75	75-100	Total
Husband's Labor Income	1-25	19.0	2.4	1.4	0.7	23.4
	25-50	18.7	2.3	2.4	1.0	24.3
	50-75	19.0	2.2	2.2	1.9	25.2
	75-100	20.8	1.8	1.6	2.8	27.0
	Total	77.5	8.7	7.6	6.3	100.0

Note: Author's calculations from the German Socio-Economic Panel

Chapter 6

CONCLUSION

My goal in this dissertation was to explore intermarriage as a way of immigrants' assimilation into the host country. An immigrant man who marries a German woman forms the most intimate bond with a member of the host society, and by association with her family and social circles. A German spouse can help an immigrant partner integrate into the society more than an immigrant spouse can, because marriage with a German spouse brings certain benefits that do not necessarily come with marrying an immigrant spouse, such as legal rights and German fluency to name a few. Thus, it is reasonable to expect that intermarried immigrants will assimilate faster and have better labor market outcomes than those who are intramarried.

Immigrant assimilation is important for Germany, a country that is experiencing the highest recorded net immigration in its history. Just to illustrate this, recall that Germany had the population of about 81.4 million and that its net immigration was 1.14 million in 2015 (Statistisches Bundesamt, 2016). Immigrants that do not assimilate, do not speak the language, and do not work, are a burden to the taxpayers, and impose strains on the economy. On the other hand, well-assimilated employed immigrants can help the economy and help close the fiscal gap that comes as a result of the aging population in Germany. Thus, better assimilation improves the labor market outcomes of immigrants and subsequently of the host country's economy.

Using an instrumental variables approach, I find that intermarried immigrant men in Germany earn 12.9 percentage points more than intramarried men, ceteris paribus. I also explore the factors that increase the odds of intermarrying and I find that being a college graduate is one of the key determinants of intermarriage. Another interesting finding is that the average German spouse of an immigrant men earns

more, is younger, better educated and more likely to be involved in the labor force than the average immigrant spouse. Lastly, I study the extent of assortative matching in different marriage types and I find that positive assortative matching by employment (both spouses are employed) is more likely in intermarriage, while positive assortative matching by wage (partners earn the wage in the same wage percentile) is more likely in intramarriage.

Studying the level of assortative matching in inter- and intra-marriages is the first step in teasing out the exact mechanisms by which intermarriage affects the wage. The potential mechanisms include legal benefits, host-country-specific human capital spillovers, network externalities, and improved access to capital markets. There might be others and some of these mechanisms are principal and can explain a large amount of the intermarriage premium. For example, Chi and Drewianka (2014) find that legal rights account for the majority of the wage premium of Mexican men in the U.S. One way to focus on the legal benefits in Germany is to put attention on those immigrants who come from countries that are not part of the European Union (EU) and who do not have the freedom of movement and work in the EU, and who gain these legal benefits via marriage to Germans. I have done this by contrasting non-EU immigrants with EU men's intermarriage premiums, and I find that the non-EU men's premium is higher, indicating that legal rights are an important mechanism.

My work could be extended in a number of ways. One way would be to study job-to-job transition of immigrants after they enter intermarriage, because moving to a higher ranked job or changing from a blue collar to a white collar job soon after marrying a German would be a clear indicator that the new spouse's legal status and stability in the country were crucial in subsequent immigrant's wage increases. Another interesting venue of further research is focusing on the outcomes of immigrant females in intermarriages. Research shows that in general there is no marriage premium for females, but it would be interesting to see if the results would be different for immigrant women married to Germans, because one would expect that they reap numerous benefits from marriage, just like the immigrant men do when they marry

German women.

Lastly, I show that intermarriage is beneficial for immigrant men's earnings in Germany, and the natural conclusion is that increasing immigrants' association with Germans benefits immigrants' wages and consequently the economy. The potential policy implication would be to provide some of the benefits that are being provided by a German spouse in an alternative way, for example, by providing intense German language classes, etc. However, a serious policy recommendation requires deeper understanding of the mechanisms in play, and further work is required.

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Appendix A

SUPPLEMENTARY RESULTS: MAIN RESULTS

Table A.1: Estimates of the 1st Stage in Modified 2SLS

Variables	Intermarriage	Intramarriage
	(1)	(2)
Excluded Variables		
Sex Ratio	-4.673*	1.418*
	(0.694)	(0.334)
Female Ratio	-8.280	33.351*
	(10.292)	(6.982)
Education		
Primary school	0.012	0.079
	(0.291)	(0.191)
Apprenticeship	0.316	0.321
	(0.363)	(0.217)
High School	-0.223	-0.590
	(0.528)	(0.386)
College or Higher	0.674	0.291
	(0.433)	(0.295)
Immigration Background		
Years in Germany	0.033**	-0.033*
	(0.016)	(0.011)
Native German speaker	0.985***	-1.450*
	(0.549)	(0.492)
Arrived to Germany before age 19	-0.258	0.042
	(0.271)	(0.169)
Experience	0.150*	0.274*
	(0.027)	(0.018)
Experience Squared	-0.004*	-0.005*
	(0.001)	(0.0003)
Constant	0.025	-1.769*
	(0.806)	(0.519)
Observations	17,798	17,798
ln(L)	-11054.347	

* p<0.01, ** p<0.05, ***p<0.1

Note: These estimates are obtained using multinomial logit. The reported standard errors are clustered at individual level. The state and year fixed effects are also included.

Table A.2: Estimates of the First Stage Results for the Main Results

Variables	Intermarriage	Intramarriage
	(1)	(2)
Instruments		
Predicted Intermarriage	0.206	0.946*
	(0.145)	(0.122)
Predicted Intramarriage	1.225*	-0.015
	(0.137)	(0.106)
Education		
Primary school	-0.001	-0.001
	(0.027)	(0.019)
Apprenticeship	-0.008	-0.000
	(0.033)	(0.026)
High School	0.018	-0.000
	(0.067)	(0.060)
College or Higher	-0.006	0.002
	(0.042)	(0.038)
Immigration Background		
Years in Germany	0.001	0.000
	(0.002)	(0.001)
Native German speaker	0.028	0.013
	(0.102)	(0.114)
Arrived to Germany before age 19	-0.001	-0.001
	(0.029)	(0.025)
Experience	-0.008	0.000
	(0.006)	(0.005)
Experience Squared	0.0001	-0.00001
	(0.0001)	-0.00008
Constant	-0.107	0.007
	(0.087)	(0.065)
Observations	17,798	17,798
R-squared	0.202	0.178
F statistics	54.82	72.83
Sanderson and Windmeijer F-statistics	109.59	106.56

* p<0.01, ** p<0.05, ***p<0.1

Note: The reported standard errors are clustered at individual level. The state and year fixed effects are included in both regressions and available at request. The instruments are predicted values of intermarriage and intrammariage obtain from multinomial logit.

Table A.3: Estimates of First Stage Results for the Standard 2SLS

Variables	Intermarriage	Intramarriage
	(1)	(2)
Instruments		
Sex Ratio	0.434*	-0.388*
	(0.044)	(0.040)
Female Ratio	6.042*	-3.249*
	(1.020)	(0.830)
Education		
Primary school	0.007	-0.006
	(0.027)	(0.019)
Apprenticeship	0.029	0.000
	(0.033)	(0.027)
High School	-0.119***	0.045
	(0.069)	(0.064)
College or Higher	-0.029	0.067***
	(0.043)	(0.039)
Immigration Background		
Years in Germany	-0.008*	0.006*
	(0.002)	(0.001)
Native German speaker	-0.415*	0.340*
	(0.090)	(0.102)
Arrived to Germany before age 19	0.017	-0.019
	(0.030)	(0.026)
Experience	0.041*	-0.004***
	(0.003)	(0.002)
Experience Squared	-0.001*	-0.00002
	(0..00005)	(0.00004)
Constant	0.118***	0.306*
	(0.068)	(0.054)
Observations	17,798	17,798
R-squared	0.176	0.146
F statistics	51.45	47.55
Sanderson and Windmeijer F-statistics	12.11	14.25

* p<0.01, ** p<0.05, ***p<0.1
Note: The reported standard errors are clustered at individual level. The state and year fixed effects are included in both regressions and available at request.

Table A.4: Estimates of the Main Results Without Exclusion Restriction

Variables	(1)
Predicted Intermarriage	0.568*
	(0.123)
Predicted Intramarriage	0.513*
	(0.089)
Sex Ratio	-4.673*
	(0.694)
Female Ratio	-8.280
	(10.292)
Education	
Primary school	0.012
	(0.291)
Apprenticeship	0.316
	(0.363)
High School	-0.223
	(0.528)
College or Higher	0.674
	(0.433)
Immigration Background	
Years in Germany	0.033**
	(0.016)
Native German speaker	0.985***
	(0.549)
Arrived to Germany before age 19	-0.258
	(0.271)
Experience	0.150*
	(0.027)
Experience Squared	-0.004*
	(0.001)
Constant	0.025
	(0.806)
Observations	17,798
R-Squared	0.114

* p<0.01, ** p<0.05, ***p<0.1

Note: Dependent variable is log(Wage). The excluded variables Sex Ratio and Female Ratio together with other independent variables are included in all regressions including multinomial logit,the first-stage of 2SLS, and the second-stage of 2SLS.

Appendix B

SUPPLEMENTARY RESULTS: ROBUSTNESS

Table B.1: Estimates of the Wage Equation for Immigrant Men With Controls for Immigration Cohort

Variables	OLS (1)		IV (2)	
Marriage				
Intermarried	0.143*	(0.024)	0.372*	(0.096)
Intramarried	0.097*	(0.014)	0.278*	(0.079)
Education				
Primary school	0.019	(0.015)	0.019	(0.016)
Apprenticeship	0.062*	(0.020)	0.059*	(0.021)
High School	0.091***	(0.048)	0.104**	(0.050)
College or Higher	0.414*	(0.036)	0.406*	(0.037)
Immigration Background				
Native German speaker	0.423*	(0.073)	0.421*	(0.076)
Arrived to Germany before age 19	0.003	(0.018)	0.001	(0.018)
Year of immigration=1954–1956	0.550***	(0.287)	0.450	(0.285)
Year of immigration=1957–1959	0.440**	(0.200)	0.372***	(0.193)
Year of immigration=1960–1962	0.511*	(0.196)	0.451**	(0.190)
Year of immigration=1963–1965	0.481**	(0.196)	0.427**	(0.189)
Year of immigration=1966–1968	0.481**	(0.195)	0.429**	(0.189)
Year of immigration=1969–1971	0.474**	(0.195)	0.426**	(0.189)
Year of immigration=1972–1974	0.432**	(0.195)	0.386**	(0.189)
Year of immigration=1975–1977	0.393**	(0.197)	0.339***	(0.191)
Year of immigration=1978–1980	0.384***	(0.196)	0.333***	(0.190)
Year of immigration=1981-1983	0.382***	(0.199)	0.340***	(0.192)
Year of immigration=1984–1986	0.425**	(0.208)	0.376***	(0.203)
Year of immigration=1987–1989	0.322	(0.199)	0.262	(0.193)
Year of immigration=1990–1992	0.264	(0.199)	0.209	(0.193)
Year of immigration=1993–1995	0.215	(0.199)	0.160	(0.193)
Year of immigration=1996–1998	0.180	(0.200)	0.128	(0.195)
Year of immigration=1999–2001	0.154	(0.201)	0.092	(0.196)
Year of immigration=2002–2004	0.077	(0.203)	0.012	(0.198)
Year of immigration=2005–2007	0.069	(0.205)	0.002	(0.200)
Year of immigration=2008–2010	0.107	(0.210)	0.073	(0.206)
Year of immigration=2011–2013	-0.155	(0.281)	-0.154	(0.270)
Year of immigration=2014–2015	-0.159	(0.205)	-0.253	(0.201)
Experience	0.020*	(0.002)	0.013*	(0.004)
Experience Squared	-0.000*	(0.000)	-0.000*	(0.000)
Constant	9.397*	(0.203)	9.365*	(0.197)
Observations	17,798		17,798	
R-squared	0.250			

* p<0.01, ** p<0.05, ***p<0.1

Note: The reported standard errors are clustered at individual level. The omitted immigration cohort is 1950-1953. The state and year fixed effects are included in both regressions and available at request together with first stage results. The first stage tests for weak instruments where intermarried is a dependent variable: F statistic is 66.40 and Sanderson and Windmeijer F statistic is 123.93. The first stage tests for weak instruments where intramarried is a dependent variable: F statistic is 83.56 and Sanderson and Windmeijer multivariate F statistic is 108.8. The Kleibergen-Paap Wald rk F statistic for weak identification is 53.84.

Table B.2: Estimates of the Wage Equation for Immigrant Men With Controls for Region of Origin

Variables	OLS	IV
	(1)	(2)
Marriage		
Intermarried	0.138*	0.518*
	(0.024)	(0.116)
Intramarried	0.101*	0.404*
	(0.015)	(0.085)
Education		
Primary school	0.019	0.020
	(0.015)	(0.017)
Apprenticeship	0.056*	0.046**
	(0.021)	(0.023)
High School	0.084***	0.103**
	(0.047)	(0.051)
College or Higher	0.399*	0.384*
	(0.035)	(0.038)
Immigration Background		
Years in Germany	0.009*	0.009*
	(0.001)	(0.001)
Native German speaker	0.411*	0.412*
	(0.078)	(0.083)
Arrived to Germany before age 19	0.012	0.013
	(0.017)	(0.018)
Region of Origin		
EU15 countries	0.046***	0.041
	(0.027)	(0.033)
Other EU countries	0.112*	0.119*
	(0.028)	(0.030)
Rest of Europe	0.034	0.027
	(0.023)	(0.024)
Experience	0.020*	0.010**
	(0.002)	(0.004)
Experience Squared	-0.000*	-0.000*
	(0.000)	(0.000)
Constant	9.681*	9.543*
	(0.058)	(0.072)
Observations	17,798	17,798
R-squared	0.246	

* p<0.01, ** p<0.05, ***p<0.1

Note: The reported standard errors are clustered at individual level. The region of origin is the rest of world. The state and year fixed effects are included in both regressions and available at request together with first stage results. The first stage tests for weak instruments where intermarried is a dependent variable: F statistic is 45.93 and Sanderson and Windmeijer F statistic is 102. The first stage tests for weak instruments where intramarried is a dependent variable: F statistic is 65.22 and Sanderson and Windmeijer multivariate F statistic is 115.85. The Kleibergen-Paap Wald rk F statistic for weak identification is 54.36.

Table B.3: Estimates of the Wage Equation for Immigrant Men Without Native German Speaking Immigrants

Variables	OLS	IV
	(1)	(2)
Marriage		
Intermarried	0.142*	0.423*
	(0.024)	(0.104)
Intramarried	0.095*	0.312*
	(0.014)	(0.083)
Education		
Primary school	0.020	0.021
	(0.015)	(0.016)
Apprenticeship	0.061*	0.055**
	(0.021)	(0.022)
High School	0.092***	0.108**
	(0.047)	(0.049)
College or Higher	0.398*	0.388*
	(0.037)	(0.038)
Immigration Background		
Years in Germany	0.009*	0.009*
	(0.001)	(0.001)
Arrived to Germany before age 19	0.012	0.012
	(0.017)	(0.017)
Experience	0.021*	0.013*
	(0.002)	(0.004)
Experience Squared	-0.000*	-0.000*
	(0.000)	(0.000)
Constant	9.707*	9.605*
	(0.052)	(0.065)
Observations	17,555	17,555
R-squared	0.213	

* p<0.01, ** p<0.05, ***p<0.1

Note: The reported standard errors are clustered at individual level. The state and year fixed effects are included in both regressions and available at request together with first stage results. The first stage tests for weak instruments where intermarried is a dependent variable: F statistic is 57.81 and Sanderson and Windmeijer F statistic is 104.23. The first stage tests for weak instruments where intramarried is a dependent variable: F statistic is 73.87 and Sanderson and Windmeijer multivariate F statistic is 100.59. The Kleibergen-Paap Wald rk F statistic for weak identification is 48.64.

Table B.4: Estimates of the Wage Equation for Immigrant Men Without Individuals Who Used to Be Married

Variables	OLS	IV
	(1)	(2)
Marriage		
Intermarried	0.151*	0.460*
	(0.025)	(0.099)
Intramarried	0.112*	0.330*
	(0.015)	(0.078)
Education		
Primary school	0.025***	0.027***
	(0.015)	(0.015)
Apprenticeship	0.066*	0.062*
	(0.020)	(0.021)
High School	0.101**	0.112**
	(0.048)	(0.050)
College or Higher	0.427*	0.412*
	(0.037)	(0.039)
Immigration Background		
Years in Germany	0.009*	0.008*
	(0.001)	(0.001)
Native German speaker	0.401*	0.394*
	(0.078)	(0.082)
Arrived to Germany before age 19	0.009	0.015
	(0.017)	(0.018)
Experience	0.021*	0.013*
	(0.002)	(0.004)
Experience Squared	-0.000*	-0.000*
	(0.000)	(0.000)
Constant	9.704*	9.606*
	(0.053)	(0.063)
Observations	17,168	17,168
R-squared	0.248	

* p<0.01, ** p<0.05, ***p<0.1

Note: The reported standard errors are clustered at individual level. The state and year fixed effects are included in both regressions and available at request together with first stage results. The first stage tests for weak instruments where intermarried is a dependent variable: F statistic is 59.2 and Sanderson and Windmeijer F statistic is 165.04. The first stage tests for weak instruments where intramarried is a dependent variable: F statistic is 79.82 and Sanderson and Windmeijer multivariate F statistic is 159.83. The Kleibergen-Paap Wald rk F statistic for weak identification is 77.68.

Table B.5: Estimates of the Wage Equation for Immigrant Men with Controls for Occupation and Industry

Variables	OLS (1)		IV (2)	
Marriage				
Intermarried	0.113*	(0.024)	0.368*	(0.100)
Intramarried	0.084*	(0.014)	0.308*	(0.081)
Education				
Primary school	0.020	(0.015)	0.018	(0.016)
Apprenticeship	0.042**	(0.020)	0.034	(0.021)
High School	0.022	(0.046)	0.035	(0.047)
College or Higher	0.232*	(0.034)	0.229*	(0.036)
Immigration Background				
Years in Germany	0.006*	(0.001)	0.007*	(0.001)
Native German speaker	0.340*	(0.079)	0.346*	(0.082)
Arrived to Germany before age 19	0.013	(0.017)	0.010	(0.018)
Occupations (1-digit level)				
Professionals	0.109***	(0.060)	0.106***	(0.061)
Technicians and Associate Professionals	-0.104**	(0.052)	-0.088***	(0.053)
Clerical Support Workers	-0.247*	(0.052)	-0.217*	(0.056)
Services and Sale Workers	-0.422*	(0.053)	-0.398*	(0.055)
Skilled Agricultural, Forestry, and Fishery Workers	-0.232*	(0.074)	-0.243*	(0.074)
Craft and Related Trade Workers	-0.248*	(0.048)	-0.234*	(0.050)
Plant and Machine Operators and Assemblers	-0.252*	(0.050)	-0.237*	(0.052)
Elementary Occupations	-0.317*	(0.049)	-0.300*	(0.051)
Industry (1-digit level)				
Energy	0.271*	(0.076)	0.255*	(0.075)
Mining	0.187*	(0.057)	0.164*	(0.056)
Manufacturing	0.179*	(0.049)	0.158*	(0.049)
Construction	0.195*	(0.050)	0.178*	(0.049)
Trade	0.091	(0.056)	0.083	(0.054)
Transport	0.155*	(0.053)	0.133**	(0.054)
Bank,Insurance	0.235*	(0.089)	0.246**	(0.098)
Services	0.165*	(0.052)	0.149*	(0.052)
Experience	0.020*	(0.002)	0.012*	(0.004)
Experience Squared	-0.000*	(0.000)	-0.000*	(0.000)
Constant	9.834*	(0.084)	9.731*	(0.092)
Observations	15,717		15,717	
R-squared	0.305			

* p<0.01, ** p<0.05, ***p<0.1

Note: The reported standard errors are clustered at individual level. The omitted occupation and industry groups are managers and agriculture, respectively. The state and year fixed effects are included in both regressions and available at request together with first stage results. The first stage tests for weak instruments where intermarried is a dependent variable: F statistic is 52.8 and Sanderson and Windmeijer F statistic is 111.23. The first stage tests for weak instruments where intramarried is a dependent variable: F statistic is 67.68 and Sanderson and Windmeijer multivariate F statistic is 104.27. The Kleibergen-Paap Wald rk F statistic for weak identification is 50.85.