

Essays on International Migration

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Introduction

Immigration is a leading economic and political issue in Europe and many other countries in the developed world. In 1995, according to United Nations estimates, about 2.9% of the world population (161 million people) lived in another country than their country of birth. By 2015, the global migrant stock increased to 3.3% reaching almost 244 million people.¹ The surge in migration flows have been especially prominent in Europe. While in 1995, 7.3% of the population was foreign born, in 2015 the number grew to 10.3% which represents a 40% increase in the immigrant stock. This increase, however, has been disproportionately distributed among European countries with EU15 receiving the largest share. In absolute terms, the countries with largest immigrant populations are Germany, Italy, France, Spain and the United Kingdom. In relative terms, however, those are Luxembourg where migrants make 44% of the population followed by Switzerland (29.4%), Austria (17.5%) and Sweden (16.8%).

Events since the summer of 2014 have placed refugees on the top of the migration policy agenda. Although this has been the worst European refugee crisis since Second World War, Europe as a whole is currently hosting only 15% of the world's refugees ([Dustmann et al., 2017](#)). By the end of 2016, there were 10.2 million people of concern of which 6.6 million refugees and asylum seekers, 3 million internally displaced people (IDPs) and more than 570 thousand were stateless.² Therefore the stock of forcefully displaced migrants is still relatively small in Europe. Rather, what distinguished this phenomenon in recent years is the sudden increase in asylum applications from 260 thousand in 2010 to more than 1.2 million in 2016.³

These migration experiences have raised public concerns as to whether governments can accommodate and successfully integrate the increasing number of migrants. As past integration policies have not been very successful, public opinion has shifted towards more restrictive immigration policies, or even closing of borders. That has brought back the two fundamental questions asked in all immigrant-receiving countries. First, what are the socio-economic outcomes of immigrants? And second, what are the economic consequences for the native

¹United Nations, Department of Economic and Social Affairs (2015). Trends in International Migrant Stock: The 2015 revision (United Nations database, POP/DB/MIG/Stock/Rev.2015).

²UNHCR Global Report 2016 - Europe Regional Summary

³Eurostat: migr_asyappctza

population?

The performance of migrants and their descendants is of considerable importance. Immigrants who perform well and integrate quickly into the new environment may contribute significantly to capital formation and economic growth both in destination and origin countries. By contrast, a poor economic performance may not only lead to significant costs for the welfare states, social exclusion and marginalization, but also to transmission of economic disadvantage to next generations. Immigrants outcomes are also crucial for native attitudes toward migration which in turn can affect immigration policy.

Concerns over the economic integration of migrants are often well-founded. Based on the European Labor Force Survey (EULFS) for the years 2007-2009, [Dustmann and Frattini \(2013\)](#) analyze the employment probability gap between immigrants and natives. They show that conditioning on education, age, gender and residence within a country, immigrants face significant labor market disadvantage.⁴ The employment gap is always negative (except for Greece) and on average larger in Central and Northern European countries like Netherlands, Sweden or Germany. On the contrary, the employment gap is the smallest in Portugal, Italy and Spain. For all countries in their sample, Non-EU display a larger gap than EU migrants pointing to country of origin composition as an important factor in explaining employment gaps. For instance, different origin groups may differ in their human capital making some migrants more disadvantaged than others. In France [Algan et al. \(2010\)](#) reports substantial gaps for African and Eastern Europeans amounting to 16 to 18 percentage points. For Turkish women, the gap is 45 percentage points. In Germany, the worst performing are immigrants from Central and East Europe and Turkey with a gap of 15 to 19 percentage points. Finally, for the UK the authors show that African, Bangladeshi and Pakistani men and women display the largest differential of more than 20 and 50 percentage points respectively. However, the gap tends to get smaller as migrants spend more time in the host countries. Yet, for some immigrants groups they find that the labor market disadvantage persists or even increases over generations.

In terms of occupation, [Dustmann and Frattini \(2013\)](#) report that conditional on socio-

⁴The countries included in their analysis are Austria, Belgium, Germany, Denmark, Spain, Finland, France, Greece, Ireland, Italy, Netherlands, Norway, Portugal, Sweden and the UK.

demographic characteristics, both EU and Non-EU migrants are concentrated in less skilled occupations compared to natives. When they look within immigrants, it emerges that Non-EU are significantly more likely to have jobs requiring less skills compared to EU nationals. Controlling for one-digit ISCO occupations reduces the gap significantly but it is still negative and statistically significant in all countries for Non-EU nationals, while it turns positive for EU migrants only in Sweden.

A similar pattern emerges when we consider the immigrant's position in the earnings distribution. Using 2009 European Labor Force Survey, [Dustmann and Frattini \(2013\)](#) report that immigrants are over-represented at the bottom of the income distribution and this is especially the case for Non-EU migrants.

Given the growing importance of refugees, [Dustmann et al. \(2017\)](#) look at the labor market performance of refugees compared to economic migrants. Using 2008 EULFS and conditioning on age, education and gender, they find significant differences in employment probabilities between the two groups. Regardless of country of origin, refugees have lower employment probabilities. However, when we look at country of origin, the disadvantage is strongest for refugees coming from South and East Asia, North Africa and the Middle East.

One of the main determinants of an individual's labor market outcomes is educational attainment. For first generation migrants who arrive in the host countries as adults, almost always their formal education was completed at home. The returns to human capital obtained abroad, however, is often very low, especially if the country of origin is less developed ([Dustmann and Glitz, 2011](#)). [Dustmann and Frattini \(2013\)](#) report the educational attainment gap using EULFS. Their analysis shows that on average immigrants are slightly less educated as comparable natives. The share of immigrants with tertiary education is 24% as compared to 26% among natives. Immigrants in France, Germany, Austria and the Netherlands have on average lower education, while in Ireland and Portugal the opposite is true. These numbers reveal a substantial heterogeneity in migrants composition across countries.

The lack of country-specific human capital, like language, is another reason behind the labor market gap between immigrants and natives. Language proficiency increases migrants' human capital which in turn fosters socio-economic integration. Moreover, language proficiency should increase productivity in the labor market leading to higher employment rates

and earnings. Evidence from Germany, the UK, Sweden and Spain confirm the importance of language for labor market outcomes ([Dustmann and Van Soest, 2002](#); [Dustmann and Fabbri, 2003](#); [Joonas and Nekby, 2012](#); [Amuedo-Dorantes and De La Rica, 2007](#)).

This thesis investigates immigrant outcomes in two European countries with relatively long history of immigration, namely Germany and Denmark. For both countries, migration flows were primarily driven by labor recruitment policies after the Second World War. After the oil crisis of 1973, however, family reunification and refugees became an important part of the immigrant stock. In 2015, 10% of the population in Denmark was foreign born and 14.4% in Germany.

The first chapter of the thesis looks at how integration policies affect savings behavior of immigrants in Germany. In particular, it aims at understanding how citizenship affects households savings and remittance behavior. Naturalization could either be seen as the end of the integration process in the host country or as fostering integration. Indeed, research from both USA, Canada and Europe point to positive effects on migrants' integration ([Chiswick, 1978](#); [Bratsberg et al., 2002](#); [Steinhardt, 2012](#)). To address this question empirically, we exploit two recent citizenship reforms in Germany that took place in 1991 and 1999 respectively. The naturalization reform of 1991 defined for the first time an explicit criteria for naturalization and introduced an age-dependent resident requirement: individuals age 16 to 22 were allowed to naturalize after 8 years of residence in the country, while individuals age 23 and above had to wait for 15 years of residence. The second reform in 1999 relaxed the residence requirements to 8 years for everyone irrespectively of age. Our data comes from the German Socio-Economic Panel dataset which provides a rich array of socio-economic, individual and household characteristics for the population in Germany.

The empirical findings reveal that granting access to citizenship significantly reduces migrants' propensity to save (extensive margin) and the amount saved (intensive margin) in the host country. Considering only domestic savings, however, gives us an incomplete picture on the saving behavior after naturalization. This is because migrants have the option to save in their home countries. Using data on remittances, we show that access to naturalization does not affect financial transfers sent abroad. This finding is rather surprising as we usually see citizenship as an outcome of permanent migration decision. While other studies find that

temporary versus permanent nature of migration does not affect domestic savings but only remittances, we show that citizenship acquisition affect savings but not financial transfers sent abroad. These results suggest different mechanisms through which return intentions and citizenship acquisition affect saving behavior of migrants.

In the second chapter, we consider the change in living conditions and surrounding environment for immigrant children and its effect on crime. The criminology literature suggests that immigrants may have higher crime rates as compared to natives simply because of their adverse early life conditions ([Hallsten et al., 2013](#)). Exposure to civil war or political and ethnic prosecution in the country of origin may have long lasting effects on delinquent behavior. It may cause temporary or permanent trauma in children, making them more likely to commit an offense as juveniles or adults.

We use migration to Denmark as an event that significantly changes the environment children are exposed to. To deal with the endogeneity of migration, we use siblings, family-fixed effects approach. Migration for two children usually occurs at the same time, but at different stages of their development. By using age at migration as a proxy for development, we can study how disproportionate exposure to home country environment will affect criminal behavior in the host country. We answer two main questions: Are first generation immigrant children more crime prone relative to their native born siblings? Second, could age at migration explain the first versus second generation crime gap?

Our results indicate a significant gap in the probability to be charged with or convicted of a crime. Children born abroad are 14.7% more likely to be convicted of a crime relative to their danish-born siblings. When we break down overall convictions into finer categories, we see that the results are entirely driven by property crimes. Next, we look whether age at migration could explain this substantial gap. Our results point to school-starting age as an important age. Children that arrive after the age of 6 are significantly more likely to exhibit delinquent behavior.

We test for two mechanisms potentially explaining our results: education and experience of a war during childhood. While lower educational achievement of first generation explains their higher crime rate, exposure to a violent environment does not seem to play a role.

Childhood Environment and Adolescent Criminal Behaviour

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Abstract

In this paper, we ask who is more likely to commit a crime, first or second generation migrant children. We further investigate whether age at migration for those born abroad plays a role in later-life criminal behavior. Our econometric approach relies on family-fixed effects. By comparing siblings in the same family, we are able to identify the causal effect of being born abroad on later-life criminal behavior. We find that first-generation children are significantly more likely to be charged with or convicted of a crime relative to their native-born sibling. Moreover, our data suggests that children coming after school-starting age are much more likely to engage in delinquent behavior. We test for two mechanisms potentially explaining our results: education and experience of a war during childhood. While lower educational achievement of first generation explains their higher crime rate, exposure to a violent environment does not seem to play a role.

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1 Introduction

In recent years, there has been an increasing amount of research looking at conditions early in life on later life outcomes such as health, fertility, wages and education. Children exposed to an adverse socio-economic environment are less healthy in adulthood, obtain less education and are less successful at the labor market ([van den Berg et al., 2014](#)). To provide causal estimates, researchers have relied on natural or quasi-natural experiments creating exogenous shocks during intrauterine or early-life environment. Such are nutritional shocks, infectious diseases, pollution exposure, maternal stress, etc.¹ Other studies, instead, have used international migration as an exogenous source of variation ([van den Berg et al., 2014](#); [Lavy et al., 2015](#)). Despite the increasing number of research on health and socio-economic outcomes, much less is known about childhood environment and its effect on criminal behavior during adolescence or adulthood.

In our study, we consider the change in living conditions and surrounding environment for immigrant children and its effect on crime. The criminology literature suggests that immigrants may have higher crime rates as compared to natives because of their adverse early life conditions ([Hallsten et al., 2013](#)). Exposure to civil war or political and ethnic prosecution in the country of origin may have long lasting effects on delinquent behavior. It may cause temporary or permanent trauma in children, making them more likely to commit an offense as juveniles or adults.

We use migration to a developed country as an event that significantly changes the environment children are exposed to. To deal with the endogeneity of migration, we use siblings, family-fixed effects approach. Migration for two children usually occurs at the same time, but at different stages of their development. By using age at migration as a proxy for development, we can study how disproportionate exposure to home country environment will affect criminal behavior in the host country. We answer two main questions: Are first generation immigrant children more crime prone relative to their native born siblings? Second, can age at migration explain the first versus second generation crime gap?

The data for the analysis comes from two main sources: the Administrative Register of Denmark and the Central Police Register. The Administrative register includes socio-economic data for the entire immigrant population residing in Denmark, while the Central Police Register allows us track their criminal trajectories. We link these two datasets and extract information on foreign-born and Danish born immigrants children and their respective crime histories. We follow those individuals

¹For excellent literature review, see the work of [Almond et al. \(2017\)](#)

over time and measure their probability to commit crime by age 21.

Results show that first generation immigrant children are significantly more likely to be charged with or convicted of a crime by age 21 as compared to their Danish-born siblings. Looking at specific types of crime, the effect is statistically significant for property crimes only. Being born abroad is associated with 22% higher chance to be convicted of a property crime. We do not find any difference in the propensity to be charged with or convicted of violent crimes. Are the observed differences in outcomes between first and second generation siblings of the same age associated with age at migration? We do not find any critical age for later-life criminal behavior, however, our analysis suggests that children coming after school-starting age are significantly more likely to be criminal.

Common belief is that foreign-born individuals are more crime prone than majority population. This is also the assumption of contemporary radical right political parties. Evidence from the U.S. goes against the common belief ([Butcher and Piehl, 2007](#)), while studies from Europe point to crime rate of immigrants exceeding that of natives. While findings on the immigrant-native crime gap are still inconclusive, a continuous influx of migrants have resulted in a large share of both first and second generation immigrant children in many developed countries. Thus, we will contribute to the literature by providing novel evidence on who is more crime prone: first or second generation migrant children. The answer to that question is of immense importance for policy makers and government officials who design not only crime-prevention policies but integration policies as well.

Second, we will also contribute to the literature on childhood environment and later-life outcomes. The research so far has found critical ages above which bad environment leads to long-lasting negative effects on health and economic outcomes. While first generation children were exposed to foreign environment, their second generation siblings were entirely raised in Denmark allowing us to study the effect of home country environment on juvenile crime. Better knowledge about the conditions in which children grow up should improve policy making. For example, if such critical periods exists better outcomes could be achieved by relocating resources from later to earlier in the life cycle.

The paper is organized as follows: In [Section 2](#) we present the literature related to our study. [Section 3](#) describes immigration patterns and the institutional setting in Denmark. [Section 4](#) presents our data. Empirical strategy and underlying assumptions are introduced in [Section 5](#). [Sections 6](#) and [7](#) presents the results and possible mechanisms. [Section 8](#) we do robustness checks. Finally, [Section 9](#) concludes.

2 Related Literature

Our paper is related to two lines of research. The first one is focused on the role of age at migration on later life socio-economic outcomes while the second looks at crime behavior of first versus second generation migrants. This section provides a brief introduction to the main findings.

2.1 Age at Migration and Socio-Economic Outcomes

For many years, research on migration was largely concerned with the gap in performance between immigrants and natives finding large disparities between the two in terms of wages, employment and education. Immigrants consistently perform worse triggering a common belief that they are also more crime prone. To explain these persistent gaps, economists have looked at various reasons among which is age at migration. From an economic perspective, the development stage at which an individual arrives in the host country is important because of the belief that younger people are better in coping with cultural and linguistic challenges, leading to better outcomes later in life. These results are particularly relevant for childhood migrants (first-generation) and children of migrants (second-generation) which are starting to represent an increasing share of the migrant population.

The early studies looking at age at migration effects use cross-sectional data and do not address the problem of endogenous migration decisions. Yet, they find consistent negative effects. Immigrants that arrive at younger ages obtain more human capital and as a consequence earn higher wages. See [Schaafsma and Sweetman \(2001\)](#) for evidence using Canadian data, [Gonzalez \(2003\)](#) and [Chiswick and DebBurman \(2004\)](#) for evidence from the USA, [van Ours and Veenman \(2006\)](#) for the Netherlands, [Cohen Goldner and Epstein \(2014\)](#) for Israel. There is also evidence for better social assimilation the younger immigrants arrive in the host country ([Bleakley and Chin, 2010](#)).² In later studies, researchers address the problem of endogenous migration and location decisions by using family-fixed effects regressions. This approach uses within family variation in age at migration for individuals who arrive in the same year, share the same socio-economic characteristics and the same reason for migration. Thus, siblings' outcomes at different ages at migration are treated as valid counterfactual outcomes.

[Böhlmark \(2008\)](#) is the first to use siblings approach to study the relationship between age at migration and school performance. Using data on GPA measured at grade nine in Sweden (age 16),

²[Bleakley and Chin \(2010\)](#) use age at migration as an instrument for English language abilities.

he finds a negative and significant effect on school performance, indicating age 9 as a critical age of arrival. The findings are in line with the results by [Bleakley and Chin \(2004\)](#) who use age at migration to proxy for language abilities of immigrant children coming from non-English speaking countries. [Åslund et al. \(2015\)](#) using rich Swedish data as well look at age at immigration for children and parental time in the host country on social integration. They focus on three main outcomes: the fraction of neighbors, co-workers, and spouses who are immigrants. Despite they do not find a critical age, their findings suggest a strong and negative association between age at arrival and integration in adulthood. Arriving later increases the probability that the migrant will live in areas with more migrants, will have more foreign-born colleagues at work, and will have foreign born spouse. Parental time in the host country also plays a significant role, despite the size of the effect is lower than the one of age.

The age at arrival effect has also been analyzed in relation to long-term health outcomes. One such study is by [van den Berg et al. \(2014\)](#), where they look at adolescent health proxied by height, hospitalizations per year and cognitive abilities. Their sample is composed of families with both Swedish-born and foreign-born children where at least two siblings enlist for compulsory military service between age 17 and 25. What they find is that if a child arrived at age beyond 8, adult height is between 2.9 and 5 cm lower as compared to a child born in Sweden. Results for cognitive abilities are also striking, *ceteris paribus*, those who immigrated at age 17 score on average one point lower on adult ability scale as compared to their siblings born in Sweden. They also show that age at migration is negatively related to weight and positively related to the probability of being diagnosed with a mental health problem at age 18. Results are similar for physical strength and maximum oxygen intake. Although very weak, they also find evidence for increased probability of hospitalization.

2.2 Migration and Crime

The pioneering work of [Becker \(1968\)](#) on economics of crime gave rise to an increasing research in the field. The literature has explored many dimensions in explaining what triggers criminal behavior. With the increasing number of foreign-born individuals in the developed world, ethnicity and crime have become an integral part of mainstream politics. Despite the focus in the economic literature has been on who commits more crimes, immigrants or natives, and why, large disparities exist between immigrants groups themselves.

In the criminology literature, and largely untouched in the economic literature, it is established

that first and second generation immigrants have different propensities to commit crime. Which group is more likely to engage in criminal behavior depends on the country studied. Evidence from the U.S. consistently show that second generation migrants are more likely to commit a crime as compared to their first-generation counterparts (Bui and Thongniramol, 2005; Bui, 2009; Bersani, 2014). They explain these findings by the initial positive selection of individuals. First generation immigrants are hard working with high ambitions ready to postpone gratification in the name of economic progress. Second generation, instead, are more likely to experience alienation, which results in ineffective parental control and supervision leading to delinquent behavior. Hagan et al. (2008) using data from Canada confirm these findings, again attributing the results to the positive selection of migrants which the Canadian point system achieves. The evidence from Sweden, however, points to a completely different picture. Hallsten et al. (2013) using data from greater Stockholm area shows that first generation immigrant children have higher level of over-representation in criminal activities than children of immigrants. Kardell and Martens (2013) shows that while first-generation immigrants in Sweden were more likely to commit crime, second generation immigrants were committing more crimes. They also find different propensities depending on the type of crime. Immigrant children are more likely to commit violent offenses whereas children of immigrants were more involved in property crimes. Despite the existing evidence, these findings should be considered with caution as no study addresses the endogeneity of migration decision.

To the best of our knowledge, there is no paper in the economic literature looking at the effect of age at immigration on criminal behavior of juvenile migrants. There are various reasons why age at migration might be related to juvenile criminal behavior. First, disproportional exposure to a violent environment in early development stage may result in post-traumatic stress leading to higher risk of committing criminal offense later in life (Beckley, 2013). The longer children were exposed, the worst outcomes one might expect. This would be especially relevant for refugee children who lived in areas with intensive violent conflict before migrating. Another channel could be through socio-economic integration. We discussed in the preceding section that children migrating at later age obtain less education and are less integrated into the host-country society. Given the high correlation between education and crime, lower educational attainment for older children at arrival may push them into more criminal activities (Machin et al., 2011). On the contrary, criminology literature suggests that cultural assimilation may instead lead to alienation and delinquent behavior. Finally, age at migration may affect criminal behavior through a change in neighborhood environment (Damm and Dustmann, 2014). The direction of the effect will depend on the quality of neighborhood pre and

post migration.

3 Institutional Background

3.1 Immigration to Denmark

In the aftermath of World War II, Denmark was a net emigration country with only few immigrants coming from Norway, Sweden, the United Kingdom and Germany. Since mid 1960s, however, it quickly turned into an attractive destination due to accelerated economic growth and increased labor market opportunities. The first large immigration wave began in late 1960s with the recruitment of guest workers coming mainly from Turkey, Pakistan and Yugoslavia to satisfy the excess demand for laborers in the flourishing Danish industrial sector. The recruitment ceased in the wake of the oil crisis in 1973 due to increased unemployment and decreased economic activity. However, the already settled guest workers were given the option to stay in the country indefinitely, and even to bring close relatives if they wished to do so. In the years to follow, family reunification became the most common route of immigration from non-European countries.

From early 1980s and during the 1990s the composition of newcomers changed significantly not only with respect to country of origin, but also with respect to reasons for migration. The wars in Iran, Iraq, Afghanistan, Somalia and ex-Yugoslavia forced many people to seek refuge in Denmark. Today, refugees are making a considerable share of the total migrant population.

The last compositional change occurred after 2004 with the largest EU expansion. A large inflow from Poland and other A10 countries came for education and work related reasons. According to Denmark Statistics, at the beginning of 2017 10% of the population was immigrants and 3% their descendants. By far the largest groups of migrants residing in Denmark are coming from Poland, followed by Syria and Turkey. The focus of the present study will be on immigrant children, both first and second generation, and their outcomes during adolescence.

3.2 Danish Criminal System

One of the most distinctive features of the Danish criminal system is that it has no separate juvenile justice.³ As in the rest of the Nordic countries, the minimum age of criminal responsibility is 15 years, and above that age, young people are sentenced in the same courts and by the same judges as adults according to the same criminal code, while children below that age are handled by the social

³The following description is based on [Kyvsgaard \(2004\)](#)

authorities. There are, however, a number of special measures and sentencing aimed at offenders that are 15 to 17 years old. This includes the frequent use of monetary fine, withdrawals of charge or more lenient sanctions in general.⁴ The reason lies in the philosophy of the Danish criminal system that young offenders should be treated with rehabilitative rather than punitive measures. Individuals age 18 to 21 instead are treated like adults in all respects.

Type of crimes are divided into three main categories (See Table A1): violations of the Penal code, the Traffic Act and the Special Act. The penal code usually deals with traditional type of crime such as sexual offenses, violent and property crimes, and drug offenses. The Traffic act deals with traffic related crimes such as drunk driving. Finally, the Special law instead deals with weapons, tax evasion, as well as some minor drug offenses such as possessing small quantity of drugs. Besides the difference in type of crimes the penal code and special laws have, they also differ in type of sanctions. While the sanctions under the penal code in many cases lead to imprisonment, the special law relies primarily on fines. This distinction, however, has become less clear cut as there are more and more fines being introduced in the penal code as a substitute for other sentences.

4 Data

We base our analysis on data coming from two main sources: (1) The Administrative Register which provide individual demographic and socio-economic characteristics for the entire population residing in Denmark, (2) the Central Police Register which records individual crime charges and convictions for the full Danish population, including immigrants. These two databases are linked using a personal identification number.

4.1 The Danish Administrative Register

The Danish Administrative Register contains individual level data for all people, both natives and immigrants, residing in the territory of Denmark. It started in 1980 and it provides a rich set of information such as birth date, sex, date of immigration, country of origin, education, income, occupation, marital status, etc. Based on our research question, we extract information for all immigrant children (and their Danish-born siblings) who arrived in Denmark before the age of 15 and who we can follow up until age 21. This will allow us to compare siblings who were responsible

⁴These types of sentences are specifically relevant for first time offenders.

for their criminal behavior for the same amount of time (age 15-21). Children are linked to their biological parents using a personal identification number. Our variable of interest is age at migration and it is measured as the difference between the immigration date (date of granting resident permit) and birthday of the child. First generation immigrant children are identified in the data as being born abroad to two foreign-born parents. Second generation immigrant children are those born in Denmark to two foreign-born parents. Sibling pairs are defined based on same father and mother, in order to make siblings as comparable as possible.⁵

One important issue to consider is that the date of immigration recorded in the registers is the date at which residence permit is granted, and this not always coincides with date of emigration from the source country. This is especially relevant for refugees, who might spend some time in refugee camp before receiving residence permit. The Danish Immigration Service has set a maximum average processing time for asylum applications to 7 months, and this period begins at the time when the application is submitted. Hence, for some children the estimated age at immigration might significantly differ from the actual age. We believe this is not a problem for us as within a family, all children arrive on the same day and are facing the same amount of waiting time⁶. This will lead to equal overestimation for all children within a family.

Our final sample of families with both Danish-born and foreign-born children consists of 21,518 boys and 19,002 girls. Table 1 reports summary statistics where we compare our sample to that of all families excluded from the analysis.⁷ This comparison will allow us to understand whether families in our sample systematically differ according to some observable socio-economic characteristics. Average age at immigration in our sample is 6 and 83 percent of all children are first generation. These numbers are significantly lower when we look at the descriptive statistics for excluded families, but this is explained by the lower share of first generation (29%). Given our restriction of having at least two children, the families in our sample are relatively larger with average number of children at 4. 27.6% of them are first born. In the excluded sample, families have on average 2.7 kids and 57.5% of them are first born. There is also more than a year gap in mothers' age at first birth between the two samples.

Most of those mothers have at most compulsory or vocational education, followed by short-

⁵van den Berg et al. (2014) identifies siblings based on mother only. This may cause some problems in a situation where a mother has children from more than one man. Situations like this are not handled by family-fixed effects. They also provide robustness check by re-defining the families to handle the issue. Their results do not change.

⁶This might not always be the case, however, our data is constructed in such a way to meet that requirement

⁷Excluded are single-child families or families whose children were all born in Denmark

medium cycle higher education.⁸ For 20% of mothers we do not have any information on their educational attainment.⁹ The numbers are statistically different for the sample of excluded families even though the differences are rather small. On average, we exclude slightly more families with mothers having vocational training. Also, the share of mothers with unknown education is lower in the excluded families sample. The large share of low educated mothers could be explained by the household composition (families are larger) and country of origin.

Following our discussion on migration patterns to Denmark in Section 3.1, not surprisingly, main regions of origin are the Middle East followed by Transition Economies and Africa. By restricting the data to families with at least two children, we mostly drop families from developed and transition economies. This selection is explained by the fertility choices of mothers coming from those regions.

As a final comparison, we also report the average number of charges and convictions for both samples. We see that for all criminal offenses, both charges and convictions, our sample has on average higher values. This might be driven by the fact that children from larger families are more likely to commit a crime, or by the country of origin composition in our final sample.

4.2 Crime Statistics

Official statistics constitute an important source of knowledge about the extent of youth crime. Crime statistics for Denmark are obtained from the Central Police Register. It is an official registry data and it includes statistics on charges and convictions for the period of 1980-2015 for the entire population residing in Denmark. Each criminal case is given a unique journal number which allows us to follow it through the legal process, from charge to conviction. For the purpose of our analysis, we use information on both charges and convictions.

The information on crime charges includes the date of committing the offense, date of charge, type of crime, and the last day of the crime if the offense has stretched over a period. For about 90% of the cases, the year of committing the crime is the same as the year of the charge, for 8% the charge has been made a year after the offense. The rest 2% of cases consists of charges that has been made more than 2 years after the offense. For our main analysis we use the year in which the

⁸Compulsory school in Denmark consists of primary and lower secondary education, and it ends at age 16 (10 years of education). After, an individual could go for either general upper secondary or vocational education. Short higher education typically last 1-2 years and is based on general secondary education or vocational training. Typical programs are financial management or computer science. Medium-cycle higher education lasts 2-4 years. Typical programs are nurses and school teachers. Finally, there is the Long-cycle higher education that consists of bachelor and master programs.

⁹This happens either because they did not acquire education in Denmark or because they did not fill in the surveys administered by Statistics Denmark about obtained education in the country of origin.

Table 1: Summary Statistics

	Excluded Families		Our Sample			p-value
	Mean	St.Dev.	Mean	St.Dev.	St.Dev.W	H_0 : Equal Means
Children						
Boys	0.526	(0.499)	0.531	(0.499)	(0.401)	0.144
Age at Migration	2.417	(4.354)	6.003	(4.574)	(2.539)	0.000
First Generation	0.298	(0.458)	0.834	(0.372)	(0.279)	0.000
First Born	0.575	(0.494)	0.276	(0.447)	(0.407)	0.000
Number of Children	2.723	(1.443)	4.126	(1.775)	(0.000)	0.000
Age at First Birth	22.816	(4.678)	21.500	(4.057)	(0.000)	0.000
Education: Mother						
Education Missing	0.147	(0.354)	0.198	(0.399)	(0.000)	0.000
Compulsory Education	0.345	(0.475)	0.336	(0.472)	(0.000)	0.004
Upper-Secondary Education	0.076	(0.265)	0.084	(0.277)	(0.000)	0.000
Vocational Education	0.240	(0.427)	0.205	(0.404)	(0.000)	0.000
Short-Medium Education	0.144	(0.351)	0.131	(0.337)	(0.000)	0.001
Bachelor/Master Education	0.048	(0.213)	0.047	(0.212)	(0.000)	0.614
Source Country: Mother						
Developed Economies	0.101	(0.302)	0.049	(0.215)	(0.000)	0.000
Transition Economies	0.408	(0.492)	0.312	(0.463)	(0.000)	0.000
Africa	0.081	(0.273)	0.098	(0.297)	(0.000)	0.000
South America	0.013	(0.113)	0.010	(0.101)	(0.000)	0.001
Middle East	0.246	(0.431)	0.418	(0.493)	(0.000)	0.000
Asia	0.083	(0.276)	0.077	(0.267)	(0.000)	0.003
Other	0.002	(0.039)	0.004	(0.066)	(0.000)	0.000
Charged with a Criminal Offence						
Charge 21	0.217	(0.412)	0.271	(0.445)	(0.326)	0.000
Charge 21: Violent	0.086	(0.280)	0.117	(0.321)	(0.240)	0.000
Charge 21: Property	0.183	(0.387)	0.229	(0.420)	(0.311)	0.000
Charge 21: Other	0.046	(0.209)	0.059	(0.235)	(0.183)	0.000
Convicted of a Criminal Offence						
Convict 21	0.171	(0.376)	0.215	(0.411)	(0.305)	0.000
Convict 21: Violent	0.051	(0.221)	0.072	(0.259)	(0.198)	0.000
Convict 21: Property	0.141	(0.348)	0.180	(0.384)	(0.289)	0.000
Convict 21: Other	0.024	(0.154)	0.027	(0.163)	(0.130)	0.004
Children	42293		40520			
Families	29273		14384			

Note: The table reports descriptive statistics for the type of families we use or exclude from analysis. Our Sample includes families with two or more siblings who are age 21, who immigrated before the age of 15 or were born in Denmark. Children for which we do not have information for the entire period are excluded. We also exclude single-child families or families with all children born in Denmark. Excluded Families are single-child families or families with all children born in Denmark. Mean and St.Dev report the mean and the overall standard deviation. The within standard deviation is presented in column St.Dev.W. The p-value refers to two-sided t-test of the equality of means between those two groups.

crime was committed.

The information on crime convictions includes date of conviction, the district police or prosecutors office which has taken the decision, verdict, sentence, and type of offense. Sentences could be custodial (conditional / unconditional), community service and fines. We also have information if an appeal was made, however, there was an appeal for only 1% of the convictions in the entire

population.

The Central Police Register categorizes conviction and charges into eight different type of offenses: sexual assault, violent crime, crimes against property, other offenses against the penal code, offenses against the Traffic Act, offenses against the Drug Act, offenses against the Arms Act, and other special acts. Throughout the analysis we omit the offenses against the Traffic Act and Special Acts, and combine the remaining into three categories: property crimes, violent crimes, and other offenses that include drug and sexual offenses. See Table A1 in Appendix A for more details on how crimes are grouped.

Table 2 reports summary statistics of crime broken down by gender. 41% of boys have been charged with a crime by age 21 and 33% have been convicted at least once for a criminal offense. The largest share of charges and convictions goes to property crimes followed by violent crimes. The numbers for girls are significantly lower: 11% of all girls have been charged by age 21 and only 8% convicted. As for boys, the largest share goes to property crimes. We also provide descriptive evidence on the share of crimes by area of origin. Numbers are reported in Table B1. In our sample, unconditional means show that overall Africans are most frequently charged and convicted, followed by south American and children from the Middle East. Children from Asia and Developed Economies report the lowest crime involvement. These patterns persist even when we look at different types of crimes. Table B2 in Appendix B lists the first four countries by area of origin with highest conviction rate. Figure B1, instead, plots the probability to be charged or convicted by age 21 according to age at migration.

Table 2: Summary Statistics

	Boys		Girls	
	Mean	St.Dev.	Mean	St.Dev.
Charged with a Criminal Offense				
Charge 21	0.411	(0.492)	0.112	(0.315)
Charge 21: Violent	0.204	(0.403)	0.018	(0.133)
Charge 21: Property	0.345	(0.475)	0.098	(0.298)
Charge 21: Other	0.102	(0.303)	0.009	(0.096)
Convicted of a Criminal Offense				
Convict 21	0.328	(0.469)	0.086	(0.281)
Convict 21: Violent	0.128	(0.334)	0.010	(0.099)
Convict 21: Property	0.269	(0.443)	0.078	(0.269)
Convict 21: Other	0.049	(0.215)	0.003	(0.057)
N	21518		19002	

Note: Table reports the mean and standard deviation for charges and convictions for boys and girls separately. Charges and convictions take the value of 1 if an individual has been charged or convicted by age 21 and 0 otherwise. The sample includes families with two or more siblings who are age 21, who immigrated before the age of 15 or were born in Denmark. Children for which we do not have information for the entire period are excluded. We also exclude single-child families or families with all children born in Denmark.

5 Identification Strategy

We attempt to answer two main questions. Following the extensive public debate on migration and crime, we begin by asking whether there are any differences in delinquent behavior between first and second generation immigrant children. After providing causal estimates to that question, we then ask if age at migration matters for their later-life criminal behavior. To address the problem of endogenous migration decision, we compare siblings in a family-fixed effect framework. Sibling migration usually occurs simultaneously and the timing and location choice are not determined by the children themselves, but rather by their parents. Hence, we exploit the exogenous source of variation induced by parental migration decision to understand whether there are critical periods during childhood on later-life criminal behavior.

We commence by estimating the following model:

$$C_{ij} = \alpha F_{ij} + X'_{ij}\beta + \gamma_j + \epsilon_{ij} \quad (1)$$

where C_{ij} denotes crime outcome of individual i in family j measured at age 21. Our data allows us to consider two types of specific crime measures: first, an outcome measuring if an individual has been charged with a crime between age 15 to 21, and second, if an individual has been convicted of a crime in the age range 15 to 21. Crime charges for immigrants might be overrepresented in the statistics due to purely reporting or discriminatory reasons. Therefore, convictions might be a

better measure of criminal involvement. However, since we use siblings fixed effects approach, this should not be a problem for us as long as there is no systematic over/under reporting of crimes depending on the child. F_{ij} is a dummy variable taking the value of 1 if child i in family j is first generation and 0 for second generation. X'_{ij} is a vector of individual-specific characteristics that vary between siblings, such as birth order, gender and mother's age at birth. Importantly for our identification, γ_j captures family-specific determinants of crime fixed over time such as country of origin, traditions, values, preferences, wealth, neighbourhoods, etc. In addition, since siblings immigrate at the same date in our sample, any immigrant-cohort effect will be captured by the family fixed effects. Finally ϵ_{ij} is the individual error term. We control for age-related outcome differences by looking at siblings at exactly the same age and who had equal amount of time to commit crime (15-21). Since outcomes are measured at the same age for all siblings, the coefficient of F_{ij} will give us the combined effect of being born abroad and years spent in the country by age 21. This automatically means that children entering Denmark at later age have been also exposed to Danish environments for a lower amount of time.

To answer our second question related to the effect of age at migration on criminal behavior, we are following the literature on critical ages during childhood ([van den Berg et al., 2014](#)) and the empirical analysis is based on the following specification:

$$C_{ij} = \alpha A_{ij} + X'_{ij}\beta + \gamma_j + \epsilon_i \quad (2)$$

where C_{ij} , X'_{ij} , γ_j and ϵ_i take the same definition as introduced above. In this specification, however, instead of using an indicator variable for being born abroad or in Denmark we use a set of dummies for the different ages at migration, namely A_{ij} .¹⁰ However, children at the same immigration age might be at very different development stage. Since age is imperfect proxy for development, we also group children based on age at arrival intervals.

Our identification strategy might be threatened in several ways. First, the main assumption we make when estimating such a model is that parental migration decision is independent of the characteristics of each child. If early criminal behavior for some children in the family actually induced the migration decision of the parents, then our sibling comparison inference fails. We are able to address this problem by performing analysis using only families whose oldest child was 5 at

¹⁰Table B3 reports the number of children depending on age at immigration. 17% are siblings born in Denmark, while 4% are children who arrived in the country before their first birthday. For the rest of the age at migration, we have somehow a uniform distribution, despite the slightly lower numbers at the two tails of the distribution. This might reflect the reluctance of parents traveling with either too young or relatively older kids.

time of migration. We believe that it is difficult to detect criminal behavior before that age.

In addition, age at migration is correlated with birth-order effects, which have been shown to play a major role in explaining juvenile delinquent behavior (Bègue and Roché, 2005). A vast amount of research suggest that parents favor first and last-born as compared to middle born. Since siblings-fixed effect does not solve the issue of birth-order effects, not taking this into account will lead to spurious correlation. If on average, first and last born children have lower propensity to commit a crime, that would underestimate our effect. To address this issue we include first-born dummy in all regressions. In Section 8 we perform a sensitivity analysis by including a full set of birth order dummies.

Finally, difference in age between siblings might also cause some concerns. For siblings who are very close in ages, our estimates will most likely pick up some measurement noise. On the other hand, siblings who have larger age difference are more likely to experience substantial differences in the environment or possibly in parenting style. We perform sensitivity analysis by including a full set of age difference dummies.

6 Estimation Results

6.1 Who is More Likely to Commit a Crime? An Analysis of First vs Second Generation

We start by providing evidence on the extensively discussed question whether first or second generation migrants are more likely to engage in criminal behavior. We do that by using our baseline specification, Eq.1, presented in Section 5. As previously discussed in Section 2.2, the literature so far has compared the crime rates of first versus second generation, however, they do not take into account the selection process that drives initial migration decision. If first generation immigrants are positively selected with respect to crime, then these results are overestimating the true effect of being a migrant on crime and vice versa. We propose a different strategy in order to estimate the true effect and provide a novel evidence where we compare first generation children to their second generation siblings in a family-fixed effects framework. For the purpose of comparison, Table 3 presents two sets of results: point estimates obtained from an OLS estimation without fixed effects and results from our baseline specification. Results presented are only using data on charges. For results using data on convictions, see Table B4 in Appendix B.

Column 1 in Table 3 shows that if a child was born abroad the propensity to be charged with a

crime by age 21 is 1.1 percentage points higher as compared to Danish born children. In columns (2) to (7), we sequentially add additional covariates to our regressions. OLS coefficients remain positive and significant. Even controlling for birth order, birth year, country of origin, municipality of residence in Denmark and mother’s education (column 7), we still find that first generation are 1.5 percentage points more likely to be charged with a crime by age 21. Compared to our baseline crime rate, it gives us a 5.7% increase in charges¹¹. Finally, in column (7) and (8) we control for family time-invariant characteristics. The coefficient more than doubles pointing to a 13.5% increase in probability to be charged with a crime for first generation relative to their second generation siblings. This pattern persists throughout all the different regressions: OLS coefficients are statistically significant, have the same sign as fixed effects estimator but are smaller in magnitude. Hence not controlling for family time-invariant characteristics leads to a downward bias in our estimates. From now on, we only focus on our baseline specification that includes siblings-fixed effects.¹²

In addition to estimating an average effect as we did in column 6 in Table 3, we are also interested to understand whether specific crime charges drive these results. We break down the overall charges into three main categories: violent, property and other offenses, which include sexual and drug related charges.¹³ Table 4 column (1) to (4) report the results from a Linear probability model. We find no significant difference in the propensity to be charged with a violent crime or other types of crimes between first and second generation migrant children. The only significant effect is found for property charges which is 4.3 percentage points higher for children arriving in Denmark after their birth. Given the probability to be charged with a property crime for second generation immigrant children is 21.5%, the estimates translate in 20.5% increase. These results provide us with novel evidence that children born abroad are more likely to be charged with property crimes, but there are no statistically significant differences for violent or other offenses.

Charge data, however, is not the best measure for criminal activity, despite there is a high correlation between charges and convictions.¹⁴ This is because of the potential minority bias possibly found in the criminal justice system (Holmberg and Kyvsgaard, 2003). Convictions data are usually seen as a better measure because the legal system is stricter at this stage. Despite there is no reason

¹¹Baseline crime rate for second generation immigrant children is 25.9%. Percentage increase in probability is given by $1.5 \div 25.9 = 5.7\%$

¹²At the bottom of Table 3 we also report the p-value of Hausman Test comparing Fixed versus Random effects. We strongly reject the null hypothesis, hence random effects are an inconsistent estimator.

¹³We group sexual, drug and other crimes together because we have very few observations. We also run regressions including each crime type separately, but there is not a significant difference.

¹⁴Correlation coefficient is 0.851. 79% of charged individuals have also been convicted by age 21.

Table 3: OLS vs Household Fixed Effects. Probability to be charged with a crime: age 15-21

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
First Generation	0.011* (0.006)	0.019*** (0.006)	0.014** (0.006)	0.011* (0.006)	0.013** (0.006)	0.015** (0.006)	0.030*** (0.007)	0.035*** (0.007)
Boys	0.299*** (0.006)	0.299*** (0.004)	0.299*** (0.004)	0.298*** (0.004)	0.299*** (0.004)	0.300*** (0.004)	0.038*** (0.005)	0.307*** (0.005)
First Born		-0.028*** (0.005)	-0.036*** (0.005)	-0.030*** (0.005)	-0.030*** (0.005)	-0.027*** (0.005)		-0.009* (0.005)
Birth Year FE	—	—	Yes	Yes	Yes	Yes	—	—
Origin FE	—	—	—	Yes	Yes	Yes	—	—
Municipality FE	—	—	—	—	Yes	Yes	—	—
Mother's Education	—	—	—	—	—	Yes	—	—
Household FE	—	—	—	—	—	—	Yes	Yes
Hausman Test (p-value)							0.000	0.000
Baseline Crime Rate	0.259	0.259	0.259	0.259	0.259	0.259	0.259	0.259
Families	14384	14384	14384	14384	14384	14384	14384	14384
Children	40520	40520	40520	40520	40520	40520	40520	40520

Note: The table reports results from a Linear Probability Model. Dependent variable is a dummy taking value of 1 if a child was charged with a crime by age 21 and 0 otherwise. Robust standard errors are reported in parenthesis. The sample includes families with two or more siblings who are age 21, who immigrated before the age of 15 or were born in Denmark. Children for which we do not have information for the entire period are excluded. We also exclude single-child families or families with all children born in Denmark.

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

Table 4: First vs. Second Generation: Who is more likely to commit a crime?

	Charge				Convict			
	(1) All	(2) Violent	(3) Property	(4) Other	(5) All	(6) Violent	(7) Property	(8) Other
First Generation	0.035*** (0.007)	0.004 (0.005)	0.044*** (0.007)	-0.004 (0.004)	0.030*** (0.007)	0.005 (0.005)	0.037*** (0.007)	-0.000 (0.003)
Boys	0.307*** (0.005)	0.189*** (0.004)	0.255*** (0.005)	0.093*** (0.003)	0.249*** (0.005)	0.120*** (0.003)	0.197*** (0.005)	0.044*** (0.002)
First Born	-0.009* (0.005)	-0.021*** (0.004)	-0.006 (0.005)	-0.015*** (0.003)	-0.012** (0.005)	-0.014*** (0.003)	-0.007 (0.005)	-0.009*** (0.002)
Household FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Baseline Crime Rate	0.259	0.121	0.215	0.071	0.203	0.075	0.164	0.035
Families	14384	14384	14384	14384	14384	14384	14384	14384
N	40520	40520	40520	40520	40520	40520	40520	40520

Note: The table reports results from a Linear Probability Model. Dependent variables are dummies taking value of 1 if a child was charged/convicted by age 21 and 0 otherwise. We report the results for overall, violent, property and other charges/convictions. Robust standard errors are reported in parenthesis. The sample includes families with two or more siblings who are age 21, who immigrated before the age of 15 or were born in Denmark. Children for which we do not have information for the entire period are excluded. We also exclude single-child families or families with all children born in Denmark.

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

to believe that police officers will target more first generation children among the siblings pairs, we provide evidence on the different propensities to be convicted. Using data on convictions in columns

5 to 8 confirms the findings above: first generation are 3 percentage points more likely to be convicted of a crime by age 21, and are 3.8 percentage points more likely to be convicted of a property crime as compared to their Danish born siblings. With baseline probabilities of 20.3% and 16.4%, the likelihood of conviction is 15% higher when all convictions are pooled together, and 22.5% higher for property offenses. Again, we find no significant differences for other types of convictions. We replicate our analysis using Probit model (Table B5 in Appendix B) and results are very similar.

Gender differences in crime propensity are well established by criminologists. Universal finding is that boys are more likely to commit crimes than girls (Steffensmeier and Allan, 1996). The descriptive statistics showing unconditional crime means in Table 2 confirms the gap. Controlling for gender in our regressions we indeed find that boys are significantly more likely to be criminally involved. For overall convictions for example, we see that boys are 30 percentage points more likely to be convicted of crimes by age 21 as compared to girls. To get a sense of the difference between first generation boys and girls, Table 5 reports the results for convictions divided by gender. The effect is entirely driven by boys. Being first generation boy increases the propensity to be charged with a crime by 5.5 percentage points, while no effect is found for girls. Interestingly, first generation girls are significantly less likely to be charged with a violent offense as compared to their second generation siblings.

Finally, we also confirm the findings previously found in the literature on birth order and delinquent behavior (Bègue and Roché, 2005). We see that first born children are significantly less likely to be charged or convicted as compared to their other siblings (Table 4)¹⁵. Results, however, are only significant for boys (Table 5).

6.2 The Effect of Age at Migration on Crime

After establishing that first-generation immigrant children are more likely to be criminally involved, we move to our next question of whether age at migration can explain these differences. In order to give an answer to that question, we estimate Eq. 2 presented in Section 5. Table B6 in Appendix B reports the results and in Figure 1 we plot the coefficients together with their respective confidence intervals.

Looking at the estimates visualized in Figure 1, we confirm the finding from above: for all ages

¹⁵In households with two siblings, the first born dummy and the foreign born dummy will coincide and we would not be able to separate the two effects. This implies that the separate identification of these two effects comes from the fact that we have households with more than 2 children. In our sample, the share of families with two children is 20% whereas the rest 80% are households with more than two children. In addition, 82% of families with two children have both children born abroad, which breaks the collinearity between being first born and first-generation.

Table 5: First vs. Second Generation: Who is more likely to commit a crime by gender?

	Boys				Girls			
	(1) All	(2) Violent	(3) Property	(4) Other	(5) All	(6) Violent	(7) Property	(8) Other
First Generation	0.044*** (0.013)	0.008 (0.010)	0.055*** (0.013)	-0.007 (0.007)	0.004 (0.009)	-0.006** (0.003)	0.001 (0.009)	-0.000 (0.002)
First Born	-0.016* (0.009)	-0.028*** (0.007)	-0.010 (0.009)	-0.011** (0.005)	0.006 (0.007)	-0.002 (0.002)	0.008 (0.006)	-0.002 (0.001)
Household FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Baseline Crime Rate	0.320	0.132	0.254	0.064	0.076	0.013	0.067	0.003
Families	12358	12358	12358	12358	11395	11395	11395	11395
N	21518	21518	21518	21518	19002	19002	19002	19002

Note: The table reports results from a Linear Probability Model. Dependent variables are dummies taking value of 1 if a child was convicted by age 21 and 0 otherwise. We report the results for overall, violent, property and other charges. Robust standard errors are reported in parenthesis. The sample includes families with two or more siblings who are age 21, who immigrated before the age of 15 or were born in Denmark. Children for which we do not have information for the entire period are excluded. We also exclude single-child families or families with all children born in Denmark.

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

at migration, immigrant children are more likely to be charged or convicted of a crime as compared to their Danish born siblings. Coefficients are statistically different from 0 at 1% meaning that essentially all ages at migration matter as compared to being born in Denmark. Despite the wide confidence intervals, the function of age at migration and probability to be suspected or convicted of a crime is upward sloping (Figure (a) and (e)) beyond the age of 5. The older the children are at immigration, the more likely they are to engage in criminal behavior. Arriving at age 7 is associated with 5.8 percentage points higher probability to be charged by age 21 relative to second generation. The associated increase for age 11 is 6.4 percentage points. As we saw in the previous section, this increasing pattern is driven by property crimes (Figure (b) and (f)). On the contrary, for violent and other crimes we observe a negative slope: the older the child arrives the less likely he/she is to be charged or convicted for the respected crimes, even though coefficients are significant for ages above 10. Arriving at age 14 is associated with 2.2 percentage points lower probability to be convicted of a violent offense and 2.1 percentage point decrease for other offense.

Age at migration, however, is an imperfect measure for child's development. Child development is a continuous process with a unique path for every child. It does not progress at the same time for everyone and each stage is heavily affected by previous experiences such as environmental factors. Hence, comparing siblings who are very close in age may introduce significant random noise. To address this issue, we group children into larger age at migration intervals. Our chosen intervals

are as follows: (0-2) arrived as toddler or born in Denmark; (3-5) arrived in preschool years; (6-9) arrived in first years of compulsory school and critical period for second language acquisition; (10-14) arrived as a school-aged child transitioning to adolescent. Results are reported in Table 6. For overall charges and convictions (column (1) and (5)), arriving at or after the age of 6 is associated with 2.8 and 2.4 percentage points increase in the probability of delinquent behavior. Similar magnitude is found for age group 10-14. Children who arrived in preschool, instead, are equally likely to engage in delinquent behavior relative to toddlers and Danish born siblings. These results point to education as a possible mechanism for explaining the first versus second generation immigrant gap. We find similar pattern for property crimes. Interestingly, as we also saw in Figure 1, arriving after age 9 is associated with lower probability of being charged with or convicted of sexual, drug or other related offenses.

Summing up, we find that first generation immigrant children are significantly more likely to engage in delinquent behavior relative to their second generation siblings. In particular, property crimes are the only crimes for which these two groups display a significant gap. Age at migration analysis suggests arriving after school starting age (age 6) as an important determinant for later life criminal behavior. Next, we turn to the possible mechanisms that can help us explain the observed gap.

Figure 1: Charge by age 21 and Age at Immigration



Note: The figure plots the fixed-effects point estimates of different crime measures as a function of age at migration. Being a first born and gender are always included as controls. These point estimates correspond to the estimates in Table B6.

Table 6: First vs. Second Generation: Age Intervals

	Charge				Convict			
	(1) All	(2) Violent	(3) Property	(4) Other	(5) All	(6) Violent	(7) Property	(8) Other
Arrived 3-5	0.013* (0.008)	-0.003 (0.006)	0.011 (0.007)	0.002 (0.005)	0.011 (0.007)	-0.001 (0.005)	0.014** (0.007)	0.002 (0.003)
Arrived 6-9	0.028*** (0.009)	-0.005 (0.006)	0.033*** (0.008)	-0.007 (0.005)	0.024*** (0.008)	0.003 (0.005)	0.031*** (0.008)	-0.005 (0.004)
Arrived 10-14	0.033*** (0.010)	-0.016** (0.008)	0.037*** (0.010)	-0.017*** (0.006)	0.027*** (0.010)	-0.007 (0.006)	0.033*** (0.009)	-0.013*** (0.004)
First Born	-0.009* (0.005)	-0.015*** (0.004)	-0.006 (0.005)	-0.011*** (0.003)	-0.012** (0.005)	-0.011*** (0.003)	-0.007 (0.005)	-0.006*** (0.002)
Boys	0.308*** (0.005)	0.189*** (0.004)	0.255*** (0.005)	0.093*** (0.003)	0.249*** (0.005)	0.120*** (0.003)	0.197*** (0.005)	0.044*** (0.002)
Household FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Baseline Crime Rate	0.267	0.122	0.227	0.067	0.212	0.077	0.175	0.034
Equal Age Dummies	0.060	0.056	0.006	0.001	0.119	0.093	0.036	0.000
Families	14384	14384	14384	14384	14384	14384	14384	14384
N	40520	40520	40520	40520	40520	40520	40520	40520

Note: The table reports results from a Linear Probability Model. Dependent variables are dummies taking value of 1 if a child was charged/convicted by age 21 and 0 otherwise. Robust standard errors are reported in parenthesis. The sample includes families with two or more siblings who are age 21, who immigrated before the age of 15 or were born in Denmark. Families with all children born in Denmark are excluded. All specifications include siblings fixed effects. The reference category is children immigrating before the age of 3 including children born in Denmark (second generation).

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

7 Channels

An important question to ask is what are the mechanisms driving these effects of migration on crime. Our first check is the educational channel. Education has been shown to be a strong predictor of criminal behavior (Machin et al., 2011). As pointed out in Section 2.1, age at migration is also a strong predictor of educational attainment.

We first check whether there are differences in educational attainment between first and second generation immigrants. We use several different dependent variables for that: the probability to have at most primary education by 21, the probability to have completed at most secondary and at most vocational training. We also look at years of education and the propensities to be enrolled in higher education. Since data on years of schooling was no longer reported after 2013, we lose some observations. Results are presented in Table 7, while the effect of age at migration on education is visualized in Figure B2 in Appendix B. On average first generation immigrant children are 7.1 percentage points more likely to have at most primary education by age 21 as compared to their Danish born siblings (column 1) and they also obtain less education in terms of years of schooling

(column 4). They are also less likely to be enrolled in higher education, both college or short, medium - high education (column 5 and 8). Looking at Figure B2 in Appendix B we see that years of education decreases in age at migration and all coefficients beyond the age of 1 are significant. Results are substantial. A child arriving at age 14 obtains one year less of schooling by age 21 as compared to his/her sibling born in Denmark. He/she is also 30 percentage points more likely to end up with primary education only. Given the stronger effect on charges and convictions we observe after school starting age and the lower educational attainment of older at migration children, we could conclude that education at least partially explains the crime gap.¹⁶

Table 7: First vs Second Generation: Educational Attainment

	(1) At Most Primary	(2) At Most Secondary	(3) At Most Vocational	(4) Years Educ	(5) Enrolled College	(6) Enrolled Secondary	(7) Enrolled Vocational	(8) Enrolled S-M
First Generation	0.071*** (0.008)	-0.009 (0.006)	0.008** (0.004)	-0.180*** (0.026)	-0.024*** (0.005)	-0.000 (0.005)	-0.021*** (0.007)	-0.029*** (0.005)
Boys	0.060*** (0.005)	-0.032*** (0.004)	-0.022*** (0.002)	-0.329*** (0.015)	-0.033*** (0.003)	0.007* (0.004)	0.050*** (0.004)	-0.030*** (0.003)
First Born	0.036*** (0.005)	-0.023*** (0.004)	-0.010*** (0.002)	-0.101*** (0.015)	-0.013*** (0.003)	0.020*** (0.004)	0.000 (0.005)	-0.019*** (0.003)
Household FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Education Rate	0.332	0.155	0.036	11.550	0.119	0.082	0.155	0.104
Families	14384	14384	14384	13884	14384	14384	14384	14384
N	40520	40520	40520	34207	40520	40520	40520	40520

Note: The table reports results from an OLS regression. Standard errors are reported in parenthesis. The sample used includes families with two or more siblings who are age 21, who immigrated before the age of 15 or were born in Denmark. Families with all children born in Denmark are excluded. All specifications include household fixed effects.

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

Another potential channel could be differences in labor market opportunities for first-generation and native-born siblings. There is a growing literature, both for the US and Europe, on the impact of immigration and crime. The main findings generally stress the importance of labor market opportunities in shaping migrants' decisions to engage in criminal behavior (Bell et al., 2013; Mastrobuoni and Pinotti, 2015; Pinotti, 2017). Lower educational attainment of first generation immigrant children coupled with restricted labor market opportunities may further push them into illegal activities. This will be a direct results of the reduced opportunity cost of committing a crime.

Next, we check whether exposure to a violent environment during childhood results in a more criminal behavior later in life. As we previously discussed, this would be especially relevant for

¹⁶We further include educational attainment as covariates in our preferred specification. Results are reported in Table B14. Point estimates decrease but the coefficients on first generation remain positive and statistically significant, suggesting that part of the effect is driven by factor other than education.

refugee children coming from war-torn countries. Evidence from immigrants in Switzerland suggests that cohorts exposed to civil conflict or mass killings during childhood are more prone to commit violent crimes as compared to cohorts born after the conflict (Couttenier et al., 2016).

In order to test this hypothesis we define two additional indicator variables. One is taking the value of one if a child was born during a war and zero otherwise. This should capture conditions at birth, which are shown to have long lasting negative effects on health and education (Almond et al., 2017). The second dummy takes the value of one if a child immigrated to Denmark while the country of origin was in a war and zero otherwise. This would give us the effect of being exposed to a war at different stages of child development. We only consider specifications in which the dummy variables are interacted with being first generation. Results are reported in Table 8 and Table 9 respectively. The coefficients on both interaction terms are insignificant telling us that there is no difference in the propensity to be charged or convicted of a crime for first generation refugee versus first generation non-refugee children. These results provide a preliminary evidence on the widely discussed issue of refugee children being much more violent as compared to the rest of the migrant groups. Our evidence suggests that such arguments might be unfounded.

Table 8: First vs Second Generation Boys: Who is committing more crimes by age 21? Immigrated during a war

	Charge				Convict			
	All	Violent	Property	Other	All	Violent	Property	Other
First Generation	0.028*** (0.009)	-0.002 (0.007)	0.037*** (0.009)	-0.008 (0.005)	0.023*** (0.009)	-0.001 (0.006)	0.032*** (0.009)	-0.002 (0.004)
First X Refugee Year	0.016 (0.013)	0.015 (0.010)	0.016 (0.013)	0.008 (0.008)	0.015 (0.012)	0.014* (0.008)	0.012 (0.012)	0.005 (0.006)
Household FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Baseline Crime Rate	0.259	0.121	0.215	0.071	0.203	0.075	0.164	0.035
Families	14384	14384	14384	14384	14384	14384	14384	14384
N	40520	40520	40520	40520	40520	40520	40520	40520

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

Note: The table reports results from an OLS regression. Standard errors are reported in parenthesis. The sample used includes families with two or more female siblings who are age 21, who immigrated before the age of 15 or were born in Denmark. Families with all children born in Denmark are excluded. All specifications include household fixed effects.

Table 9: First vs Second Generation Boys: Who is committing more crimes by age 21? Born during a war

	Charge				Convict			
	All	Violent	Property	Other	All	Violent	Property	Other
First Generation	0.042*** (0.008)	0.002 (0.006)	0.051*** (0.008)	-0.006 (0.005)	0.035*** (0.008)	0.002 (0.005)	0.044*** (0.008)	-0.002 (0.004)
First X Refugee Born	-0.015 (0.009)	0.005 (0.007)	-0.016* (0.009)	0.002 (0.005)	-0.011 (0.009)	0.006 (0.006)	-0.014 (0.008)	0.004 (0.004)
Household FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Baseline Crime Rate	0.259	0.121	0.215	0.071	0.203	0.075	0.164	0.035
Families	14384	14384	14384	14384	14384	14384	14384	14384
<i>N</i>	40520	40520	40520	40520	40520	40520	40520	40520

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

Note: The table reports results from an OLS regression. Standard errors are reported in parenthesis. The sample used includes families with two or more female siblings who are age 21, who immigrated before the age of 15 or were born in Denmark. Families with all children born in Denmark are excluded. All specifications include household fixed effects.

8 Sensitivity Analysis

We do several robustness checks in order to assess the sensitivity of our results with respect to sample selection. First, we address the concern of missing father’s information. 11,5% of our sample has no information on who the legal father is. We have kept those observations by creating family identifier based on the mother only. This might be a concern if the mother re-married and had additional children. We drop all observations for which legal father is missing or mother had additional children from another men. Results are unaffected (Table B7 in Appendix B.)

Second, we restrict our sample to families with all children arriving before the age of five. We do this in order to understand whether migration decision of the parents was driven by delinquent behaviour for some of the children pre-migration. There is no scientific reason for the chosen threshold, rather we have taken a very conservative view on the age up until which we cannot determine a criminal inclination in kids. Due to the additional restriction on age at migration our sample decreases significantly to 9385 children. However, results presented in Table B10 in Appendix B are very similar to the one we found on the full sample. First generation children who arrived in Denmark before the age of 5 are significantly more likely to charged and convicted of a crime by their 22nd birthday as compared to their Danish born siblings. Point estimates are also very similar in magnitude to our baseline results. Hence we can conclude that our results are not driven by selective migration decision by the parents.

Another concern is that parents may invest differently in their children, which would lead to

spurious correlation. In our baseline results, we try to account for that by including a dummy for being a first born or not.

As a next step, we also include a dummy indicating whether a child is a middle born¹⁷. The results are slightly lower in magnitude but sign and significance is unaffected (Table B11). We replicate the analysis using a full set of birth order dummies, and again results are unaffected (Table B12).

So far we have not addressed the issue of age differences between children. To do that, we re-do our main analysis including dummies for age difference with respect to first born child in the family. Results are presented in Table B13. Even controlling for age differences, our main conclusion is unaffected. First generation immigrant children are significantly more likely to be charged and convicted of criminal offences. The magnitude of the effect is slightly lower but significant at 5 percent. We still find that results are mainly driven by property crimes, even though convictions for violent offences are also positive and significant at 10 percent.

There is a significant concern with respect to selective return migration. If parents decide to send more aggressive children back to the country of origin, and if first generation are more likely to be send home because of the established ties they have, we will underestimate the true effect on crime. Despite the opposite scenario is quite unlikely, our results will be overestimated if best children are send back home instead. Since we exploit within family variation, to do a sufficient robustness check it is enough to keep families whose composition did not change over time, i.e. families where we have information for all children at age 21. Our sample decreases by half, nonetheless results and magnitudes are unaffected (see Table B9).

9 Conclusion

The present study raises two questions concerning migrants and their criminal behavior. First, we ask who is more likely to commit a crime, first or second generation immigrant children? Second, can age at migration explain the observed crime gap?

There are several reasons why it is important to have an analysis by immigrant generation. First, a continuous influx of migrants have resulted in a large share of both first and second generation immigrant children in many developed countries. This has created an intensive public debate on their socio-economic integration. Second, while first generation was exposed to a foreign environ-

¹⁷Middle born children exist in families with more than 2 children. Hence if a family is composed of two children only, the value of the variable middle born will be 0.

ment, second generation has been entirely raised in the host country allowing us to study the effect of home country environment. Lastly, second generation are a distinctive group. They are born in the host countries while their immigrant parents play a crucial role in their later life outcomes. Thus, by studying the crime gaps between these two groups will not only help us better design crime prevention and integration policies, but it will also allow to study whether delinquent behavior is a result of bad childhood environment.

Our econometric approach relies on family-fixed effects. By comparing siblings in the same family, we are able to identify the causal effect of being born abroad on later-life criminal behavior. In addition, by comparing siblings who arrive to Denmark in the same year but at different ages, we are able to assess the causal effect of age at migration on crime.

Our results indicate a significant gap in the probability to be charged with or convicted of a crime. Children born abroad are 13.5% more likely to be charged with a crime relative to their danish-born siblings. For convictions the number is 14.7%. When we break down overall charges and convictions into finer categories, we see that the results are entirely driven by property crimes. Being first generation is associated with 20.5% higher probability to be charged with property crime.

Next, we look whether age at migration can explain this substantial gap. Our results point to school-starting age as an important age. Children that arrive after the age of 6 are significantly more likely to exhibit delinquent behavior.

We provide tests for two mechanisms which could explain our results: education and experience of a war during childhood. We find significant negative effects of age at migration on education. The later a child arrives in the host country the lower the amount of schooling. Effects are indeed substantial: children arriving at age 14 obtain one year less of schooling as compared to their siblings born in Denmark. Experiencing a war during childhood, instead, seems to be irrelevant to explain the criminal behavior of first-generation children.

Future research should understand how long first and second generation children take to show the first signs of criminal behavior. Moreover, the intensive margin of committed crimes represents another dimension to be investigated further.

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A Data

The crime data is divided into three main categories (See Table [A1](#)): Penal code, Traffic Act and Special Act. The penal code usually deals with traditional type of crime such as sexual offences, violent and property crimes, and drug offences. The Special law instead deals with weapons, tax evasion, as well as some minor drug offences such as possessing small quantity of drugs. Besides the difference in type of crimes the penal code and special laws have, they also differ in type of sanctions. While the sanctions under the penal code in many cases lead to imprisonment, the special law relies primarily on fines. This distinction, however, has become less clear cut as there are more and more fines being introduced in the penal code as a substitute for other sentences.

A.1 Immigration Data

- **Country of Origin:** The Country from which the individual immigrates. It is available since 1973
- **Year of Immigration:** Year of immigration. It is available since 1973. For individuals that have immigrated for the first time before 1973 is set to missing. 37% of the cases are for migrants from Turkey, 18% from Pakistan, 10% from Yugoslavia and 8% from Morocco. These were also the countries which supplied most guest workers to Denmark. The so-called guest worker programme ended in the beginning of the 70s. Individuals coming from outside Europe must register if they stay is more than 3 months while individuals from Europe or Nordic countries, if they stay more than 6 months.

Table A1: Crime Categories

Code/Act Violated	Crime in the Central Police Register	Assigned Category
Penal Code	Sexual Assaults	
	Incest and Rape	Other Crime
	Sexual assault against children	Other Crime
	Other Sexual assaults	Other Crime
	Violence	
	Violence against public authority	Violent Crime
	Manslaughter	Violent Crime
	Simple Violence	Violent Crime
	Threats	Violent Crime
	Other violent crimes	Violent Crime
	Property Crime	
	Forgery	Property Crime
	Fraud	Property Crime
	Arson	Property Crime
	Theft	Property Crime
	Robbery	Property Crime
	Burglary	Property Crime
	Vandalism	Property Crime
	Other Property Crimes	Property Crime
	Other offences	
	Perjury	Other Crime
	Negligent manslaughter (road accident)	Other Crime
	Privacy violation and defamation	Other Crime
	Injunction	Other Crime
	Drug related crimes	
	Sale and Smuggling of Drugs	Other Crime
Traffic Act	Traffic Act Offences	
	Traffic Accidents	Excluded
	Drunk driving	Excluded
	Other traffic offences	Excluded
Special Act	Drug Act Offences	
	Law on Narcotics	Excluded
	Law on Narcotics (Sales)	Excluded
	Arms Act Offences	
	Law on Weapons and Explosive	Excluded
	Other offenses	Excluded
	Tax acts and others	
	Tax and duty law	Excluded
	Other special laws 39	Excluded
	Laws concerning gambling and trade	Excluded

B Additional Results

Table B1: Summary Statistics: Crime by Area of Origin

	Developed Economies	Transition Economies	Africa	South America	Middle East	Asia	Other
Charges							
Charge 21	0.159 (0.365)	0.252 (0.434)	0.373 (0.484)	0.331 (0.471)	0.292 (0.455)	0.185 (0.388)	0.388 (0.489)
Charge 21: Violent	0.042 (0.201)	0.104 (0.306)	0.181 (0.385)	0.129 (0.336)	0.137 (0.343)	0.053 (0.224)	0.188 (0.392)
Charge 21: Property	0.137 (0.344)	0.210 (0.407)	0.322 (0.467)	0.284 (0.452)	0.246 (0.430)	0.154 (0.361)	0.333 (0.473)
Charge 21: Other	0.031 (0.174)	0.047 (0.211)	0.096 (0.295)	0.041 (0.199)	0.075 (0.263)	0.016 (0.127)	0.079 (0.270)
Convictions							
Convict 21	0.133 (0.340)	0.199 (0.399)	0.297 (0.457)	0.274 (0.447)	0.231 (0.422)	0.148 (0.355)	0.321 (0.468)
Convict 21: Violent	0.029 (0.168)	0.067 (0.250)	0.111 (0.315)	0.072 (0.259)	0.085 (0.278)	0.033 (0.180)	0.103 (0.305)
Convict 21: Property	0.115 (0.320)	0.163 (0.369)	0.257 (0.437)	0.245 (0.431)	0.191 (0.393)	0.125 (0.331)	0.297 (0.458)
Convict 21: Other	0.016 (0.127)	0.021 (0.143)	0.043 (0.203)	0.023 (0.151)	0.035 (0.184)	0.009 (0.092)	0.042 (0.202)
N	1977	12632	3976	417	16953	3138	176

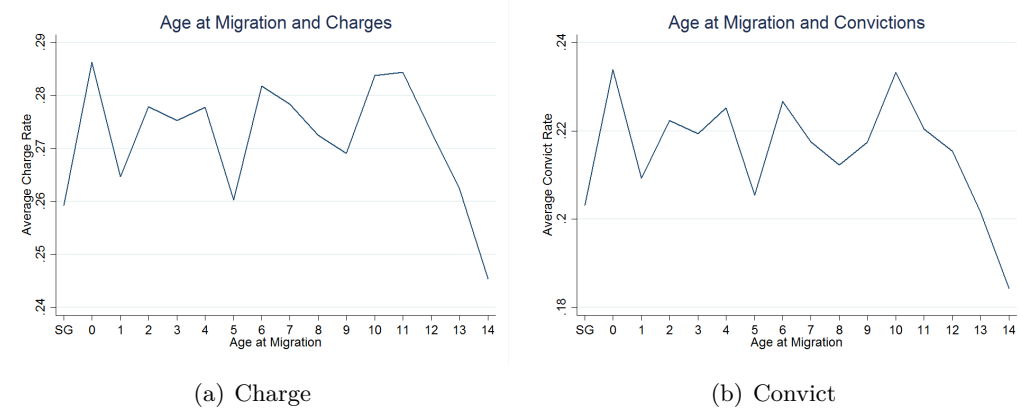
Note: Table reports the mean and overall standard deviation for charges and convictions broken down by country of origin. Charges and convictions take the value of 1 if an individual has been charged or convicted by age 21 and 0 otherwise. The sample includes families with two or more siblings who are age 21, who immigrated before the age of 15 or were born in Denmark. Children for which we do not have information for the entire period are excluded. We also exclude single-child families or families with all children born in Denmark.

Table B2: Summary Statistics: Highest Conviction Rate by Country

Developed Economies	Transition Economies	Africa	South America	Middle East	Asia	
Italy 35%	Soviet Union 36%	Eritrea 55%	Uruguay 53%	Kuwait 45%	Cambodia 30%	
Israel 26%	Yugoslavia 33%	Gambia 45%	Brazil 32%	Jordan 43%	Philippines 28%	
Spain 25%	Ukraine 32%	Tunisia 44%	Peru 31%	Lebanon 39%	Thailand 22%	
France 21%	Serbia & Montenegro 31%	Tanzania 42%	Chile 28%	Syria 35%	Vietnam 17%	
N	1977	12632	3976	417	16953	3138

Note: Table reports the first four countries by area of origin with highest conviction rate. Ranking is based on countries having at least 20 children in our sample. The sample includes families with two or more siblings who are age 21, who immigrated before the age of 15 or were born in Denmark. Children for which we do not have information for the entire period are excluded. We also exclude single-child families or families with all children born in Denmark.

Figure B1: Crime Rate and Age at Migration



Note: The figure shows the propensity to be charged with (2(a)) and convicted of (2(b)) a crime by age at migration. SG refers to second generation, while 0 to children who immigrated to Denmark before their first birthday. The sample includes families with two or more siblings who are age 21, who immigrated before the age of 15 or were born in Denmark. Children for which we do not have information for the entire period are excluded. We also exclude single-child families or families with all children born in Denmark.

Table B3: Summary Statistics: Number of children by age at migration

	Boys		Girls	
	Children	Percent	Children	Percent
Second Generation	3501	(16)	3216	(17)
0	927	(4)	826	(4)
1	952	(4)	854	(4)
2	1052	(5)	855	(4)
3	1123	(5)	951	(5)
4	1230	(6)	1052	(6)
5	1262	(6)	1143	(6)
6	1337	(6)	1147	(6)
7	1397	(6)	1268	(7)
8	1401	(7)	1256	(7)
9	1375	(6)	1219	(6)
10	1365	(6)	1249	(7)
11	1298	(6)	1156	(6)
12	1208	(6)	1044	(5)
13	1125	(5)	914	(5)
14	965	(4)	852	(4)
Total	21518	(100)	19002	(100)

Note: Table reports summary statistics for the number of boys and girls in our sample by their respective age at immigration. We also report the share of each group in the sample.

Table B4: OLS vs Household Fixed Effects. Probability to be convicted by age 21

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
First Generation	0.011** (0.005)	0.019*** (0.006)	0.017** (0.006)	0.014** (0.006)	0.017*** (0.006)	0.018*** (0.006)	0.030*** (0.007)
Boys	0.241*** (0.004)	0.241*** (0.004)	0.241*** (0.004)	0.240*** (0.004)	0.241*** (0.004)	0.241*** (0.004)	0.249*** (0.005)
First Born		-0.025*** (0.004)	-0.031*** (0.004)	-0.027*** (0.004)	-0.027*** (0.004)	-0.025*** (0.005)	-0.012** (0.005)
Birth Year FE	–	–	Yes	Yes	Yes	Yes	–
Origin FE	–	–	–	Yes	Yes	Yes	–
Municipality FE	–	–	–	–	Yes	Yes	–
Mother's Education	–	–	–	–	–	Yes	–
Household FE	–	–	–	–	–	–	Yes
Hausman Test (p-value)							0.000
Baseline Crime Rate	0.203	0.203	0.203	0.203	0.203	0.203	0.203
Families	14384	14384	14384	14384	14384	14384	14384
Children	40520	40520	40520	40520	40520	40520	40520

Note: The table reports results from a Linear Probability Model. Dependent variables is a dummy taking value of 1 if a child was convicted with a crime by age 21 and 0 otherwise. Robust standard errors are reported in parenthesis. The sample includes families with two or more siblings who are age 21, who immigrated before the age of 15 or were born in Denmark. Families with all children born in Denmark are excluded.

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

Table B5: First vs. Second Generation: Probit Model

	Charge				Convict			
	(1) All	(2) Violent	(3) Property	(4) Other	(5) All	(6) Violent	(7) Property	(8) Other
First Generation	0.027*** (0.006)	-0.000 (0.004)	0.029*** (0.006)	-0.007*** (0.002)	0.022*** (0.006)	0.001 (0.003)	0.025*** (0.005)	-0.004** (0.002)
Boys	0.320*** (0.005)	0.194*** (0.005)	0.258*** (0.005)	0.086*** (0.004)	0.252*** (0.005)	0.112*** (0.005)	0.193*** (0.004)	0.046*** (0.003)
First Born	-0.020*** (0.005)	-0.024*** (0.003)	-0.015*** (0.005)	-0.014*** (0.002)	-0.019*** (0.005)	-0.015*** (0.002)	-0.012*** (0.004)	-0.007*** (0.002)
Household FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	40520	40520	40520	40520	40520	40520	40520	40520

Note: The table reports marginal effects from a Random Effects Probit Model. Standard errors are reported in parenthesis. The sample includes families with two or more siblings who are age 21, who immigrated before the age of 15 or were born in Denmark. Families with all children born in Denmark are excluded. All specifications include siblings random effects.

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

Table B6: Age at Migration: Who is more likely to commit crime by age 21?

	Charge				Convict			
	(1) All	(2) Violent	(3) Property	(4) Other	(5) All	(6) Violent	(7) Property	(8) Other
Born in Denmark: Reference								
Age 0	0.040*** (0.012)	0.014 (0.009)	0.044*** (0.012)	0.003 (0.007)	0.034*** (0.012)	0.008 (0.008)	0.035*** (0.011)	0.006 (0.006)
Age 1	0.035*** (0.012)	-0.000 (0.009)	0.051*** (0.012)	-0.019*** (0.007)	0.030*** (0.011)	-0.001 (0.007)	0.039*** (0.011)	-0.008 (0.005)
Age 2	0.027** (0.012)	0.001 (0.009)	0.041*** (0.012)	-0.004 (0.008)	0.022** (0.011)	0.007 (0.008)	0.034*** (0.011)	-0.003 (0.006)
Age 3	0.027** (0.012)	-0.006 (0.009)	0.031*** (0.012)	-0.005 (0.007)	0.023** (0.011)	-0.009 (0.007)	0.031*** (0.011)	-0.007 (0.005)
Age 4	0.034*** (0.012)	-0.002 (0.009)	0.040*** (0.011)	-0.000 (0.007)	0.030*** (0.011)	0.009 (0.008)	0.035*** (0.011)	0.005 (0.005)
Age 5	0.028** (0.012)	-0.001 (0.009)	0.035*** (0.012)	-0.003 (0.007)	0.022* (0.011)	0.001 (0.008)	0.034*** (0.011)	0.001 (0.005)
Age 6	0.039*** (0.012)	-0.004 (0.009)	0.052*** (0.012)	-0.013* (0.007)	0.037*** (0.012)	0.004 (0.008)	0.051*** (0.011)	-0.005 (0.005)
Age 7	0.058*** (0.013)	0.006 (0.009)	0.064*** (0.012)	-0.013* (0.007)	0.043*** (0.012)	0.013 (0.008)	0.046*** (0.011)	-0.006 (0.005)
Age 8	0.041*** (0.013)	-0.012 (0.010)	0.063*** (0.012)	-0.012 (0.008)	0.030** (0.012)	-0.005 (0.008)	0.052*** (0.012)	-0.011** (0.005)
Age 9	0.044*** (0.013)	-0.011 (0.010)	0.056*** (0.013)	-0.013* (0.008)	0.044*** (0.013)	0.003 (0.008)	0.057*** (0.012)	-0.010* (0.006)
Age 10	0.062*** (0.014)	0.004 (0.010)	0.071*** (0.013)	-0.010 (0.008)	0.059*** (0.013)	0.009 (0.009)	0.066*** (0.012)	-0.007 (0.006)
Age 11	0.064*** (0.014)	-0.014 (0.010)	0.071*** (0.014)	-0.032*** (0.008)	0.047*** (0.013)	-0.007 (0.009)	0.059*** (0.013)	-0.017*** (0.006)
Age 12	0.046*** (0.015)	-0.039*** (0.011)	0.068*** (0.014)	-0.024*** (0.008)	0.037*** (0.014)	-0.018** (0.009)	0.056*** (0.013)	-0.015** (0.006)
Age 13	0.036** (0.015)	-0.018 (0.012)	0.047*** (0.015)	-0.027*** (0.009)	0.026* (0.015)	-0.003 (0.010)	0.043*** (0.014)	-0.026*** (0.006)
Age 14	0.033** (0.016)	-0.043*** (0.012)	0.063*** (0.016)	-0.029*** (0.009)	0.027* (0.015)	-0.022** (0.010)	0.047*** (0.015)	-0.021*** (0.006)
Boys	0.308*** (0.005)	0.189*** (0.004)	0.255*** (0.005)	0.093*** (0.003)	0.249*** (0.005)	0.120*** (0.003)	0.197*** (0.005)	0.044*** (0.002)
First Born	-0.011** (0.006)	-0.012*** (0.004)	-0.012** (0.006)	-0.008*** (0.003)	-0.014** (0.005)	-0.010*** (0.003)	-0.012** (0.005)	-0.004* (0.002)
Household FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Baseline Crime Rate	0.259	0.121	0.215	0.071	0.203	0.075	0.164	0.035
Equal Age Dummies	0.106	0.000	0.102	0.002	0.184	0.005	0.364	0.000
Families	14384	14384	14384	14384	14384	14384	14384	14384
N	40520	40520	40520	40520	40520	40520	40520	40520

Note: The table reports results from a Linear Probability Model. Dependent variables are dummies taking value of 1 if a child was charged/convicted by age 21 and 0 otherwise. Robust standard errors are reported in parenthesis. The sample includes families with two or more siblings who are age 21, who immigrated before the age of 15 or were born in Denmark. Families with all children born in Denmark are excluded. All specifications include siblings fixed effects.

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

Figure B2: Education by Age 21 and Age at Migration

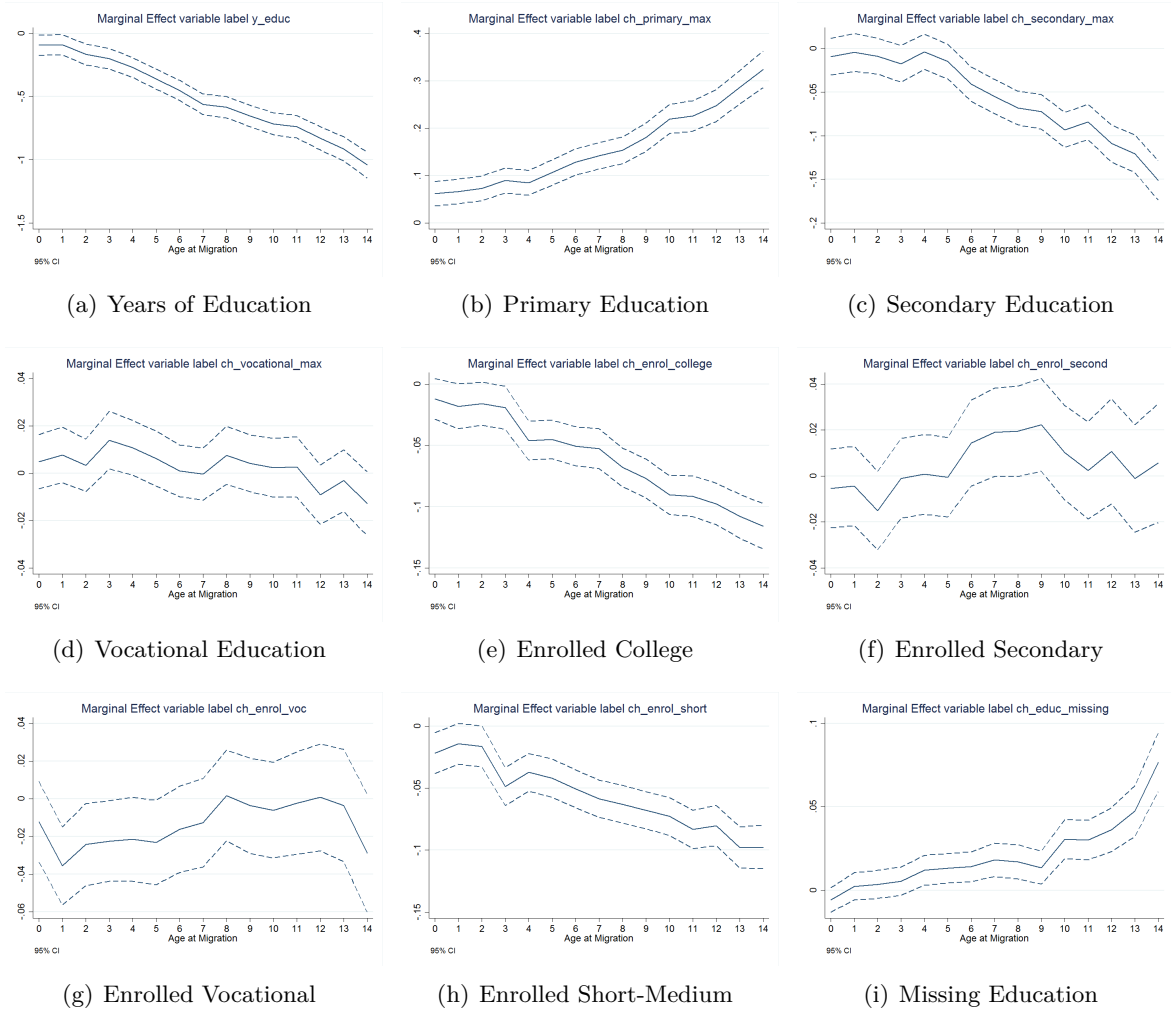


Table B7: First vs Second Generation: Father Missing

	Charge				Convict			
	(1) All	(2) Violent	(3) Property	(4) Other	(5) All	(6) Violent	(7) Property	(8) Other
First Generation	0.037*** (0.007)	0.005 (0.006)	0.045*** (0.007)	-0.004 (0.005)	0.032*** (0.007)	0.005 (0.005)	0.040*** (0.007)	-0.001 (0.003)
Boys	0.311*** (0.005)	0.190*** (0.004)	0.258*** (0.005)	0.093*** (0.003)	0.250*** (0.005)	0.123*** (0.003)	0.198*** (0.005)	0.044*** (0.002)
First Born	-0.010* (0.005)	-0.021*** (0.004)	-0.008 (0.005)	-0.015*** (0.003)	-0.014*** (0.005)	-0.014*** (0.003)	-0.009* (0.005)	-0.009*** (0.002)
Mean Crime Rate	0.266	0.116	0.225	0.059	0.210	0.072	0.174	0.027
Household FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	35387	35387	35387	35387	35387	35387	35387	35387

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

Note: The table reports results from a Linear Probability Model. Dependent variables are dummies taking value of 1 if a child was charged/convicted by age 21 and 0 otherwise. Robust standard errors are reported in parenthesis. The sample includes families with two or more siblings who are age 21, who immigrated before the age of 15 or were born in Denmark. Families with all children born in Denmark are excluded. All specifications include siblings fixed effects.

Table B8: Alternative Specifications for age at migration

	First and Second Generation			First Generation		
	(1) All Charges	(2) All Charges	(3) All Charges	(4) All Charges	(5) All Charges	(6) All Charges
Age at Migration	0.003*** (0.001)	0.008*** (0.002)	0.006** (0.003)	0.001 (0.001)	0.004 (0.003)	-0.014** (0.006)
Age at Migration ²		-0.000*** (0.000)	-0.000 (0.001)		-0.000 (0.000)	0.003*** (0.001)
Age at Migration ³			-0.000 (0.000)			-0.000*** (0.000)
First Born	-0.010* (0.006)	-0.010* (0.006)	-0.010* (0.006)	-0.016** (0.006)	-0.016** (0.006)	-0.015** (0.006)
Boys	0.308*** (0.005)	0.308*** (0.005)	0.308*** (0.005)	0.302*** (0.006)	0.302*** (0.006)	0.303*** (0.006)
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean Crime Rate	0.271	0.271	0.271	0.273	0.273	0.273
N	40520	40520	40520	33803	33803	33803

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

Note: The table reports results from a Linear Probability Model. Dependent variables are dummies taking value of 1 if a child was charged/convicted by age 21 and 0 otherwise. Robust standard errors are reported in parenthesis. The sample includes families with two or more siblings who are age 21, who immigrated before the age of 15 or were born in Denmark. Families with all children born in Denmark are excluded. All specifications include siblings fixed effects.

Table B9: Constant Family Composition

	Charge				Convict			
	(1) All	(2) Violent	(3) Property	(4) Other	(5) All	(6) Violent	(7) Property	(8) Other
First Generation	0.035*** (0.010)	0.008 (0.007)	0.039*** (0.009)	-0.001 (0.005)	0.028*** (0.009)	0.007 (0.006)	0.032*** (0.009)	-0.001 (0.004)
Boys	0.269*** (0.007)	0.157*** (0.005)	0.219*** (0.007)	0.078*** (0.004)	0.219*** (0.007)	0.097*** (0.004)	0.173*** (0.006)	0.037*** (0.003)
First Born	-0.004 (0.006)	-0.018*** (0.004)	0.002 (0.006)	-0.014*** (0.003)	-0.008 (0.006)	-0.014*** (0.003)	-0.002 (0.006)	-0.007*** (0.002)
Mean Crime Rate	0.251	0.100	0.213	0.049	0.199	0.061	0.168	0.023
Household FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	20568	20568	20568	20568	20568	20568	20568	20568

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

Note: The table reports results from a Linear Probability Model. Dependent variables are dummies taking value of 1 if a child was charged/convicted by age 21 and 0 otherwise. Robust standard errors are reported in parenthesis. The sample includes families with two or more siblings who are age 21, who immigrated before the age of 15 or were born in Denmark. Families with all children born in Denmark are excluded. All specifications include siblings fixed effects.

Table B10: Robustness check: First born arrived before the age of 5

	Charge				Convict			
	(1) All	(2) Violent	(3) Property	(4) Other	(5) All	(6) Violent	(7) Property	(8) Other
First Generation	0.038*** (0.013)	-0.002 (0.010)	0.049*** (0.012)	-0.008 (0.008)	0.036*** (0.012)	0.004 (0.008)	0.038*** (0.012)	0.001 (0.006)
Boys	0.296*** (0.010)	0.182*** (0.008)	0.249*** (0.010)	0.099*** (0.006)	0.238*** (0.010)	0.119*** (0.007)	0.193*** (0.009)	0.054*** (0.005)
First Born	-0.017 (0.011)	-0.012 (0.008)	-0.021** (0.011)	-0.009 (0.006)	-0.028*** (0.011)	-0.012* (0.007)	-0.025** (0.010)	-0.008 (0.005)
Mean Crime Rate	0.252	0.110	0.214	0.060	0.200	0.070	0.168	0.031
Household FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	9534	9534	9534	9534	9534	9534	9534	9534

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

Note: The table reports results from a Linear Probability Model. Dependent variables are dummies taking value of 1 if a child was charged/convicted by age 21 and 0 otherwise. Robust standard errors are reported in parenthesis. The sample includes families with two or more siblings who are age 21, who immigrated before the age of 15 or were born in Denmark. Families with all children born in Denmark are excluded. All specifications include siblings fixed effects.

Table B11: Robustness check: First born and Middle Born Dummy

	Charge				Convict			
	(1) All	(2) Violent	(3) Property	(4) Other	(5) All	(6) Violent	(7) Property	(8) Other
First Generation	0.032*** (0.008)	0.005 (0.006)	0.039*** (0.007)	-0.004 (0.005)	0.027*** (0.007)	0.006 (0.005)	0.034*** (0.007)	0.000 (0.003)
Boys	0.308*** (0.005)	0.189*** (0.004)	0.255*** (0.005)	0.093*** (0.003)	0.249*** (0.005)	0.120*** (0.003)	0.197*** (0.005)	0.044*** (0.002)
First Born	-0.002 (0.006)	-0.021*** (0.004)	0.002 (0.006)	-0.015*** (0.003)	-0.007 (0.006)	-0.016*** (0.004)	-0.002 (0.005)	-0.010*** (0.002)
Middle Born	0.011* (0.006)	-0.001 (0.004)	0.014** (0.005)	-0.001 (0.003)	0.008 (0.005)	-0.003 (0.004)	0.009* (0.005)	-0.002 (0.002)
Mean Crime Rate	0.271	0.117	0.229	0.059	0.215	0.072	0.180	0.027
Household FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	40520	40520	40520	40520	40520	40520	40520	40520

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

Note: The table reports results from a Linear Probability Model. Dependent variables are dummies taking value of 1 if a child was charged/convicted by age 21 and 0 otherwise. Robust standard errors are reported in parenthesis. The sample includes families with two or more siblings who are age 21, who immigrated before the age of 15 or were born in Denmark. Families with all children born in Denmark are excluded. All specifications include siblings fixed effects.

Table B12: Robustness check: First born and Birth Order Dummy

	Charge				Convict			
	(1) All	(2) Violent	(3) Property	(4) Other	(5) All	(6) Violent	(7) Property	(8) Other
First Generation	0.035*** (0.008)	0.015** (0.006)	0.039*** (0.008)	0.004 (0.005)	0.031*** (0.008)	0.012** (0.005)	0.034*** (0.007)	0.006* (0.003)
Boys	0.307*** (0.005)	0.188*** (0.004)	0.255*** (0.005)	0.093*** (0.003)	0.248*** (0.005)	0.120*** (0.003)	0.197*** (0.005)	0.044*** (0.002)
Mean Crime Rate	0.271	0.117	0.229	0.059	0.215	0.072	0.180	0.027
Household FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Birth Order Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	40520	40520	40520	40520	40520	40520	40520	40520

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

Note: The table reports results from a Linear Probability Model. Dependent variables are dummies taking value of 1 if a child was charged/convicted by age 21 and 0 otherwise. Robust standard errors are reported in parenthesis. The sample includes families with two or more siblings who are age 21, who immigrated before the age of 15 or were born in Denmark. Families with all children born in Denmark are excluded. All specifications include siblings fixed effects.

Table B13: Robustness check: First vs. Second Generation with dummies for age difference

	Charge				Convict			
	(1) All	(2) Violent	(3) Property	(4) Other	(5) All	(6) Violent	(7) Property	(8) Other
First Generation	0.023*** (0.009)	0.013** (0.006)	0.026*** (0.008)	0.000 (0.005)	0.019** (0.008)	0.009* (0.005)	0.023*** (0.008)	0.005 (0.004)
Boys	0.308*** (0.005)	0.189*** (0.004)	0.255*** (0.005)	0.093*** (0.003)	0.249*** (0.005)	0.120*** (0.003)	0.197*** (0.005)	0.044*** (0.002)
First Born	-0.381* (0.217)	-0.092** (0.042)	-0.358 (0.219)	-0.325 (0.236)	-0.364 (0.222)	-0.058** (0.027)	-0.340 (0.226)	-0.304 (0.242)
Mean Crime Rate	0.271	0.117	0.229	0.059	0.215	0.072	0.180	0.027
Household FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Age Difference	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	40520	40520	40520	40520	40520	40520	40520	40520

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

Note: The table reports results from a Linear Probability Model. Dependent variables are dummies taking value of 1 if a child was charged/convicted by age 21 and 0 otherwise. Robust standard errors are reported in parenthesis. The sample includes families with two or more siblings who are age 21, who immigrated before the age of 15 or were born in Denmark. Families with all children born in Denmark are excluded. All specifications include siblings fixed effects. All specifications include siblings fixed effects and dummies for age difference with respect to first born child in the family.

Table B14: First vs. Second Generation: Who is more likely to commit crime by age 21?

	Charge				Convict			
	All	Violent	Property	Other	All	Violent	Property	Other
First Generation	0.023*** (0.007)	-0.003 (0.006)	0.033*** (0.007)	-0.010** (0.005)	0.020*** (0.007)	-0.001 (0.005)	0.027*** (0.007)	-0.003 (0.003)
Boys	0.293*** (0.005)	0.187*** (0.004)	0.238*** (0.005)	0.093*** (0.003)	0.236*** (0.005)	0.120*** (0.003)	0.184*** (0.005)	0.045*** (0.002)
First Born	-0.013** (0.005)	-0.024*** (0.004)	-0.010** (0.005)	-0.017*** (0.003)	-0.018*** (0.005)	-0.016*** (0.003)	-0.012** (0.005)	-0.011*** (0.002)
Most Primary	0.065*** (0.008)	0.029*** (0.006)	0.066*** (0.008)	0.038*** (0.005)	0.063*** (0.007)	0.023*** (0.005)	0.064*** (0.007)	0.021*** (0.004)
Most Secondary	-0.110*** (0.009)	-0.059*** (0.007)	-0.100*** (0.009)	-0.035*** (0.005)	-0.101*** (0.009)	-0.041*** (0.005)	-0.087*** (0.008)	-0.015*** (0.004)
Most Vocational	-0.036** (0.014)	-0.023** (0.010)	-0.034** (0.014)	-0.012* (0.007)	-0.018 (0.013)	-0.006 (0.008)	-0.017 (0.013)	-0.008 (0.005)
Enrolled College	-0.119*** (0.009)	-0.062*** (0.006)	-0.104*** (0.009)	-0.032*** (0.005)	-0.106*** (0.009)	-0.045*** (0.005)	-0.086*** (0.008)	-0.016*** (0.004)
Enrolled Secondary	-0.056*** (0.010)	-0.051*** (0.007)	-0.048*** (0.010)	-0.026*** (0.005)	-0.054*** (0.009)	-0.038*** (0.006)	-0.041*** (0.009)	-0.008** (0.004)
Mean Crime Rate	0.274	0.119	0.231	0.061	0.217	0.075	0.180	0.029
Household FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	37785	37785	37785	37785	37785	37785	37785	37785

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

Note: The table reports results from a Linear Probability Model. Dependent variables are dummies taking value of 1 if a child was charged/convicted by age 21 and 0 otherwise. Robust standard errors are reported in parenthesis. The sample includes families with two or more siblings who are age 21, who immigrated before the age of 15 or were born in Denmark. Families with all children born in Denmark are excluded. All specifications include siblings fixed effects.

The Effect of Citizenship on Savings: Evidence from Germany

Fatma Usheva*

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Abstract

In the last decades, many developed countries have experienced a sizable change in their immigrant populations accompanied with problems of socio-economic integration. Despite the existence of an extensive economic research on the socio-economic integration of migrants, we still know very little about their saving and consumption choices.

This paper aims at filling this gap by asking how access to citizenship affects savings behavior of migrants. The empirical strategy exploits two immigration reforms in Germany that took place in 1990 and 1999 respectively. Using the German Socio-Economic Panel, our results show that immigrants significantly reduce their propensity to save (extensive margin) and amount saved (intensive margin) in the host country with each additional year after naturalization. Considering only host country savings, however, gives us an incomplete picture on the saving behavior after naturalization. We address this problem by providing evidence using data on remittances. Our final results show a significant and negative effect of citizenship on savings, while no effect is found for remittances.

JEL Classification: E21, F22, K37

Keywords: Naturalization, Migrants, Savings, Remittances

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1 Introduction

According to estimates, 3.3 percent of the world population is currently living in another country than their country of birth. The estimate compares to 2.9 percent in 1990, representing a 14 percent increase in the share of international migrants over the last 15 years.¹ This increasing trend in population movements has motivated an extensive economic research on the socio-economic integration of migrants in the host countries, an important indicator of the welfare implications of immigration. Primarily, the literature has been focused on the labor market such as employment and wages ([Chiswick, 1978](#); [Borjas, 1994](#)) and despite its importance, relatively little attention has been paid to saving and wealth accumulation patterns of migrants.

Private savings are important for understanding a wide range of economic phenomena, both at the household (individual) and national levels. How much people choose to save for future consumption has significant implications for the welfare during retirement, especially today, when the increase in life expectancy coupled with fertility rates below reproduction level have put an enormous pressure on public pension systems. If accumulated savings to be used in post-working years are too low, individuals will be forced to accept lower living standards in older age. Even though only a small fraction of migrants is at/or near-retirement as compared to the native population, we know very little about their capacity to provide for themselves in old age and achieve economic security.²

Savings are also important for consumption smoothing during periods of uncertainty. With the changing economic and political landscapes in both home and host countries, migrants may face higher risks in periods of uncertainty as compared to natives. This, for example, may happen because foreign-born individuals are more likely to be employed in riskier jobs ([Orrenius and Zavodny, 2009](#)) or because of unequal treatment in the labor market ([Arai and Skogman Thoursie, 2009](#)). Consequently, how well they are able to cope with economic downturns will depend largely on their savings.

Lower level of savings and wealth accumulation might also put migrants' children in financial disadvantage relative to children with native-born parents. Children of immigrants are starting to represent a sizable share in many European countries. In 2014, the share of second generation im-

¹United Nations, Department of Economic and Social Affairs (2015). Trends in International Migrant Stock: The 2015 revision (United Nations database, POP/DB/MIG/Stock/Rev.2015).

²In 2015, the share of migrants above age 65 was 10.9% in UK, 14.8% in Sweden, 20.7% in France, 28.6% in Germany and 13.5% in the USA

migrants was 5.5% in Germany, 9.2% in the UK, 10.4% in France and 11.2% in Sweden.³ Therefore, parental financial decisions are of great policy concern.

Households savings are also very important at a national level. For example, they are the main source of funds for capital investments, a major driving force for long term economic growth. Encouraging migrants to save in the host countries rather than send their savings in the form of remittance will be beneficial for the destination countries both in the short and long run. Consumption also makes a major share of GDP and a fast growing governmental revenue source through VAT. Stimulating consumption by discouraging excessively high saving rates will translate into an immediate fiscal benefit for the country.

Even though savings and consumption have a direct link to micro and macroeconomic outcomes, it is surprising that there is very little research looking at how economic, social and welfare policies affect migrants' decision to save and consume.

This paper attempts to fill this gap in the literature by providing evidence on how saving choices of migrants respond to changes in integration policies in the host countries. In particular, we will focus on naturalization. As a result of the insufficient socio-economic and political integration of migrants, citizenship laws have moved to the core of the integration policy agendas. Naturalization policies will not only determine who will settle permanently and will come in the future, but they are also important for labor markets outcomes, welfare programs, and demographic trends ([Bertocchi and Strozzi, 2010](#)).

To address the question empirically, we exploit two recent citizenship reforms in Germany that took place in 1991 and 1999 respectively. The naturalization reform of 1991 defined for the first time explicit criteria for naturalization and introduced an age-dependent resident requirement: individuals age 16 to 22 were allowed to naturalize after 8 years of residence in the country, while individuals age 23 and above had to wait for 15 years of residence. The second reform in 1999 relaxed the residence requirements to 8 years for everyone irrespectively of age. Our data comes from the German Socio-Economic Panel dataset which provides a rich array of socio-economic, individual and household characteristics for the population in Germany.

The empirical findings reveal that granting access to citizenship significantly reduces migrants' propensity to save (extensive margin) and amount saved (intensive margin) in the host country. Considering only domestic savings, however, gives us an incomplete picture on the saving behavior after naturalization. This is because migrants have the option to save in their home countries.

³Eurostat. First and second-generation immigrants - statistics on main characteristics

Using data on remittances, we show that access to citizenship does not affect financial transfers sent abroad. Results are surprising as we usually see naturalization as an outcome of permanent migration decision. While other studies find that temporary versus permanent nature of migration does not affect domestic savings but only remittances, we show that citizenship acquisition affect savings but not financial transfers sent abroad. These results suggest of different mechanisms through which return intentions and citizenship acquisition affect saving behavior of migrants.

This paper contributes to the existing literature in several ways. First, while most of the studies focus on temporary versus permanent migration in explaining saving behavior of migrants, our analysis instead looks at citizenship status ([Merkle and Zimmermann, 1992](#); [Dustmann and Mestres, 2010](#); [Bauer and Sinning, 2011](#)). Naturalization or legalization are perhaps one of the most important ways to improve integration and reduce uncertainty for migrants. Hence, this paper will provide novel evidence on how households respond to a change in uncertainty through citizenship policy. Second, we also contribute to the literature on citizenship in general, which has been predominantly focused on labor market effects (see the work of [Chiswick \(1978\)](#); [Bratsberg et al. \(2002\)](#); [DeVoretz \(2008\)](#); [Gathmann and Keller \(2017\)](#)). While existing research documents a positive and significant effect on employment probability and wage growth, we add an additional piece to the puzzle by providing an evidence of negative impact on savings.

The structure of the paper is as follows: in [Section 2](#) we provide a theoretical motivation of how citizenship and savings interact. We then make an introduction to immigration and citizenship reforms in Germany. [Section 4](#) and [5](#) discuss the data and empirical strategy. [Section 6](#) estimates the model and summarizes the results providing possible explanations for our empirical findings. In [Section 8](#) we perform robustness checks. The final section concludes.

2 Theoretical Considerations and Literature Review

How do we expect citizenship to affect the saving and consumption choices of migrants? Existing research has pointed out to three different mechanisms: (1) through economic integration such as employment and wages; (2) through altering their intentions to return; and (3) through reduction in uncertainty for the migrant's household. This section discusses each one in detail.

2.1 Citizenship and Economic Integration

The first relevant channel through which naturalization may lead to a change in savings behavior is by improving the economic position of migrants. This can happen in several ways. First, citizenship gives unrestricted access to the labor market regardless of country of origin. Even though permanent residents have the same rights in terms of legal status, access to education or welfare programs, certain jobs in the public and private sector are restricted, especially if the migrant is from a Non-EU country. In Germany, restrictions are for jobs in public administration, justice, national defense, lawyers, notaries, pharmacists, etc. Legally allowing immigrants to work in these occupations may not only improve their labor market position, but also their wages. In addition, many jobs for both high and low-skill migrants require extensive traveling and people from outside the EU may face burdensome process of visa applications. In this respect, new passport could lower the barriers to entry to better-paid jobs. Besides traveling, employers face higher red tape when hiring foreign nationals, and naturalization may facilitate better job matches by reducing hiring costs. Lastly, citizenship acquisition may act as a signal to the employer, revealing not only the willingness to acquire country-specific or job-specific human capital but also the commitment to settle permanently in the host country.

The effect of citizenship on the economic integration of migrants has been studied extensively. Starting with the seminal work on immigrant earnings by [Chiswick \(1978\)](#), the literature suggests notable returns to naturalization. Using US census data from 1970, [Chiswick \(1978\)](#) finds a positive and highly significant effect of naturalization on earnings of foreign-born men. Those who obtain American citizenship earn 15% more. Yet, this effect becomes insignificant once general assimilation effects, proxied by years since migration, are included. He attributes the loss of significance to the fact that non-naturalized migrants have been in the USA for fewer years and have not reached the same level of labor market inclusion.⁴ However, using cross - sectional data has its drawbacks such as the inability to control for unobserved heterogeneity between individuals which may seriously bias the estimates. [Bratsberg et al. \(2002\)](#) are the first to address this issue by using longitudinal data from the USA. Even controlling for individual time-invariant characteristics, citizenship is still associated with higher earnings and better jobs. Migrants' probability of white-collar and public-sector employment increases, as well as chances of being unionized. These results assert the

⁴In later work, [Chiswick and Miller \(1992\)](#) find 5% premium to naturalization in the USA and 7% in Canada. For Australia, [Chiswick and Miller \(1995\)](#) show no returns to citizenship. For other studies using data from Canada, see the work of [DeVoretz and Pivnenko \(2005\)](#) and [DeVoretz \(2008\)](#). They find positive effect on wages and employment, but self-selection either entirely explains the gap or reduces it to almost negligible.

importance of citizenship for gaining unrestricted labor market access. However, it is important to stress that even using longitudinal data, the problem of self-selection remains unaddressed. Later research has tried to explicitly account for the endogeneity of naturalization decision. For example, [Mazzolari \(2009\)](#) uses an exogenous change in citizenship laws in five Latin American countries during 1990s, which allowed for dual nationality. She finds that immigrants in the USA with dual citizenship experienced increased employment probability and wages.

In the European context, the advantages of acquiring host country citizenship are perhaps not as big as in the USA or Canada. Within the European Union, permanent residents obtain almost identical rights as natives making it difficult to understand how citizenship affects economic outcomes of migrants. Despite the literature on the economics of citizenship is relatively scarce for Europe, there is evidence of naturalization premium in terms of wages and employment. [Bevelander and Pendakur \(2011\)](#) use Swedish administrative data and instrumental variable approach to show that citizenship greatly benefits foreign-born individuals.⁵ Using administrative panel data and an exogenous change in the German nationality law in 1991 and again in 2000, [Steinhardt \(2012\)](#) finds significant wage returns to male immigrants following naturalization. The effect on female migrants is also positive but it is a result of self-selection rather than citizenship itself. In line with the prediction that some people will benefit more from naturalization, [Steinhardt \(2012\)](#) shows that immigrants coming from outside the European Union receive the largest premium. [Gathmann and Keller \(2017\)](#) also use the German citizenship reforms to estimate the effect on wages and employment. However, instead of looking at citizenship acquisition per se, they use the exogenous variation in waiting time to be eligible for citizenship induced by the aforementioned reforms. Their findings reveal that migrant women facing shorter waiting time to naturalize have higher wages and are more likely to be employed. The effect for men is instead negligible.⁶

Since citizenship positively affects wages and employment, we may expect that savings will also be affected. As saving behavior reflects what people expect to happen to their incomes in the future, an expected increase in income may result in a reduction of amount saved or even to a change from saving to dissaving.

⁵They use eligibility for citizenship as an instrument for naturalization. In a earlier work for Sweden, [Scott \(2008\)](#) finds only small effect of naturalization on wages, however he argues that it is entirely driven by self-selection.

⁶There is more evidence from Europe. For Yugoslav migrants in Austria and Sweden, see [Kogan \(2003\)](#). For the Netherlands see the work of [Bevelander and Veenman \(2006, 2008\)](#). For France, [Fougère and Safi \(2009\)](#) and Norway, [Bratsberg and Raaum \(2011\)](#)

2.2 Citizenship and Return Migration

A very important decision migrants have to make is whether to return to their homelands. Today, it is well established that a large number of them do⁷. If citizenship acquisition alters the intentions to return by improving the relative socio-economic position of the migrant, then as shown in the literature, optimal savings will also be affected.

Djajić (1989) and Galor and Stark (1990) are the first to study the relationship between savings and nature of migration. The authors use theoretical models to explain the saving behavior of migrant workers when a positive probability of return migration exists. According to the prediction of these models, a reduction in the expected length of stay will increase savings.⁸ Since migrants derive higher utility by consuming at home, a decrease in the expected length of stay (decrease in expected future income) will reduce optimal spending upon return leading to increase in savings.

Due to the relatively longer history of immigration and data availability, the theoretical predictions were tested mainly using data for Germany. Merkle and Zimmermann (1992) analyze migrants' savings and remittances using the German Socio-Economic Panel (GSOEP). They show no effect of return intentions on domestic savings, but a negative and significant effect on remittances. They conclude that temporary migrants save primarily in their home countries. Dustmann and Mestres (2010) also do not find any evidence on different saving rate between temporary and permanent migrants in Germany. Yet, their analysis shows that temporary migrants place a higher proportion of their savings and wealth in the home country compared to permanent migrants. Sinning (2011) confirms the finding that migrants wishing to return send higher amount of money to the home country.⁹ Finally, Arcangelis and Joxhe (2015) provide evidence that temporary migrants in the UK save and remit more relative to permanent migrants.

The literature on citizenship and return intentions is instead very limited. To the best of our knowledge there is no paper that tries to estimate a direct causal effect. Existing research has focused on the importance of socio-economic characteristics on the decision to return¹⁰, and

⁷Borjas and Bratsberg (1996) find that 17.5% of all immigrants who entered the U.S. between January 1, 1975 and April 1, 1980 returned by the end of the same period. Dustmann et al. (1996) reports substantial return migration for European countries as well. Constant and Zimmermann (2011) report that more than two thirds of the guest workers generation left Germany.

⁸In the literature on migration, migrants could accumulate savings and wealth both in the host country and home country. Home country savings take place through remittances. For excellent literature review on the purpose of remittances, see Rapoport and Docquier (2006).

⁹Bauer and Sinning (2011) compare migrants to natives paying particular attention to temporary versus permanent migrants. They still find that temporary migrants have higher saving rates.

¹⁰Such are home country development, rate of return to skills, political situation, proximity of the two countries, etc. For example, see the work of Borjas and Bratsberg (1996).

citizenship has been used to account for individual's attachment to the host-country. Nevertheless, these results were not interpreted as causal due to the endogeneity of citizenship. [Sajons \(2016\)](#) addresses this problem by using the German naturalization law of 1999 as an exogenous change in birthright citizenship to immigrant children to see how that affects family return migration. The paper shows that granting citizenship at birth negatively affects the propensity of return migration for the entire family.

Based on the existing empirical evidence, we expect a decrease in the propensity and amount saved following naturalization.

2.3 Citizenship and Uncertainty

The question of how uncertainty affects consumer's choices between saving and contemporaneous consumption has received considerable attention in the literature. By now, it is well established that increased uncertainty about future income creates precautionary demand for savings.

Citizenship may significantly reduce the uncertainty a migrant faces in the host country. This happens in several ways. First, after obtaining citizenship the migrant is no longer required to be economically active in order to reside in the host country. This is particularly relevant for individuals coming from outside the EU, who are subject to visa and work permit restrictions. In addition, one of the biggest uncertainties a migrant faces is unexpected unemployment. Without citizenship, the host country may not fully commit to provide welfare benefits during unemployment spell, or it may do so for a limited amount of time. Same is true for social security benefits, especially for migrants coming in advanced stage of their labour market career. Hence, naturalization will not only provide security during an economic downturn, but also during retirement, leading to a significant reduction in uncertainty.

The importance of uncertainty in the determination of optimal savings of migrants was first pointed out by [Dustmann \(1997\)](#). He develops a model to look at length of migration and savings behavior of migrant workers in a framework where there is uncertainty about future income streams. The theoretical prediction is that immigrants may accumulate more precautionary savings than comparable natives if they face high income uncertainties on the labour market of their host country. On the other hand, they might also engage in lower precautionary savings if able to diversify risks across countries. Using data from the 1979 Youth Cohort of the National Longitudinal Survey, [Amuedo-Dorantes and Pozo \(2002\)](#) test the hypothesis posed by [Dustmann \(1997\)](#). They analyze how precautionary savings of migrants and natives change in response to income

uncertainty. Using buffer-stock model of savings¹¹, they find supportive evidence for immigrants accumulating less wealth than natives do, a result explained either by the ability of migrants to diversify risk across countries or by remitting their savings. As they do not possess data on remittances, it is impossible to disentangle what precisely drives the lower precautionary savings of migrants as compared to natives. Instead of looking at savings, [Dustmann et al. \(2017\)](#) provide evidence on migrants' consumption choices after a significant reduction in uncertainty through legalization. Using unique survey data from Italy, they find that undocumented migrants consume around 30% less than documented ones conditional on income. These findings give a strong support to the importance of legalization and naturalization policies.

Following the empirical evidence, we expect to see a decrease in propensity and amount saved after naturalization driven by a decrease in uncertainty.

3 Institutional Background

3.1 Immigration to Germany

After the end of World War II, West German economy grew so rapidly that the local labor supply was not enough to satisfy the increasing demand in the flourishing industrial sector.¹² Due to this shortage of workers, the government signed bilateral agreements for labor recruitment with several countries among which were Italy, Spain, Greece, Turkey, and Yugoslavia. These agreements allowed the recruitment of mostly low-skilled workers, also called "guest-workers". Despite this program was intended as a short to medium run measure, many guest workers decided to stay and settle in Germany permanently. This type of recruitment terminated in 1973 with the oil crisis and the increasing unemployment rate which had reached 3.1% in 1975. However, the flow of immigrants did not stop. The period after 1973 was characterized by mainly family reunification of the already settled guest workers. A new wave of immigration started in early 1980s with the arrival of the first larger waves of asylum seekers. Towards the end of the decade and especially after the fall of the Berlin Wall, Germany experienced new inflows coming mainly from Eastern Europe and the former Soviet Union. The two largest groups were the returning ethnic Germans (known as Aussiedler) and migrants from Former Yugoslavia, who came in as refugees, escaping the Yugoslav war of the

¹¹Buffer-stock savers have a target wealth to permanent income ratio such that if wealth is below the target, precautionary savings will dominate, while if wealth is above, dissaving will occur. For more details, see [Carroll \(1997\)](#).

¹²According to OECD estimates, the unemployment rate in 1965 was 0.42%.

1990s. By 1990, there were 5.9 million foreign citizens living in Germany, amounting to 7.5% of the population.¹³ Despite the large immigrant stock, Germany had no explicit naturalization policy.

3.2 The Citizenship Reforms

Naturalization of migrants is probably the last step towards integration into the host-country society. Citizenship status gives immigrants numerous possibilities such as the right to participate in national elections and have political influence over which politicians are elected, what policies are adopted and how resources are allocated. In addition to giving inalienable right of residence, it also gives occupational freedom, freedom of movement and/or exemption from visa for many other countries. For some countries which do not have an open welfare state for migrants, it also gives social security benefits during retirement and other periods of uncertainty.

Until 30 years ago, Germany was seen as a country with outdated and restrictive naturalization policies unable to address the changing demographic trends in the country and with misperception of migration as temporary. Despite this being the case for more than three decades after the first large immigration flows during the late 1950s, Germany's citizenship laws have undergone considerable changes. Prior to 1991, citizenship acquisition was closely related to the concept of ancestry (*jus sanguinis*) as determined by the law of 1913. According to this, citizenship was granted to every child on blood-based definition, while foreigners had no entitlement to naturalization. The only way for foreigners to obtain citizenship was either by marriage to a German national or by specific state discretion, which was given only if it was in the public interest.¹⁴ This approach was maintained even after the guest workers settled permanently and had children in Germany.

The passage of the Alien Act in 1990 was a turning point for Germany and its view over demographic diversity. The reform, which came into effect from 1 January 1991 defined for the first time explicit rules for an immigrant naturalization.¹⁵ More specifically, the 1991 reform defined an age-dependent resident requirement for naturalization: adult immigrants aged 23 and above, faced 15 years resident requirement while adolescent immigrants age 16-22 could apply after only 8 years. In addition, applicants for German citizenship had to renounce their previous citizenship¹⁶, as the

¹³World Development Indicators

¹⁴Foreigners who served for at least one year as a German in the army or navy were also entitled to naturalization upon application. In addition, Germany provided a right of return and naturalization to all ethnic Germans coming from Eastern Europe or East-Germany. Our analysis excludes this group of people.

¹⁵The law of 1990 was the first legal change in citizenship law, despite that decision over naturalizations were to be made by local or regional authorities who had full right to approve or reject applications. Citizenship as an entitlement became possible after a small revision to the 1990 policy in 1993.

¹⁶Exceptions were made in case renouncing the home-country citizenship was too costly for the migrant.

law was not allowing dual citizenship. The different residence requirements stayed in place until the second reform which came into effect from 1 January 2000. The first change in the new law was the reduction of the residence requirements to 8 years irrespectively of age. In addition, language proficiency, an oath to the German constitution, no criminal record and economic self-sufficiency were introduced as additional prerequisites for naturalization.

4 Data

In our empirical analysis, we use data from the German Socio-Economic Panel (GSOEP). GSOEP is a representative household longitudinal survey initiated in 1984 in West Germany, and from 1990 on it also covers the territory of the former Democratic Republic of Germany. In the first wave, about 4500 households with a German born household head were interviewed and about 1500 with a foreign born household head. Two main surveys are conducted each year. The first is an individual questionnaire that is completed by each adult household member reporting their own socio-economic and demographic characteristics. The second survey is at the household level. The household head provides information about the entire household, as well as about all other individuals in the household below the interviewing age of 16.

Our empirical analysis is limited by data availability. Information about monthly financial savings and remittances is available only after 1994.¹⁷ Thus, our analysis is for the years 1994 to 2011.

The saving data in the survey are recorded at the household level. This, however, is not a problem since it has long been recognized that saving or consumption behavior represents joint family member decisions rather than individual one. The variable consists of positive financial savings (net monthly savings) and it is left censored at 0 for households that have no or negative savings.¹⁸ Data on wealth and financial assets are not available for the period under consideration.

A particular difficulty when analyzing the savings of migrants is the treatment of remittances, as migrants have the option to save in their home countries. Not taking that into account may lead to a serious underestimation of the true saving behavior. Fortunately, GSOEP allows us to use information on whether foreign-born households have made any financial transfers to their country

¹⁷Data on savings is available since 1992, but remittances are missing for 1993, which made us choose 1994 as a starting point for our analysis. In addition, we also choose 1994 as a starting year because the naturalization reform was fully implemented in 1993 when a legal claim to eligibility was introduced.

¹⁸The precise question asked regarding financial savings is the following: "Do you usually have an amount of money left over at the end of the month that you can save for larger purchases, emergency expenses or to acquire wealth? If yes, how much?"

of origin, even though we do not have information on the purpose of remittances.^{19,20}

A major drawback of GSOEP data is that it does not ask questions on naturalization, which is crucial for our analysis. Since year of naturalization is missing, we define naturalization based on observed changes in citizenship recorded by the individuals. Based on information about current citizenship status, we create an indicator variable telling us whether the migrant naturalized or not, and if it did, we impute the number of years an immigrant has been naturalized for.²¹ For all immigrants in the sample, we also impute the year in which one gets eligible for naturalization, and how many years since a person becomes eligible.²² The variable is 0 in the years when the individual is not eligible yet, while after eligibility it equals to the number of years since eligible.

The analysis is restricted to immigrant households, where both of the partners are migrants and the household head is between 18 and 65 years old. Immigrants are defined as foreign-born persons who immigrated to Germany since 1948. In addition, we also drop from our sample immigrants with German descent who had the right to naturalize much faster than the rest of the migrants.

The set of explanatory variables considered in the empirical analysis include socio-economic and demographic characteristics such as age and education of the household head, household characteristics such as household size, marital status, and whether children or spouse live in the home country. The seminal work of [Friedman \(1957\)](#) on permanent income hypothesis suggests that savings will depend on the transitory component of income and individuals will save when current income is above permanent income and borrow when the opposite is true. Consumption instead will remain fairly constant throughout the life cycle, unless permanent income shocks occur. Our specification relies on household fixed effects estimator which we assume will absorb the permanent income component. Hence we control for current income only. We equalize current household net income in order to take into account the changing household composition of each family. For this

¹⁹The precise question asked regarding financial transfers to a foreign country is the following: "In the last year, have you given any payments or financial support to relatives or other persons outside this household? – your parents/parents-in-law; your children/son or daughter in law; separated/divorced wife/husband; other relatives; unrelated persons; no, I made none of these type of payments."

²⁰A vast economic literature suggests a number of motivations for remittances including altruism, insurance, loan repayment and investment. For more details, see the excellent literature review by [Rapoport and Docquier \(2006\)](#).

²¹We do not observe a change in citizenship status for individuals who have naturalized prior to entering the sample. Thus, we use a question asked in 2002 about the year in which a migrant obtained German citizenship. If the individual did not provide an answer, we assume he/she naturalized in the year entering the sample. For those individuals, we will underestimate the number of years they have been citizens for. In Section 8 we do robustness check by excluding migrants for which we do not know the year of naturalization.

²²The variable is obtained as follows: (1) the year in which an immigrant has lived in Germany for at least 8 years and is between 16-22 years old in the years 1991-1999; (2) the year in which an immigrant has lived in Germany for at least 15 years and is 23 and above years old in 1991-1999 period; (3) the year in which an immigrant has lived in the country at least 8 years and is of age above 16 in the period after 2000. Our variable years since eligible is the difference between current year and the year in which individual becomes eligible

purpose, we use the widely used Square root scale, which deflates the current net household income by the square root of the household size.²³

Finally, we also control for migration background characteristics such as years since migration of the household head and return intentions. Despite citizenship status could be seen as a sign of commitment toward the host-country, the nature of migration intentions, temporary versus permanent, is also included in the analysis. This will allow us to distinguish between precautionary saving and temporary migration motives. We define immigrants as permanent or temporary based on their intentions to return. Specifically, temporary migrants are migrants who intend to return to their country of origin, while permanent migrants want to stay in Germany forever. An indicator is added to the regressions in order to assess the difference in saving and remittance behavior between these two groups.²⁴

4.1 Descriptive Statistics

Our analysis will be performed at the household level. When we refer to individual characteristics, we usually refer to the characteristics of the household head.²⁵ Table 1 presents descriptive statistics by naturalized and non-naturalized household heads in the sample. It reports the mean, the standard deviation and differences obtained by two-sided t-test.

Although 93% of households in our sample are eligible for naturalization, only 18% have taken the opportunity. Despite the low naturalization rate, there are some substantial differences between those who naturalized and those who did not. Naturalized individuals are on average younger, better educated and arrived in Germany at a younger age. Even if unconditional on socio-economic characteristics, this provides some evidence that the perceived benefit of citizenship decreases with age at migration and increases with education (Yang, 1994). As regards to savings, we see that larger share of non-citizens report positive savings (42.2%) relative to naturalized households (38.6%). Moreover, they also save relatively more per month in absolute terms (€164 compared to €139) and as a share of income (5.4% relative to 4.9% of household net income). The same pattern emerges for remittances. Naturalized households are less likely to remit (16.1% relative to 20.7%), and they

²³There are numerous equivalent scales proposed in the literature. The simplest scale divides household income by number of household members to obtain income per capita, assuming no economies of scale and no sharing of resources between members. Since evidence suggests otherwise, commonly used equivalence scales are OECD equivalence scale, OECD-modified scale and Square root scale, the main difference being the weight given to each household member. For detailed explanation, see OECD (2013)

²⁴Every year GSOEP asks a question about the migrants' intentions of return migration.

²⁵Developed Economies are: EU15 plus USA, Switzerland, Israel, Japan, Australia and Canada

²⁶The use of household head characteristics is common in the literature performing household level analysis. For example, see the work of Dustmann and Mestres (2010) and Bauer and Sinning (2011).

Table 1: Summary Statistics

	Total		Naturalized		Not Naturalized		Difference
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	
Naturalization							
Naturalized	0.181	(0.385)	1.000	(0.000)	0.000	(0.000)	-1.000
Eligible	0.929	(0.256)	0.995	(0.074)	0.915	(0.279)	-0.080*
Years Since Citizen	0.616	(2.009)	3.409	(3.581)	0.000	(0.000)	-3.409*
Years Since Eligible	7.577	(4.984)	9.142	(4.896)	7.232	(4.937)	-1.910*
Household Characteristics							
Age	42.804	(10.651)	39.770	(9.641)	43.474	(10.748)	3.703*
Age at Migration	19.009	(10.166)	17.322	(10.460)	19.381	(10.062)	2.059*
Years in Germany	23.795	(8.774)	22.448	(8.446)	24.092	(8.818)	1.644*
Years Schooling	10.615	(2.352)	11.580	(2.785)	10.402	(2.189)	-1.177*
Savers	0.415	(0.493)	0.386	(0.487)	0.422	(0.494)	0.036*
Remitters	0.198	(0.399)	0.161	(0.367)	0.207	(0.405)	0.046*
Share Saved	0.053	(0.092)	0.049	(0.086)	0.054	(0.093)	0.005*
Temporary	0.365	(0.481)	0.085	(0.279)	0.427	(0.495)	0.342*
Single	0.078	(0.268)	0.104	(0.305)	0.072	(0.259)	-0.032*
Self-employed	0.055	(0.228)	0.092	(0.288)	0.047	(0.211)	-0.045*
House Owner	0.188	(0.391)	0.307	(0.461)	0.162	(0.369)	-0.145*
Developed Economies ²⁵	0.280	(0.449)	0.023	(0.151)	0.337	(0.473)	0.314*
Turkey	0.373	(0.484)	0.340	(0.474)	0.380	(0.485)	0.040*
Yugoslavia	0.167	(0.373)	0.102	(0.302)	0.181	(0.385)	0.079*
Income							
HH Income	2431	(1259)	2364	(1176)	2446	(1277)	82*
Equivalized Income	1373	(715)	1339	(676)	1380	(724)	41*
Amount Saved	159	(387)	139	(288)	164	(406)	25*
Amount Remitted	304	(1312)	166	(709)	335	(1409)	169*
N	8100		1464		6636		8100
Conditional > 0							
Amount Saved	384	(524)	360	(368)	388	(550)	28
Amount Remitted	1534	(2607)	1032	(1498)	1621	(2744)	589*
Share Saved	0.13	(0.10)	0.13	(0.10)	0.13	(0.10)	0.002
N	3363		565		2798		3363

Note: The table reports summary statistics for our sample of first generation immigrant household heads for the period 1994-2011. Ethnic Germans and households with German spouse are excluded. Mean values and standard deviation for naturalized, non-naturalized, and total are displayed for each variable. Last column reports two-sided t-test for mean differences. First part of the table reports unconditional household characteristics, while second part displays descriptive statistics for savings/remittances conditional on being positive in a given year.

* p < 0.05

remit lower amounts (€166 compared to €335). When we look at the conditional means²⁷, we still see that naturalized individuals are saving and remitting lower amounts, even though the t-test for savings is not significant at conventional level of significance.

There are differences with respect to other socio-economic dimensions as well. Households with naturalized heads have slightly lower household income, a result probably driven by the fact that they are more likely to be single. When we consider equivalized household income, the difference

²⁷Conditional on saving or remitting positive amount in a given year

decreases significantly but persists. In addition, naturalized immigrants are more likely to own their own house and their own business, confirming the hypothesis of positive correlation between economic adaptation and commitment to the host country. Finally, as expected, individuals with German citizenship are less likely to report future return intentions to their home country.

It is also important to point out the composition of migrants in our sample. 28% are coming from developed economies, 37% from Turkey, 16% from Yugoslavia and the remaining 18% from all other countries. Instead, when we look at the naturalizations based on origin, only 2% of naturalized heads come from advanced economies, 34% from Turkey and 10% from Yugoslavia. This already points to a very low take up rate among people coming from developed countries probably due to low socio-economic returns to naturalization.

5 Identification Strategy

Based on the data presented in Section 4, the objective of our analysis is to understand whether access to citizenship has an effect on saving choices of migrants. Therefore, we estimate the following model:

$$S_{ht} = \alpha + \beta YC_{ht} + X'_{ht}\gamma + d_t + \mu_h + \epsilon_{ht} \quad (1)$$

where h is an index for household and t is a year. The dependent variable S_{ht} is an overall measure of savings, and it will either be an indicator variable telling us if a household h reports positive savings in year t , or a continuous variable measuring the amount of monthly savings. YC_{ht} is our variable of interest; it is the years since an individual obtained citizenship and β captures the change in savings induced by an additional year of possessing host-country citizenship. X_{ht} is a vector of controls for the economic and social adaptation of migrants in Germany. It includes equalised household income, a dummy variable indicating if the household owns a house, whether the household head is self-employed and his intentions to return. We also control for household characteristics such as household size, employment status of the head, presence of children under age 16, marital status and finally, we include a dummy for the presence of child or spouse in the country of origin.²⁸ Time effects are captured by d_t . μ_h is the household specific time invariant component of the error term and ϵ_{ht} is an time-varying idiosyncratic disturbance. Standard errors are clustered at household level.

²⁸It is important to stress that some of the covariates in X_{ht} are endogenous. Therefore, we always compare the results to a specification with no controls.

Causal interpretation of the effect of citizenship, however, is not straightforward. The reason is the presence of self-selection. Individuals committed to remain and integrate into the host society are perhaps more likely to apply for citizenship. Those individuals could also be more likely to face lower or higher uncertainty, an important determinant of saving behavior. In this respect, risk aversion plays an important role. If the largest benefit of citizenship is certainty and protection, then for the same level of uncertainty, it is perhaps the most risk-averse individual that will choose to naturalize. Those will also be the people that have high savings independently of citizenship status. Therefore, we might expect that naturalized individuals self-select into citizenship based on derived economic and social benefits which may bias our estimates of β . However, when individual fixed effects are included, time invariant characteristics such as risk-aversion will be absorbed, and the effect that remains would be the additional change in savings due to citizenship. The identifying assumption is that there are no time varying characteristics that affect both the decision to naturalize and to save. Since this is a strong assumption, we use eligibility for naturalization as opposed to actual naturalization in order to estimate a causal effect. Along with the above specified model, we also estimate:

$$S_{ht} = \alpha + \delta Y E_{ht} + X'_{ht} \gamma + d_t + \mu_h + \epsilon_{ht} \quad (2)$$

where now our variable of interest is the number of years since an immigrant has been eligible for naturalization.²⁹ The parameter of interest is δ , which identifies the intention-to-treat effect (ITT). From a policy perspective, ITT effect is the most relevant as it tells us the potential effects of offering the option to naturalize rather than the effect of naturalization per se.³⁰

In order to provide evidence of the significant and positive relationship between eligibility and citizenship, we estimate the following model:

$$YC_{ht} = \alpha + \lambda Y E_{ht} + X'_{ht} \gamma + d_t + \mu_h + \epsilon_{ht} \quad (3)$$

²⁹One could think of using indicator variables for both naturalization and eligibility which will provide us with the level effect of the reform. We do not do that for two reasons. First, savings decision are dynamic choices as they depend on the transitory component of income, therefore level effects have little explanatory power. Second, the literature on the effect of citizenship on wages finds only growth effect and no evidence of level effect following naturalization. We expect savings behavior to closely resemble wages. However, even if we attempt to estimate level effects, they will be highly imprecise. The reason for this is that the immigrants in GSOEP have been residing in the country for quite a long time, making 93% of them eligible for naturalization.

³⁰It would be also interesting to compare ITT effects to the average effect for those who naturalized (LATE). This could be done by using eligibility as an instrument for the endogenous citizenship variable. However, due to very low naturalization take up rate (18%) and high eligibility rate (93%), we are facing a weak instrument problem. In addition, the correlation between the two variables is small which can make IV have more asymptotic bias than OLS. The same is true if even if we use years since eligible to instrument for years since citizen.

where the dependent variable YC_{ht} is equal to the number of years since naturalization and our key independent variable, YE_{ht} is the years since an individual first became eligible for naturalization. The parameter we are interested in is λ which measures how likely a migrant is to naturalize with each additional year of eligibility. It will tell us the importance of eligibility in the decision to obtain citizenship, an important parameter when designing naturalization policies. The additional controls are the same as in Eq. 1 and Eq. 2. Results are presented in the section to follow.

We are facing two major challenges in this study. One is due to non-random sample attrition (selective out-migration) and the other to measurement error in our main explanatory variables.³¹ Sample selection as a result of selective out-migration may lead to biased results if the return migrants are not a random group of people, and the type of selection would be important to assess the sign of the bias. If only low savers return to their home countries after naturalization or eligibility, then our estimates will underestimate the true result, whereas if high savers return then we will get an overestimate. As long as changes in migrants composition do not systematically vary with naturalization and eligibility, our estimates will be unbiased. We test for systematic sample dropouts in Section 8.

The second important concern is related to measurement error in the explanatory variables. Such measurement error will lead to attenuation bias in our estimates.³² As discussed in Section 4 we do not know the year of eligibility. In order to impute it, we assume that an individual has uninterruptedly resided in Germany. If, however, there has been a period in which the migrant was abroad, and that does not count in his residence years, then we will be defining eligibility too early. The same is true for the rest of the prerequisites German law imposes in order for one to qualify for naturalization, such as fluency in German language. Therefore, our estimates are to be interpreted as a lower bound of the true effect of eligibility on savings.

³¹Measurement error in our savings variable could also cause biased estimates. This will be the case only if the error is systematically correlated with some of the explanatory variables. For example, we might expect that more educated individuals will report savings more accurately, and the opposite will be true for less educated households. Since we are exploiting within family variation, accuracy in reporting should be accounted for. In that case, measurement error in the dependent variable will only lead to increase in the standard errors.

³²This will be the case if the error is not systematically correlated with the other explanatory variables and it is serially uncorrelated.

6 Empirical Results

6.1 The Effect of Eligibility on Naturalization

We first start by reporting the results obtained after estimating Eq. 3. From Table 2 we see that there is a strong and significant positive correlation between years since eligible and years since naturalized, despite the effect is rather modest (column 1). At mean years of eligibility, there is 0.86 years increase in years of citizenship. In column 2 we introduce a square term in order to understand if the effect is linear. We find a negative effect if households have been eligible for too many years³³. This evidence suggests that naturalization is more likely to happen in the first years after being granted the possibility. In column 3 we add additional covariates, but our point estimates are unaffected.

Why is the naturalization rate of migrants in Germany so low?³⁴ Existing research explains naturalization decision as a weighted outcome of the costs and benefits of becoming citizen, and variation between individuals could be explained by the greater value that some place on benefits or by the fact that some costs are easier to incur. As already discussed in Section 3, such benefits include unconditional residence rights, full access to the labor market, the right to travel and work in the EU, and the right to participate in national elections. Costs could be substantial as well. Perhaps one of the most significant is that in order to obtain citizenship, migrants have to renounce their previous nationality. This brings not only psychological cost for them, but also monetary. Such costs include reduced political participation in the country of origin, psychological cost of giving up their own citizenship, increased impediments to inheriting or buying land. A good example in this respect is Turkey.³⁵ Turkey does not support double-citizenship and nationals wanting a foreign-country citizenship must give up on their Turkish passport. However, without citizenship, one cannot inherit land, which creates an enormous costs for some individuals. From purely financial perspective, Germany is also charging a fee for processing the application, which amounts to 255 Euro per adult and 51 for each dependent minor child naturalized along a parent.³⁶ The application process could take months or even years, and some migrants even pay for legal assistance to guide them through the complex paperwork of applying. Another important reason could be the composition of migrants. As we discussed, the biggest migrant groups are Turkish,

³³The coefficients turns negative after 17.6 years. In our sample, only 3% of households have been eligible for more than 17 years.

³⁴Recall that 93% of household heads are eligible, while only 18% have naturalized.

³⁵It is the largest non EU immigrant group in Germany

³⁶<http://www.bmi.bund.de>

Yugoslav, Greek and Italians. These are all migrants coming from countries which are relatively close to Germany in terms of distance. Proximity to the country of origin increases the likelihood of return migration because it allows lower cost return journeys, and it slows the process of integration due to frequent, continues ties with everyone in the home country (Constant and Zimmermann, 2011).

To empirically test benefits and/or costs to naturalization, we break down our sample by rough measure of origin, education, home ownership and nature of migration (permanent versus temporary). Looking at Table 2, we see that indeed some group of people obtain citizenship much sooner than other. For example, each additional year of eligibility matters more for highly educated immigrants relative to low skilled (see column 4). One explanation could be their ability to handle the application process without costly external help. Apart from costs, highly educated individuals are also the one to benefit the most from the new labor market opportunities after naturalization, either because of relaxed travel restrictions or because of the public sector jobs which were previously inaccessible. Positive selection with respect to education has been reported in other studies as well (Chiswick and Miller, 2009; Fougère and Safi, 2009). Furthermore, we see that the benefits to naturalization are stronger for individuals coming from non-advanced economies whereas immigrants from developed countries, Turkey and Yugoslavia are significantly less likely to naturalize (column 5). This finding is not surprising given the effective labor market barriers for people coming from less-developed countries. For Turkey, we confirm the hypothesis of high monetary and psychological costs of giving up Turkish nationality.

Table 2 also shows some other interesting selection patterns among immigrant groups. We find that eligibility matters more for households who own a house (column 6). This finding confirms the hypothesis that home ownership is a sign of adaptation to the host country. In line with the prediction that migrants who wish to return to their home countries will be less interested in German citizenship, we find that eligibility matters less for temporary migrants (column 7). It is important to stress that we do not interpret these results as causal due to possible endogeneity.

6.2 Propensity to Save (Extensive Margin)

We start our main analysis with estimating the propensity to save after naturalization using linear probability model (*Are migrants more or less likely to save in the host country after naturalization?*). Estimation of Eq. 1 generates an estimate β that measures the difference in saving behaviour induced by an additional year of citizenship. This effect combines both the causal effect of citizenship on

Table 2: The Effect of Eligibility on Citizenship

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Years Since Eligible	0.115*** (0.041)	0.246*** (0.060)	0.116*** (0.043)	0.084** (0.043)	0.429*** (0.078)	0.098** (0.042)	0.135*** (0.043)
Years Since Eligible ²		-0.007** (0.003)					
Y Eligible $\times$ Developed Economies					-0.448*** (0.067)		
Y Eligible $\times$ Turkey					-0.277*** (0.074)		
Y Eligible $\times$ Yugoslavia					-0.322*** (0.078)		
Y Eligible $\times$ Medium-Skilled				0.063* (0.038)			
Y Eligible $\times$ High-Skilled				0.153** (0.066)			
Y Eligible $\times$ House Owner						0.067* (0.038)	
Y Eligible $\times$ Temporary							-0.076*** (0.023)
Equivalised HH Income			0.005 (0.079)	-0.006 (0.076)	-0.028 (0.075)	0.005 (0.079)	0.001 (0.079)
Child under 16			0.028 (0.142)	0.006 (0.141)	0.081 (0.132)	0.052 (0.143)	0.002 (0.140)
Number of People			0.074 (0.059)	0.064 (0.059)	0.061 (0.055)	0.068 (0.059)	0.079 (0.057)
Full-time Worker			-0.143** (0.072)	-0.148** (0.071)	-0.126* (0.069)	-0.138* (0.072)	-0.144** (0.070)
Self-Employed			0.372 (0.233)	0.333 (0.232)	0.228 (0.203)	0.361 (0.236)	0.325 (0.233)
Child or Spouse Abroad			-0.007 (0.057)	-0.022 (0.057)	-0.007 (0.057)	0.000 (0.058)	-0.008 (0.056)
House Owner			0.363 (0.226)	0.296 (0.220)	0.378* (0.208)	-0.305 (0.366)	0.339 (0.222)
Temporary			0.013 (0.082)	0.009 (0.076)	0.038 (0.079)	0.014 (0.082)	0.594*** (0.159)
Married			0.080 (0.240)	0.052 (0.238)	0.064 (0.225)	0.076 (0.242)	0.072 (0.237)
Years Since Migration	✓	✓	✓	✓	✓	✓	✓
Age	✓	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓	✓	✓	✓
Household Fixed Effects	✓	✓	✓	✓	✓	✓	✓
N	8100	8100	8100	8100	8100	8100	8100

Note: The table reports the effect of eligibility on citizenship. The dependent variable is years since naturalization. The sample covers household heads age 18-64 from 1994 to 2011. It includes all immigrant households, where both of the partners are immigrants. Ethnic Germans are excluded. Robust standard errors in parenthesis. Years since migration and age are included in all specifications.

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

savings, as well as the effect through selecting of immigrants into citizenship. Results are reported in column (1) to (3) in Table 3. We then proceed with estimating Eq. 2, which gives us an estimate of δ measuring the effect of eligibility. Results are reported in column (4) to (6).

Table 3: Propensity to Save

	(1)	(2)	(3)	(4)	(5)	(6)
Years Since Citizen	-0.016** (0.007)	-0.016** (0.006)	-0.014** (0.006)			
Years Since Eligible				-0.035*** (0.012)	-0.025** (0.012)	-0.023** (0.011)
Equivalised HH Income		0.327*** (0.021)	0.327*** (0.022)		0.325*** (0.021)	0.325*** (0.022)
Child under 16			0.052** (0.025)			0.051** (0.026)
Number of People			-0.001 (0.011)			-0.002 (0.012)
Full-time Worker			0.033** (0.016)			0.034** (0.017)
Self-Employed			-0.026 (0.048)			-0.033 (0.049)
Child or Spouse Abroad			-0.028 (0.029)			-0.028 (0.029)
Owner			-0.107*** (0.033)			-0.112*** (0.033)
Temporary Migration			0.013 (0.017)			0.013 (0.017)
Married			0.056 (0.045)			0.056 (0.046)
Years Since Migration	✓	✓	✓	✓	✓	✓
Age	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓	✓	✓
Household Fixed Effects	✓	✓	✓	✓	✓	✓
N	8100	8100	8100	8100	8100	8100

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

Note: Robust standard error in parentheses. The dependent variable is dummy taking the value of 1 is household reports positive savings and 0 otherwise. The sample covers household heads age 18-64 from 1994 to 2011. Specification (1)-(3) report the effect of citizenship on savings, while (4)-(6) report the effect of eligibility. The sample includes all immigrant households, where both of the partners are immigrants. Ethnic Germans are excluded. Years since migration and age are included in all specifications.

Results in Table 3 reveal a substantial decrease in propensity to save with each additional year of possessing a host-country citizenship. The estimates in column (1) show that an additional year of citizenship decreases the probability of saving by 1.6 percentage points. With baseline probability of 42.2%, that results in 3.8% decrease in propensity to save. We sequentially add additional covariates such as income and household characteristics (columns (2) and (3)). Conditional on socio-economic characteristics we see only a slight decrease in our coefficient. Even though these estimates do not account for the sorting of individuals into citizenship, it is a nonetheless sizable and important average treatment effect. However, as discussed above, this effect includes a selection bias and we are unable to conclude that naturalization per se leads to lower probability of saving. If the most risk-averse people, which tend to save a lot irrespectively of their economic and social conditions, select

into citizenship that would result in a positive selection bias. If on the contrary, most vulnerable households unable to accumulate savings or not wishing to do so, opt for the option, there will be a negative selection bias. Instead, the intention to treat effect is given by the coefficient δ (columns (4) to (6)). We still observe a significant reduction in propensity to save with each additional year of exposure to the option to naturalize. These effects are admittedly substantial. One additional year of eligibility decreases the probability to save by 3.5 percentage points, which is equivalent to a 8.5% decrease. Conditioning on socio-economic characteristics, the coefficient decreases but remains negative and significant. The largest decrease is due to differences in income.

Reported in Table 3 are also the coefficients of other household characteristics. Their sign and statistical significance should be interpreted with caution due to the possible endogeneity issues. Comparing to previous studies on migrants' savings, a higher current net income yields the predicted positive sign on the propensity to save (Sinning, 2011). Household size does not have a statistically significant effect but the presence of children under age 16 is strong predictor of saving behavior.³⁷ On the contrary, house owners are less likely to report saving at all which may be due to mortgage payments. Finally, as confirmed by Merkle and Zimmermann (1992) and Bauer and Sinning (2011), we find that the nature of migration, whether temporary or permanent, has no effect on host-country financial savings. The same is true even for households who have children or spouse abroad, although the sign is negative.

So far, we have assumed a linear relationship between citizenship (eligibility) and savings. But this might not be the case. One could argue that the effect is strongest immediately after obtaining citizenship or becoming eligible and it dies out with each additional year. Or it might be the opposite; the benefits of possessing host-country nationality are occurring after certain amount of time. For example, we have plenty of evidence that citizenship does not cause an immediate jump in wages, but rather a wage growth with each additional year (Bratsberg et al. 2002, Steinhardt 2012). To test whether migrants actually decrease their propensity to save differently depending on the years of exposure, we use regression with linear splines. Results are reported in Table 4. For both citizenship and eligibility we see stronger effect after the first four years, despite a two-sided t test cannot reject the hypothesis of equality of coefficients.³⁸ This suggests that the change in behavior after eligibility is not immediate.

³⁷Household size is insignificant because we already take into account the size in our equivalized income variable. If we use disposable income instead, we find a negative and significant sign on household size indicating that larger households are less able to accumulate savings. This result is in line with other studies on migrants savings.

³⁸We also test difference in slopes, finding no effect. Results are reported in Table A1 in Appendix A

Despite the negative effect of citizenship and eligibility on saving propensities, these results do not give us the full picture on saving behavior of migrants. This is because migrants, as compared to natives, also have the option to save in their home-countries through remittances, especially when the nature of migration is temporary. Indeed, [Dustmann and Mestres \(2010\)](#) argue that neglecting home-country savings may lead to serious underestimation. To address this problem, Table 5 reports the estimates when we use remittances as dependent variable. It is very interesting to see that we find no significant effect on the probability to remit created by citizenship or eligibility. These results suggest that citizenship status affects only host-country savings and probability of remitting does not respond to naturalization. In line with other studies, we still find that remittances positively depend on income and on the location of the family.

Table 4: Propensity to Save, Linear Splines

	(1)	(2)	(3)	(4)	(5)	(6)
Years Since Citizen < 5	-0.011 (0.011)	-0.008 (0.010)	-0.005 (0.010)			
5 ≤ Years Since Citizen < 10	-0.026* (0.015)	-0.027* (0.014)	-0.028** (0.014)			
Years Since Citizen ≥ 10	-0.010 (0.027)	-0.015 (0.023)	-0.015 (0.022)			
Years Since Eligible < 5				-0.025 (0.016)	-0.017 (0.015)	-0.014 (0.015)
5 ≤ Years Since Eligible < 10				-0.036*** (0.013)	-0.026** (0.012)	-0.024** (0.012)
Years Since Eligible ≥ 10				-0.034** (0.014)	-0.023* (0.013)	-0.021* (0.013)
Years Since Migration	✓	✓	✓	✓	✓	✓
Age	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓	✓	✓
Household Fixed Effects	✓	✓	✓	✓	✓	✓
Income Controls		✓	✓		✓	✓
HH Controls			✓			✓
Two-Sided T Test	0.731	0.652	0.511	0.605	0.742	0.650
N	8100	8100	8100	8100	8100	8100

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

Note: Robust standard error in parentheses. The dependent variable is whether a migrant household saves or not. The sample covers household heads age 18-64 from 1994 to 2011. Specification (1)-(3) report the effect of citizenship on savings, while (4)-(6) report the effect of eligibility. The sample includes all immigrant households, where both of the partners are immigrants. Ethnic Germans are excluded. Years since migration and age are included in all specifications.

6.3 Amount Saved (Intensive Margin)

After establishing that the probability of holding positive savings decreases with citizenship, we proceed with estimating how the amount of savings in the host country and remittances are af-

Table 5: Propensity to Remit

	(1)	(2)	(3)	(4)	(5)	(6)
Years Since Citizen	-0.004 (0.006)	-0.003 (0.006)	-0.003 (0.006)			
Years Since Eligible				-0.010 (0.013)	-0.008 (0.013)	-0.006 (0.012)
Equivalised HH Income		0.057*** (0.016)	0.043*** (0.014)		0.056*** (0.016)	0.042*** (0.014)
Child under 16			0.006 (0.019)			0.006 (0.019)
Number of People			0.015 (0.010)			0.015 (0.010)
Full-time Worker			0.044*** (0.013)			0.044*** (0.013)
Self-Employed			-0.003 (0.029)			-0.004 (0.029)
Child or Spouse Abroad			0.324*** (0.033)			0.324*** (0.033)
Owner			-0.024 (0.026)			-0.025 (0.026)
Temporary Migration			0.015 (0.014)			0.015 (0.014)
Married			0.010 (0.024)			0.010 (0.024)
Years Since Migration	✓	✓	✓	✓	✓	✓
Age	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓	✓	✓
Household Fixed Effects	✓	✓	✓	✓	✓	✓
N	8100	8100	8100	8100	8100	8100

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

Note: Robust standard error in parentheses. The dependent variable is whether a migrant household remits or not. The sample covers household heads age 18-64 from 1994 to 2011. Specification (1)-(3) report the effect of citizenship on savings, while (4)-(6) report the effect of eligibility. The sample includes all immigrant households, where both of the partners are immigrants. Ethnic Germans are excluded. Years since migration and age are included in all specifications.

fects (*Do migrants save/remits more or less after naturalization?*).

We saw in Table 1 that a large share of the households in the sample does not save (59%). Consequently, OLS estimation of Eq. 1 and Eq. 2 will lead to inconsistent estimates of both β and δ . To take into account the left censoring nature of our variable, we estimate them using Tobit Random Effects model. Table 6 reports the results. We see that migrants not only reduced their propensity to save, but the amount of savings as well. The result is statistically significant for our preferred specifications (column 1 and 4) where we do not include any possibly endogenous covariates. As in the analysis on propensity to save, the intention to treat effect is larger in absolute value. One additional year of being citizen decreases amount of savings by 3% while an extra year of being eligible by 12%. Even conditioning on current household income (column 2 and 5), we still observe

Table 6: Amount Saved, Tobit Random Effects Model

	(1)	(2)	(3)	(4)	(5)	(6)
Years Since Citizen	-0.029*	-0.039**	-0.032**			
	(0.016)	(0.016)	(0.016)			
Years Since Eligible				-0.118***	-0.074***	-0.002**
				(0.030)	(0.028)	(0.001)
Equivalised HH Income		2.132***	2.146***		2.118***	0.053***
		(0.079)	(0.083)		(0.079)	(0.002)
Child under 16			0.277***			0.005**
			(0.076)			(0.002)
Number of People			-0.048*			-0.003***
			(0.029)			(0.001)
Full-time Worker			0.234***			0.007***
			(0.055)			(0.002)
Self-Employed			-0.331**			-0.010**
			(0.133)			(0.004)
Child or Spouse Abroad			-0.124			0.000
			(0.103)			(0.003)
Owner			-0.173**			-0.003
			(0.081)			(0.002)
Temporary Migration			0.021			0.003
			(0.057)			(0.002)
Married			0.233***			0.005**
			(0.089)			(0.003)
Age	✓	✓	✓	✓	✓	✓
Year Dummies	✓	✓	✓	✓	✓	✓
Household Random Effects	✓	✓	✓	✓	✓	✓
Immigration Dummies	✓	✓	✓	✓	✓	✓
Country of Origin	✓	✓	✓	✓	✓	✓
N	8100	8100	8100	8100	8100	8100

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

Note: The dependent variable is logarithm of amount saved + 1. The sample covers household heads age 18-64 from 1994 to 2011. Specification (1)-(3) report the effect of citizenship on savings, while (4)-(5) report the effect of eligibility. The sample includes all immigrant households, where both of the partners are immigrants. Ethnic Germans are excluded. Years since migration and age are included in all specifications.

significant negative effect of naturalization or eligibility on amount of savings. Household characteristics are also important determinants of savings. Having a child under 16 significantly increases the amount of money saved, probably due to the foreseen future expenses on education parents will face. On the contrary, larger households are less able to accumulate savings. We add splines in this specification as well in order to explore whether migrants behave differently depending on how long they have been naturalized/eligible. Results are reported in Table A3 in Appendix A. A two sided t test suggests that individuals decrease their savings the most after four years of naturalization or eligibility (column 1 and 4).

As in the previous section, we also estimate the effect of access to citizenship or eligibility on amount of remittances. Results are reported in Table A5 in Appendix A. We do not find any

supportive evidence of migrants changing their propensity to remit or amount remitted. In line with other studies on migrants' remittances we find that temporary migrants and those with a child or a spouse abroad are sending higher amounts of money as compared to permanent settlers who do not have children or spouse in the home country.

7 Potential Mechanisms

In this section, we briefly discuss what are the potential mechanisms through which we expect naturalization or eligibility to affect saving behavior of migrant households.

One possible explanation for the decrease in savings is that migrants may actually increase their consumption. To the best of our knowledge, [Dustmann et al. \(2017\)](#) are the only one to analyze the effect of immigrants' legal status on their consumption behavior. Using unique survey data from Italy, they show that legalizing immigrants increases their consumption by 40% conditional on background characteristics. One quarter of this difference is attributed to undocumented migrants having a lower income. Conditional on income, legal migrants consume 30% more. Their findings point to a significant increase in consumption due to legalization policies. While they do not attempt to provide formal tests of what drives the increase in consumption, they suggest two main channels: uncertainty and legal constraints to consumption such as buying a vehicle or getting a mortgage. Unfortunately, SOEP data does not provide information on consumption, so we are unable to test how consumption choices are affected as a result of naturalization policies. Future research is needed to address this gap in the literature.

Another possible channel is through a decrease in precautionary savings. We already discussed that German citizenship might benefit some groups more than others. We expect people coming from outside EU and less developed economies to experience the largest benefit in terms of reduction in uncertainty. Or perhaps people with low education instead will be the one benefiting the most. In [Table 7](#) we attempt to provide some evidence by interacting the independent variables with an indicator if a household head comes from a developed economy or not. We do not find any evidence on households from developed economies having different propensity to save or remit. The same is true for amounts remitted following eligibility. However, when we look at amount saved (column 6), we see that households from developed economies decrease their savings more as compared to the rest of the households.³⁹ This result is surprising but it points to the fact that households

³⁹The result is significant at 93% confidence intervals.

from less developed countries save more even if uncertainty reducing policies are implemented. In Table 8 instead, we look at how different education groups respond to the reform. We would expect that the low educated are the most vulnerable and unable to cope in periods of higher uncertainty. Again, we do not find any statistically significant differences in propensity to save, but low educated households reduce their savings more as compared to medium and high skilled (column 6). These results suggest that perhaps the decrease in savings we observe is partially due to a decrease in uncertainty. On the other hand, however, people with low education saving less may result in inadequate wealth accumulation for post-work years. Future work is needed to better understand how naturalization policies and uncertainty affects savings decision of migrants.

Table 7: Heterogeneity by Origin

	(1) Saving	(2) Amount Saved	(3) Remit	(4) Amount Remitted	(5) Saving	(6) Amount Saved	(7) Remit	(8) Amount Remitted
Years Since Citizen	-0.016** (0.007)	-0.029* (0.016)	-0.003 (0.006)	-0.008 (0.020)				
Years Since Eligible					-0.034*** (0.013)	-0.113*** (0.030)	-0.012 (0.013)	-0.025 (0.036)
Y Citizen $\times$ Developed Economy	-0.025 (0.021)	-0.018 (0.125)	-0.023 (0.020)	-0.306 (0.258)				
Y Eligible $\times$ Developed Economy					-0.003 (0.004)	-0.018 (0.011)	0.005* (0.003)	-0.029 (0.018)
Years Since Migration	✓	✓	✓	✓	✓	✓	✓	✓
Age	✓	✓	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓
Household Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓
N	8100	8100	8100	8100	8100	8100	8100	8100

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

Note: Robust standard error in parentheses. Specification (1)-(4) report the effect of citizenship on savings, while (5)-(8) report the effect of eligibility. The sample includes all immigrant households, where both of the partners are immigrants. Ethnic Germans are excluded. Years since migration and age are included in all specifications.

Table 8: Heterogeneity by Education

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Saving	Amount Saved	Remit	Amount Remitted	Saving	Amount Saved	Remit	Amount Remitted
Years Since Citizen	-0.013 (0.011)	-0.045* (0.026)	0.001 (0.010)	0.002 (0.031)				
Years Since Eligible					-0.036*** (0.013)	-0.131*** (0.030)	-0.010 (0.013)	-0.028 (0.036)
Y Citizen $\times$ Medium-Skilled	-0.004 (0.014)	0.018 (0.033)	-0.012 (0.012)	-0.052 (0.041)				
Y Citizen $\times$ High-Skilled	-0.009 (0.017)	0.041 (0.042)	-0.001 (0.017)	0.042 (0.048)				
Y Eligible $\times$ Medium-Skilled					0.005 (0.004)	0.038*** (0.009)	-0.002 (0.003)	-0.008 (0.012)
Y Eligible $\times$ High-Skilled					-0.006 (0.008)	0.066*** (0.015)	0.008 (0.007)	0.052*** (0.018)
Years Since Migration	✓	✓	✓	✓	✓	✓	✓	✓
Age	✓	✓	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓
Household Fixed Effects	✓	✓	✓	✓	✓	✓	✓	✓
N	8100	8100	8100	8100	8100	8100	8100	8100

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

Note: Robust standard error in parentheses. Specification (1)-(4) report the effect of citizenship on savings, while (5)-(8) report the effect of eligibility. The sample includes all immigrant households, where both of the partners are immigrants. Ethnic Germans are excluded. Years since migration and age are included in all specifications.

8 Robustness

8.1 Sample Restriction

Until now, we have performed our analysis on household level using eligibility and/or citizenship of the household head only. However, if the household head is ineligible, but his spouse is, then we might be under or overestimating the effect. In this section, we provide evidence that our results are robust to alternative sample definitions.

In order to test whether our results are not driven by the specific sample restriction, we exclude all households whose spouse got citizenship or eligibility before the household head did. There is only one possibility for this to be true: the spouse arrived in Germany earlier than the household head. Table 9 report the results. The magnitude of the effects decrease slightly but they remain negative and significant. The standard errors are also larger due to a reduction in sample size.

An additional robustness check we do is restricting our sample to household heads aged 25 to 55. We do this because some may argue that the decrease in savings is entirely driven by either too young or too old households, which tend to dissave. Results reported in Table 10 show that estimates are very similar to the baseline and remain significant.

Table 9: Robustness: Dropping spouse that naturalized or became eligible before head

	(1) Saving	(2) Amount saved	(3) Remit	(4) Saving	(5) Amount Saved	(6) Remit
Years Since Citizen	-0.013* (0.007)	-0.029* (0.018)	-0.005 (0.006)			
Years Since Eligible				-0.029** (0.014)	-0.066* (0.038)	0.004 (0.014)
Years Since Migration	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓	✓	✓
Household Fixed Effects	✓	✓	✓	✓	✓	✓
N	7288	7288	7288	7288	7288	7288

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

Note: Robust standard error in parentheses. Specification (1)-(3) report the effect of citizenship on savings, while (4)-(5) report the effect of eligibility. The sample includes all immigrant households, where both of the partners are immigrants. Ethnic Germans are excluded. Years since migration and age are included in all specifications.

Table 10: Robustness: Restricting age to 25-55

	(1) Saving	(2) Amount Saved	(3) Remit	(4) Saving	(5) Amount Saved	(6) Remit
Years Since Citizen	-0.020** (0.008)	-0.042** (0.018)	-0.005 (0.007)			
Years Since Eligible				-0.032** (0.014)	-0.067* (0.038)	-0.005 (0.014)
Years Since Migration	✓	✓	✓	✓	✓	✓
Age	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓	✓	✓
Household Fixed Effects	✓	✓	✓	✓	✓	✓
N	6319	6319	6319	6319	6319	6319

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

Note: Robust standard error in parentheses. Specification (1)-(3) report the effect of citizenship on savings, while (4)-(5) report the effect of eligibility. The sample includes all immigrant households, where both of the partners are immigrants. Ethnic Germans are excluded. Years since migration and age are included in all specifications.

As a final check with respect to sample restriction, we instead drop all individuals that naturalized prior to entering our sample. We drop those individuals as we are not able to estimate precisely for how long they have been German citizens. Results are reported in Table 11. We still observe a negative and significant effect as in our baseline.

8.2 Attrition

So far we have largely ignored the problem of sample drop-outs due to outmigration or attrition. Estimates in the literature point to return migration being indeed substantial and permanent settlements are seen as an exception rather than the rule (Dustmann and Görlach, 2015). A problem arises when individuals returning to their home countries or dropping out of the survey for other

Table 11: Propensity: Robustness, dropping people naturalized prior sample

	(1) Saving	(2) Amount Saved	(3) Remit	(4) Saving	(5) Amount Saved	(6) Remit
Years Since Citizen	-0.018** (0.009)	-0.035* (0.020)	-0.009 (0.008)			
Years Since Eligible				-0.036*** (0.012)	-0.109*** (0.039)	-0.013 (0.014)
Years Since Migration	✓	✓	✓	✓	✓	✓
Age	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓	✓	✓
Household Fixed Effects	✓	✓	✓	✓	✓	✓
N	6713	6713	6713	6713	6713	6713

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

Note: Bootstrapped standard error in parentheses. The dependent variable is whether a migrant household saves or not. Specification (1)-(3) report the effect of citizenship on savings, while (4)-(5) report the effect of eligibility. The sample includes all immigrant households, where both of the partners are immigrants. Ethnic Germans are excluded. Second-order polynomial in years since migration is included in all specifications.

reasons are a non-random group of people. Over time, we might expect that households who are still in the survey are also those who are more likely to settle permanently and obtain citizenship. If those who remain in the sample have a different savings behavior then our estimates of both β and δ will be biased. As already briefly discussed in Section 6, if migrants with higher savings were the one to leave, then there will be a downward bias in our estimates and upward bias if the contrary is true.

We address this problem by taking the probability of leaving the sample due to outmigration and test whether it depends on naturalization or eligibility. In our sample, 10% of households report return migration as a reason to leave the sample. Table 12 indeed suggests that naturalization or eligibility leads to lower probability of return migration.⁴⁰ This result is perhaps not surprising given that citizenship acquisition is seen as the final step toward full integration into the host country society. We also see that households in better economic position are less likely to re-migrate.

The question that arises is how these findings affect our estimates. Since we have negative correlation between naturalization/eligibility and return migration, our estimates will be downward biased. To test how sensitive our results are, we perform a robustness check by excluding all households that dropped out of our sample due to return migration. Results are reported in Table A7 in Appendix A. Since the point estimates are unaffected it leads us to conclude that selection is based on time-invariant characteristics and the bias is eliminated by using family fixed effects approach.

⁴⁰Table A6 in Appendix A reports the results when dummies for naturalization and eligibility are used as main explanatory variables.

Table 12: Attrition

	(1)	(2)	(3)	(4)	(5)	(6)
Years Since Citizen	-0.003*** (0.001)	-0.003*** (0.001)	-0.003*** (0.001)			
Years Since Eligible				-0.008** (0.004)	-0.008** (0.004)	-0.009** (0.004)
Equivalised HH Income		-0.021*** (0.008)	-0.017** (0.008)		-0.022*** (0.008)	-0.018** (0.007)
Child under 16			0.002 (0.005)			0.002 (0.005)
Number of People			-0.001 (0.003)			-0.001 (0.003)
Full-time Worker			-0.017*** (0.005)			-0.017*** (0.005)
Self-Employed			0.011 (0.010)			0.009 (0.010)
Child or Spouse Abroad			-0.003 (0.012)			-0.003 (0.012)
Owner			-0.013** (0.006)			-0.014** (0.006)
Temporary Migration			0.000 (0.004)			0.000 (0.004)
Married			0.020** (0.010)			0.020** (0.010)
Years Since Migration	✓	✓	✓	✓	✓	✓
Age	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓	✓	✓
Household Fixed Effects	✓	✓	✓	✓	✓	✓
N	8100	8100	8100	8100	8100	8100

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

Note: Robust standard error in parentheses. The dependent variable is whether a migrant household leaves the sample due to return migration. Specification (1)-(3) report the effect of citizenship on return probability, while (4)-(5) report the effect of eligibility. The sample includes all immigrant households, where both of the partners are immigrants. Ethnic Germans are excluded. Years since migration and age are included in all specifications.

9 Conclusion

In the last decades, many developed countries have experienced a sizable change in their immigrant populations accompanied with problems of socio-economic integration. This has led to an extensive economic research on the effect of different integration policies on migrants' outcomes in the host countries. One such policy is access to naturalization. In the economic literature, citizenship acquisition is seen as a way to foster not only social, but economic integration as well. Indeed, previous research has found sizable returns to employment and wages (Chiswick, 1978; Borjas, 1994), but the question of how savings and consumption choices are affected is largely under-researched.

In this paper, we provide empirical evidence on the causal effect of citizenship eligibility on saving and remittance behavior of migrants in Germany. Until recently, Germany was seen as a country

with outdated and restrictive naturalization policies unable to address the changing demographic trends. Despite this was the case for more than three decades after the first large immigration flows during the late 50s, Germany's citizenship laws have undergone considerable changes in 1990 and 1999. Using the two exogenous citizenship reforms and the German Socio-Economic Panel (GSOEP) for the period 1994-2011, we document significant decrease in savings both at the extensive and intensive margin: the possibility to naturalize negatively affects the propensity to save and amount of savings in Germany. Furthermore, our analysis suggests that the biggest decrease in saving comes from low skilled households. Since migrants have also the option to save in their home countries by sending remittances, our second important finding shows that remittance behavior does not change after being granted the access to citizenship.

The results presented in this paper should be seen as the first step in analyzing how migrants change their savings and remittance behavior as a result of naturalization policies. Future research is needed to better understand the mechanism behind these results and the consequences for both host and home countries. Moreover, as the share of migrants will continue to grow, we need to better understand all the possible socio-economic consequences for both immigrants and natives as a result of naturalization and legalization policies.

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A Appendix

Table A1: Propensity to Save, Difference in Slope Splines

	(1)	(2)	(3)	(4)	(5)	(6)
Years Since Citizen < 5	-0.010 (0.011)	-0.008 (0.010)	-0.005 (0.010)			
5 ≤ Years Since Citizen < 10	-0.016 (0.021)	-0.018 (0.020)	-0.023 (0.020)			
Years Since Citizen ≥ 10	0.016 (0.030)	0.010 (0.028)	0.012 (0.027)			
Years Since Eligible < 5				-0.025 (0.016)	-0.017 (0.015)	-0.014 (0.015)
5 ≤ Years Since Eligible < 10				-0.011 (0.012)	-0.008 (0.011)	-0.010 (0.011)
Years Since Eligible ≥ 10				0.001 (0.010)	0.003 (0.010)	0.003 (0.009)
Years Since Migration	✓	✓	✓	✓	✓	✓
Age	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓	✓	✓
Household Fixed Effects	✓	✓	✓	✓	✓	✓
Income Controls		✓	✓		✓	✓
HH Controls			✓			✓
Two-Sided T Test	0.696	0.759	0.688	0.296	0.429	0.499
N	8100	8100	8100	8100	8100	8100

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

Note: Bootstrapped standard error in parentheses. The dependent variable is whether a migrant household saves or not. The sample covers household heads age 18-64 from 1994 to 2011. Specification (1)-(3) report the effect of citizenship on savings, while (4)-(6) report the effect of eligibility. The sample includes all immigrant households, where both of the partners are immigrants. Ethnic Germans are excluded. Second degree polynomial in years since migration is included in all specifications.

Table A2: Propensity to Save, Dummies

	(1)	(2)	(3)	(4)	(5)	(6)
5 ≤ Years Since Citizen < 10	-0.068* (0.039)	-0.058 (0.038)	-0.054 (0.036)			
Years Since Citizen ≥ 10	-0.164** (0.075)	-0.160** (0.067)	-0.158** (0.067)			
5 ≤ Years Since Eligible < 10				-0.032 (0.029)	-0.029 (0.028)	-0.025 (0.028)
Years Since Eligible ≥ 10				-0.059 (0.043)	-0.047 (0.041)	-0.043 (0.040)
Years Since Migration	✓	✓	✓	✓	✓	✓
Age	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓	✓	✓
Household Fixed Effects	✓	✓	✓	✓	✓	✓
Income Controls	✓	✓	✓		✓	✓
HH Controls			✓			✓
Two-Sided T Test	0.149	0.088	0.076	0.312	0.489	0.491
N	8100	8100	8100	8100	8100	8100

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

Note: Robust standard error in parentheses. The dependent variable is whether a migrant household saves or not. The sample covers household heads age 18-64 from 1994 to 2011. Specification (1)-(3) report the effect of citizenship on savings, while (4)-(6) report the effect of eligibility. The sample includes all immigrant households, where both of the partners are immigrants. Ethnic Germans are excluded. Second degree polynomial in years since migration is included in all specifications.

Table A3: Amount Saved Splines, Tobit RE model

	(1)	(2)	(3)	(4)	(5)	(6)
Years Since Citizen < 5	0.019 (0.028)	0.008 (0.027)	0.021 (0.028)			
5 ≤ Years Since Citizen < 10	-0.109** (0.046)	-0.106** (0.045)	-0.109** (0.045)			
Years Since Citizen ≥ 10	-0.017 (0.081)	-0.071 (0.080)	-0.065 (0.080)			
Years Since Eligible < 5				-0.050 (0.045)	-0.029 (0.043)	-0.028 (0.043)
5 ≤ Years Since Eligible < 10				-0.117*** (0.033)	-0.078** (0.031)	-0.078** (0.031)
Years Since Eligible ≥ 10				-0.093*** (0.035)	-0.055* (0.033)	-0.052 (0.033)
Age	✓	✓	✓	✓	✓	✓
Year Dummies	✓	✓	✓	✓	✓	✓
Household Random Effects	✓	✓	✓	✓	✓	✓
Immigration Dummies	✓	✓	✓	✓	✓	✓
Country of Origin	✓	✓	✓	✓	✓	✓
Two-Sided T Test	0.118	0.110	0.060	0.149	0.392	0.381
N	8100	8100	8100	8100	8100	8100

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

Note: The dependent variable is logarithm of amount saved + 1. The sample covers household heads age 18-64 from 1994 to 2011. Specification (1)-(3) report the effect of citizenship on savings, while (4)-(5) report the effect of eligibility. The sample includes all immigrant households, where both of the partners are immigrants. Ethnic Germans are excluded. Second-order polynomial in years since migration is included in all specifications.

Table A4: Propensity: Robustness, both spouse and people naturalized prior sample

	(1) Citizenship Saving	(2) Citizenship Amount saved	(3) Citizenship Remit	(4) Eligibility Saving	(5) Eligibility Amount Saved	(6) Eligibility Remit
Years Since Citizen	-0.0180** (0.00909)	-0.0677*** (0.0225)	-0.00930 (0.00782)			
Years Since Eligible				-0.0361* (0.0185)	-0.0681 (0.0557)	0.00474 (0.0225)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Household Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
N	5566	5566	5566	5566	5566	5566

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

Note: Bootstrapped standard error in parentheses. The dependent variable is whether a migrant household saves or not. Specification (1)-(3) report the effect of citizenship on savings, while (4)-(5) report the effect of eligibility. The sample includes all immigrant households, where both of the partners are immigrants. Ethnic Germans are excluded. Second degree polynomial in years since migration is included in all specifications.

Table A5: Amount Remitted Tobit Model

	(1)	(2)	(3)	(4)	(5)	(6)
Years Since Citizen	-0.010 (0.020)	-0.015 (0.020)	-0.004 (0.019)			
Years Since Eligible				-0.029 (0.036)	-0.012 (0.036)	-0.016 (0.034)
Equivalised HH Income		0.748*** (0.085)	0.619*** (0.085)		0.745*** (0.085)	0.617*** (0.085)
Child under 16			-0.054 (0.089)			-0.056 (0.089)
Number of People			-0.014 (0.033)			-0.014 (0.033)
Full-time Worker			0.334*** (0.065)			0.334*** (0.065)
Self-Employed			-0.020 (0.155)			-0.025 (0.155)
Child or Spouse Abroad			1.655*** (0.106)			1.655*** (0.106)
Owner			-0.118 (0.100)			-0.119 (0.100)
Temporary Migration			0.222*** (0.066)			0.222*** (0.066)
Married			0.400*** (0.109)			0.402*** (0.109)
Age	✓	✓	✓	✓	✓	✓
Year Dummies	✓	✓	✓	✓	✓	✓
Household Random Effects	✓	✓	✓	✓	✓	✓
Immigration Dummies	✓	✓	✓	✓	✓	✓
Country of Origin	✓	✓	✓	✓	✓	✓
N	8100	8100	8100	8100	8100	8100

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

Note: Robust standard error in parentheses. The dependent variable is logarithm of remittances sent + 1. Specification (1)-(3) report the effect of citizenship, while (4)-(5) report the effect of eligibility. The sample includes all immigrant households, where both of the partners are immigrants. Ethnic Germans are excluded.

Table A6: Attrition

	(1) Citizenship	(2) Citizenship	(3) Citizenship	(4) Eligibility	(5) Eligibility	(6) Eligibility
Naturalized	-0.021*** (0.004)	-0.020*** (0.004)	-0.021*** (0.005)			
Eligible				0.002 (0.010)	0.003 (0.010)	0.003 (0.010)
Equivalised HH Income		-0.021*** (0.008)	-0.017** (0.008)		-0.021*** (0.008)	-0.017** (0.007)
Child under 16			0.002 (0.005)			0.002 (0.005)
Number of People			-0.001 (0.003)			-0.001 (0.003)
hh_head_full			-0.017*** (0.005)			-0.017*** (0.005)
Self-Employed			0.011 (0.010)			0.010 (0.010)
spouse_child_abroad			-0.003 (0.012)			-0.003 (0.012)
Owner			-0.013** (0.006)			-0.014** (0.006)
Temporary Migration			-0.000 (0.004)			0.000 (0.004)
Married			0.019** (0.010)			0.019** (0.010)
Years Since Migration	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Household Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Income Controls	No	Yes	Yes	No	Yes	Yes
HH Controls	No	No	Yes	No	No	Yes
N	8100	8100	8100	8100	8100	8100

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

Note: Bootstrapped standard error in parentheses. The dependent variable is whether a migrant household saves or not. Specification (1)-(3) report the effect of citizenship on savings, while (4)-(5) report the effect of eligibility. The sample includes all immigrant households, where both of the partners are immigrants. Ethnic Germans are excluded. Second degree polynomial in years since migration is included in all specifications.

Table A7: Attrition Robust Savings

	(1)	(2)	(3)	(4)	(5)	(6)
Years Since Citizen	-0.017** (0.007)	-0.017*** (0.006)	-0.015** (0.006)			
Years Since Eligible				-0.038*** (0.013)	-0.028** (0.012)	-0.027** (0.012)
Years Since Migration	✓	✓	✓	✓	✓	✓
Age	✓	✓	✓	✓	✓	✓
Year Fixed Effects	✓	✓	✓	✓	✓	✓
Household Fixed Effects	✓	✓	✓	✓	✓	✓
N	7328	7328	7328	7328	7328	7328

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

Note: Bootstrapped standard error in parentheses. The dependent variable is whether a migrant household saves or not. Specification (1)-(3) report the effect of citizenship on savings, while (4)-(5) report the effect of eligibility. The sample includes all immigrant households, where both of the partners are immigrants. Ethnic Germans are excluded. Second degree polynomial in years since migration is included in all specifications.

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