

UNIVERSITÀ POLITECNICA DELLE MARCHE

FACOLTÀ DI ECONOMIA "GIORGIO FUÀ"



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# Essays on Economic Integration of Immigrants

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*Supervisor:*

Prof. Alberto Zazzaro

*Author:*

Md. Taslim Uddin

*Co-Supervisor:*

Prof. Giulia Bettin

*A thesis submitted in fulfillment of the requirements  
of the degree of Doctor of Philosophy in Economics (XXXII cycle)*

Academic Year: 2016-2019

## **Abstract**

This study contributes to the debate regarding the extent to which immigrants are economically integrated into Italian society. The work analyses some of the factors that may influence migrants' economic integration- namely wealth accumulation, financial inclusion, portfolio choice, home-ownership and discrimination in mortgage lending. By drawing on data from two rich datasets run by the bank of Italy and including analyses of different economic outcomes between immigrants and natives over time and across continents, the thesis examines the economic integration of immigrants from various angles with the aim that combining these aspects provides a deeper insight into the factors that drive integration of immigrants into the host society.

In chapter one, I present arguments that rationalize the studies presented in this thesis. In chapter two, I investigate the differences in financial market participation and asset accumulation between immigrants and natives using the 2006-2016 Italian Survey of Household Income and Wealth (SHIW) data. The quantile regression analyses indicate that immigrants hold significantly less net wealth than their native counterparts throughout the wealth distribution. The wealth gap persists even after controlling for demographic characteristics and other influencing factors including income, level of education, risk profile. When compared to natives, immigrants are less likely to participate in the formal financial markets and their portfolio choices also differ from those of the native-born. The likelihood of holding risky assets, government securities, homeownership, and businesses are reduced by immigrant status.

In chapter 3, using a unique and large dataset on the granted loan contract for 2011-2016, I examine the pricing differences of mortgages between immigrants and natives as so to explain immigrants' lower home-ownership rates and wealth accumulation as well. Results show that immigrants pay substantially higher than



natives for mortgages. The interest rates differential persists and is highly significant even after controlling for different risk factors, mortgage characteristics and personal characteristics of borrowers. The Oaxaca-Blinder decomposition reveals that 80 percent of the observed differential interest rate does not depend on the observable characteristics. The empirical evidence provided here indicates that these differentials are likely caused by discrimination.

To  
my parents, Mr. and Mrs.Yousuf  
&  
my wife, Shimu

## Acknowledgements

My Ph.D. study would not have been possible without the support, guidance, and encouragement of numerous kind souls.

First and foremost, I wish to acknowledge the generous and unconditional support of my supervisor, Alberto Zazzaro, who never wavered in guiding and directing me throughout the period of this program. His keen devotion of time and energy in correcting my academic flaws has been most exceptional. I also gratefully acknowledge his support to have the opportunity to spend a visiting research period at the Department of Economics and statistics of the University of Naples Federico II. I am privileged to have him as my academic supervisor and teacher.

I would like to express my deepest gratitude to Giulia Bettin, my co-supervisor, to whom I owe tremendously for her infinite patience in providing me constant guidance and support. Without her unwavering support and mentorship, my research would not have been possible.

I would like to thank wholeheartedly Paolo Emilio Mistrulli, who kindly accepted to assist me during the writing of the third essay. I would also to thank Tommaso Oliviero, who gave me precious feedback and, in general, has always been very kind to me.

I am grateful to all the other Professors for helping me in developing the research. My sincere appreciation goes to Riccardo Jack Lucchetti and Marco Cuculelli, who have been so supportive and kind to listen and provide solutions to my academic problems. A special mention is therefore for Claudia Pigini, who withheld no effort in her support for me and my work, and was always generous with her time, energy, and resources.

I am also indebted to my fellow Ph.D. students. In particular, Luca corraggio, Amadou, Muhammed, Gloria, Chiara and Francesco for their accompany, suggestions and feedback on several occasions. A special thanks to Andreina Baronini for her enormous support since the beginning of this adventure.

Back to my home, I express my heartfelt gratitude to all my teachers and colleagues for their spontaneous support. In particular, I would like to thank Mohammed Hasmat Ali, Kamrul Hasan and Shahadat Hossain for their constructive advice and consistent encouragement.

I would like to acknowledge the support and encouragement of my family. I'm very grateful to my parents, parents in law, uncle Mohameed Ali, Abdul Gaffar and Brother Arif for their unwavering love and believing in me. Last, but by no means least, my deepest thanks go to Shimu (my better half), whom I deprive the most during this period. Words cannot properly express my gratitude for her support, understanding and companionship.

# Contents

<b>abstract</b>	<b>1</b>
<b>Acknowledgements</b>	<b>4</b>
<b>List of Figures</b>	<b>9</b>
<b>List of Tables</b>	<b>11</b>
<b>1 Introduction</b>	<b>12</b>
1.1 Immigration and Immigrant stock . . . . .	12
1.2 Understanding Economic Integration- A Brief Overview . . . . .	14
1.3 Immigration to Italy . . . . .	15
1.4 Data used in this study . . . . .	17
1.5 Structure of the Thesis . . . . .	19
1.6 Situating the Study- Aims and Research Questions . . . . .	20
<b>2 Immigrants' wealth Position and Financial Integration</b>	<b>22</b>
2.1 Introduction . . . . .	22
2.2 Literature review . . . . .	25



2.3	Data . . . . .	33
2.4	Descriptive Analysis . . . . .	34
2.5	Empirical Analysis of wealth gap . . . . .	39
2.6	Financial Inclusion . . . . .	44
2.7	Portfolio Choices . . . . .	51
2.8	How robust our findings? . . . . .	52
2.9	Discussion and Conclusions . . . . .	60
<b>3</b>	<b>Immigrants and Mortgage Pricing: Evidence from Italy</b>	<b>62</b>
3.1	Introduction . . . . .	62
3.2	Conceptual framework and literature . . . . .	65
3.2.1	Economic theories of discrimination . . . . .	65
3.2.2	Empirical literature . . . . .	66
3.3	Italian Mortgage Market . . . . .	68
3.4	Data . . . . .	71
3.5	Summary Statistics . . . . .	72
3.6	Econometrics strategy and results . . . . .	76
3.7	Oaxaca-Blinder Decomposition Analysis . . . . .	81
3.8	Propensity Score matching . . . . .	83
3.9	How robust are the results? . . . . .	89
3.9.1	Single Borrower Contract analysis . . . . .	89
3.9.2	Co-borrower Contract Analysis . . . . .	90





3.9.3	Mortgage Pricing: SHIW data . . . . .	92
3.10	Discussion and Conclusions . . . . .	95
<b>4</b>	<b>Conclusions</b>	<b>97</b>
<b>A</b>	<b>Appendix- Chapter1</b>	<b>102</b>
A.1	Immigrant stock by origin . . . . .	102
A.2	Migrant inflows to Italy, 2000-2017 . . . . .	103
A.3	The contribution of foreign-born to total population in Italy, 2009- 2018 . . . . .	104
<b>B</b>	<b>Appendix- Chapter2</b>	<b>105</b>
B.1	Wealth gap between Financially included immigrants and Financially excluded immigrants . . . . .	106

# List of Figures

1.1	Inflows of migrant,2000-2017 . . . . .	16
1.2	Share of foreign-born population in Italy, 2009-2018 . . . . .	17
2.1	Mean and selected quantile values for net worth,2006-2016 . . . . .	37
2.2	Mean values for sources of wealth,2006-2016 . . . . .	38
3.1	Average Fixed rate vs Adjustable rate . . . . .	70
3.2	Comparison of the mortgage rates between immigrants and natives .	70
3.3	Average yearly mortgage rate . . . . .	73
3.4	The endowments and coefficients components of a threefold Oaxaca- Blinder decomposition . . . . .	82
3.5	Histograms of propensity scores before and after matching . . . . .	87
A.1	Origin Continents . . . . .	102

# List of Tables

1.1	Migrant stock by continent of origin . . . . .	17
1.2	Top 20 countries or areas of origin . . . . .	18
2.1	Definition of Variables . . . . .	35
2.2	Descriptive Statistics . . . . .	36
2.3	Net Wealth(in thousand) Quantiles for Immigrants and the native Italian, 2006-2016 . . . . .	41
2.4	Net Wealth(in Thousand) by Cohorts of Arrival of Immigrant Household Head . . . . .	43
2.5	Financial Inclusion of Immigrants . . . . .	48
2.6	Financial Inclusion of immigrants by Cohort of arrival ,2006-2016 . . . . .	50
2.7	Random effect Probit- Asset portfolios . . . . .	53
2.8	Inverse hyperbolic transformed Net Worth for Immigrants and the Natives . . . . .	55
2.9	Wealth holding by financially included and not-included immigrants . . . . .	56
2.10	Net wealth position by Financial Inclusion of Immigrant household head, 2006-2016 . . . . .	58
2.11	Quantile regression, Q=50 . . . . .	59

3.1	Probit model . . . . .	71
3.2	Variable names and definitions . . . . .	74
3.3	Summary Statistics . . . . .	75
3.4	Test of mean differences of observable characteristics between Immigrants and Italian . . . . .	75
3.5	Basic regression results . . . . .	78
3.6	Oaxaca-Blinder Decomposition of the mortgage rate gap between immigrants and Natives . . . . .	83
3.7	The matching procedure: Average Treatment Effect . . . . .	85
3.8	Regression results- Matched data . . . . .	86
3.9	Univariate Imbalance Measures: Before matching . . . . .	88
3.10	Univariate Imbalance Measures: After matching . . . . .	88
3.11	Sample Average Treatment Effect on the Treated . . . . .	88
3.12	Single borrower contract Analysis . . . . .	91
3.13	Co-borrower contract analysis . . . . .	92
3.14	Mortgage rate gap between Immigrant and Natives (SHIW data) . . . . .	94
A.1	Migrant inflows, 2000-2017 . . . . .	103
A.2	Share of foreign-born population in Italy . . . . .	104
B.1	Net Wealth: Native vs. Financial Included Immigrants, 2006-2016 . . . . .	106
B.2	Net Wealth: Native vs. Financial Excluded Immigrants, 2006-2016 . . . . .	107

# Chapter 1

## Introduction

### 1.1 Immigration and Immigrant stock

In today's technologically advanced and unified world, immigration and integration of immigrants in societies where they reside have become causes of major public concern and political debate. Given that, over 272 million or 3.5 percent of the world's population in 2019 are migrants (UN, 2019) <sup>1</sup> At the European level, there has been a significant change in stocks of the foreign population in the last 20 years and at present, it hosted the largest number of international migrants (82 million) (UN, 2019). Consequently, the growing share of immigrants in European societies is progressively shaping economic and demographic trends. This rising immigrant population is producing a number of pressing and fundamental challenges to European societies. Of course, the most important concern among governments, policymakers, and society as a whole is the social cultural and economic integration of immigrants.

The overwhelming majority of economists agree that the contributions of immigrants to sustainable economic growth and development in both host and home countries are undeniable (Hass, 2008; McAuliffe and Ruhs, 2017; Ratha et al., 2009). Migrant's remittances fuel investment in education, health, sanitation, housing, and

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<sup>1</sup>Only 20 countries absorbed 67 percent of the overall immigrant population (UN,2017).

infrastructure development in home countries (OECD/ILO, 2018). Holzmann (2005) reports that at current labor force participation and fertility rates, a yearly 1.3-1.6 million immigrants into the EU25 are required to keep the labor force constant. In addition to filling labor gaps and creating job opportunities as entrepreneurs, increased immigration is associated with an overall increase in GDP, innovation activities and productivity in host countries (McAuliffe and Ruhs, 2017). Despite immigrant's notable contributions, still, the extent to which immigrants adapt to economic and social life within the host societies is a matter of intense arguments. In general, there exist a sizeable gap between immigrants and natives in economic, educational, social and political outcomes (OECD, 2015). In economic terms, immigrants tend to have higher unemployment rates, lower occupational attainment, and lower wages compared to natives (Constant et al., 2009).

In recent decades, Italy has undergone a period of mass transformation and shifted from a major emigration country to immigrants receiving country. Since the mid-1980s, Italy has passed many sets of legislation so as to regulate migration flows, legalise and ease the integration of immigrants (Cesareo, 2009; Chaloff, 2004; Pastore et al., 2006). The rise of immigration to Italy has created the necessity for evaluating the effectiveness of integration policies. If any policy that limits immigrants' economic, social and political opportunities can create a whole host of issues including poverty and marginalization of immigrant families which are economically wasteful and may undermine social cohesion.

A crucial aspect of migrant's integration is economic integration. Immigrants migrate primarily to work and improve their economic well-being. The literature on the economic integration of immigrants has largely concentrated on participation and achievement in the labor market outcomes (Borjas, 1994; Constant and Zimmermann, 2011). Recent studies have started to examine the relative wealth position to infer the overall economic well-being of immigrants. Wealth provides liquidity in times of economic hardship, eases access to the credit market, better education, enhanced health facilities, and the resources to maintain living standards in retirement (Bauer et al., 2011; Cobb-Clark and Hildebrand, 2006; Gittleman and Wolff, 2004). Immigrants' financial integration also, directly and indirectly, relates

to their economic position and plays a role in stimulating other forms of immigrant integration.

The aim of this thesis is to understand the present level of immigrant's economic integration in Italy and the factors that affecting it . To contextualize this study, a brief overview of the concept of immigrants' economic integration is presented, followed by an overview of migration to Italy. A short description of datasets used in this thesis and research questions with the contributions to the literature are then outlined. The specific research questions and how they relate to gaps in the literature and relevant research are presented in each chapter, together with the empirical analysis and data used.

## 1.2 Understanding Economic Integration- A Brief Overview

Integration is a process by which immigrants become an accepted part of their host society (Penninx, 2010). Generally, immigrant integration can be defined as the cultural, social, political and economic inclusion of immigrants into the host society both as an individual and as a group (IOM, 2011). Successful integration implies immigrants eventually reach parity with the natives in the labour market, financial market access, education, health and other critical aspects of social life.

The integration of immigrants is like a double edge sword. On the one side, successful integration in labor markets and society as a whole may provide an opportunity for accelerating economic growth and contributing diverse and dynamic cultures. It is also vital for promoting the ability of immigrants to be self-sufficient, productive citizens as well. On the flip side, unsuccessful integration can create a large burden for the host society and threaten social cohesion (Dumont and Liebig, 2014). Successful integration is hard to measure because it is multidimensional, and spanning the economic, political and social sphere (Danzer, 2011). However, economists often measure the rate of economic integration by calculating the differences between immigrants and natives in indicators like labor market position,

residential condition, wealth position and financial market participation (Abdul-Razzak et al., 2015; Amuedo-Dorantes and Pozo, 2002; Borjas, 2002).

In the literature, theories and policy debates on immigrants mainly place emphasis on three areas: first, the determinants of migration; second, the impacts of immigrants on the native population; and finally, the integration and performance of migrants in the host country's economy (Constant and Zimmermann, 2005). This thesis focuses on the economic integration of immigrants in Italy to define the wealth position of immigrants and financial inclusion and does not touch on aspects of social or cultural integration.

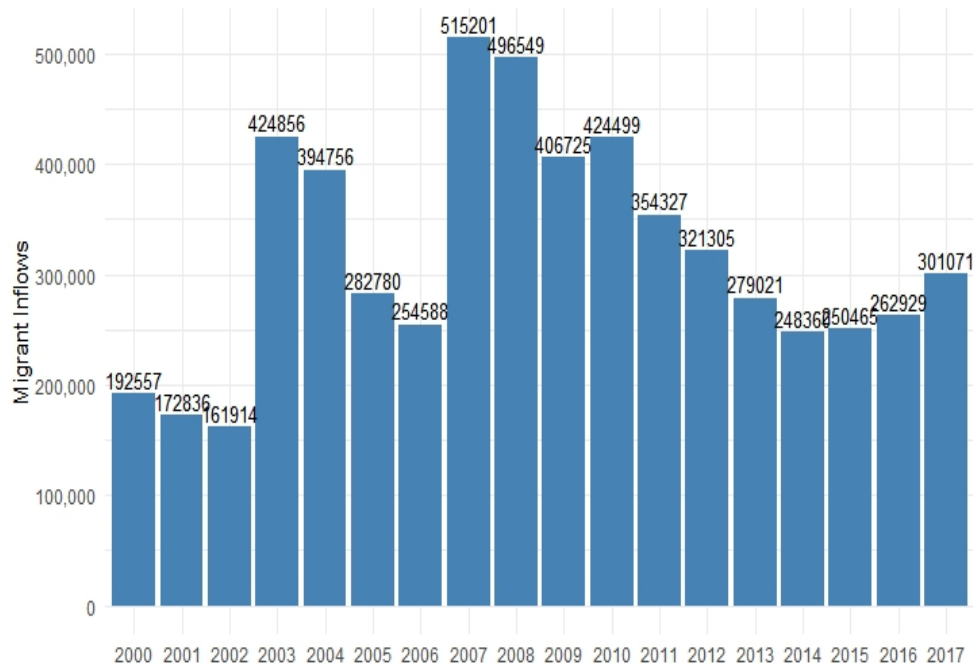
### 1.3 Immigration to Italy

Italy was traditionally a country of mass emigration and has undergone an extensive migratory change in the past decades. In 1973, it experienced a positive migration balance for the first time, mainly due to the economic boom in the 1950s and 1960s, and transformed itself into an immigration country. High rates of immigration over the past two decades raised substantially the share of foreign-born in the total resident population.

In Figure 1.1 we present the inflows of migrants in Italy, from 2000 to 2017. Between 2000 and 2002, the migrant flows in Italy were quite constant. Since the expansion of the European Union (EU), flows of immigrants change drastically in 2003 and 2004. In the transition period, except Britain, Ireland, and Sweden, other old member states including Italy kept their labour markets shut from the free labour movement (Bettin and Cela, 2014). As a result, inflows gradually dropped in this transition period. In 2007, further enlargement of the EU, particularly the inclusion of Romania, contributed to the largest influx of migrants in Italy, immigration increased from 245.59 thousand in 2006 to 515.20 thousand in 2007. The year 2008 was the year of experiencing the financial crisis all over the world. The financial crisis had a negative result on migrant inflows to Italy, with a sharp reduction of both labor and family migration starting after 2008. The reduction of the size of the



Figure 1.1: Inflows of migrant,2000-2017



Source: OECD

inflows continued until 2014. In the subsequent three years, migration flows remain stable. However, in 2017, it again increased, and the size was 301071 individuals.

Figure 1.2 depicts the share of foreign-born population in Italy. According to the OECD, there are more than 6 million foreign-born legally residing in Italy in 2018, which is around 10.4% of Italy's total population of 60.5 million<sup>2</sup>. Between 2009 to 2013, the stock of foreign-born population remained relatively stable. After 2013, the share has started to rise again<sup>3</sup>.

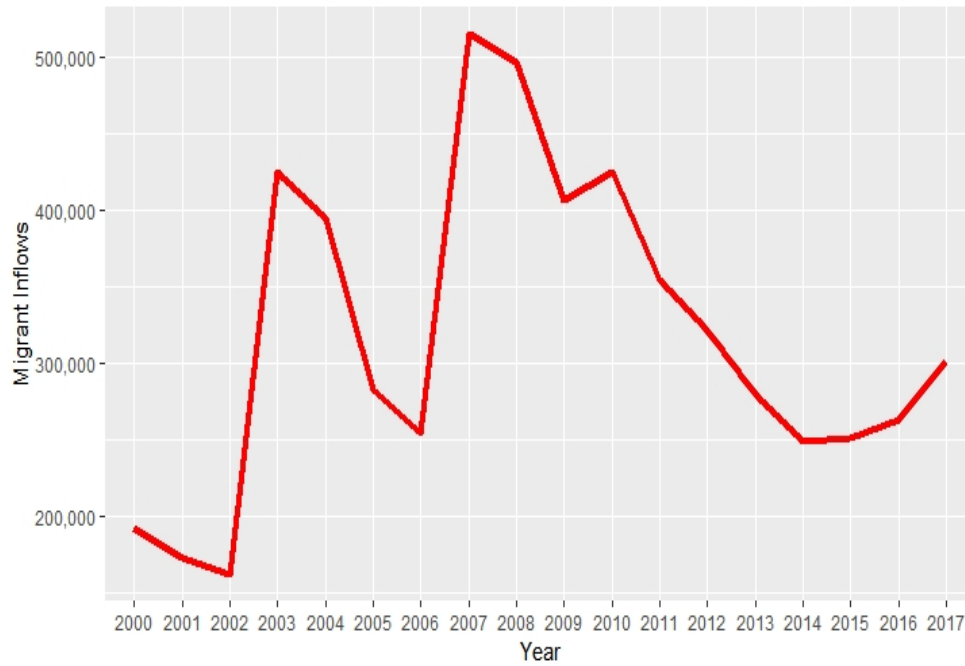
Table 1.1 and Table 1.2 present migrant stocks by origin both continent and country wise. Looking at the continent of origin, we see that the biggest group of migrants comes from Europe, account for 4.31% of the total population in Italy or 51% of total immigration stock. The lowest portion of foreign-born in Italy are from Oceania.

As far as the single nationalities are concerned, the change in the structure of the foreign population by nationality is diversified. Nowadays, Romania

<sup>2</sup>See OECD(2018), available at <https://www1.compareyourcountry.org/migration/en/1/389/datatable>

<sup>3</sup>We present the figures in Appendix A.2

Figure 1.2: Share of foreign-born population in Italy, 2009-2018



Source: OECD

and Albania are the two main countries of origin, followed by Morocco, China and Ukraine. Significant changes appear in the composition of immigrant stocks by nationality. Besides European countries, sub-Saharan and Asian countries represent an increasing fraction.

Table 1.1: Migrant stock by continent of origin

Continent	Total	% share	% share to Total population
Europe	2600748	50.53%	4.31%
North Africa and Western/Central Asia	735681	14.3%	1.22%
South Asia	507553	9.85%	0.84%
East and South-East Asia	478417	9.26%	0.79%
Sub-Saharan Africa	444058	8.68%	0.74%
Americas	373354	0.07%	0.62%
Oceania	2157	0.11%	0.01%

Source: ISTAT, 2018

## 1.4 Data used in this study

We use two rich datasets in this thesis to perform analysis of migrants' economic and financial integration. Chapters two is based on the Survey on Household Income

Table 1.2: Top 20 countries or areas of origin

2008		2018	
Romania	796477	Romania	1206938
Albania	441396	Albania	441027
Marocco	403592	Marocco	422980
China	170265	China	299823
Ukraine	153998	Ukraine	239424
Filippine	113686	Filippine	168292
Tunisia	100112	India	157965
Polonia	99389	Bangladesh	139953
India	91855	Moldova	128979
Moldova	89424	Egypt	126733
Macedonia	89066	Pakistan	122308
Ecuador	80070	Nigeria	117358
Perù	77629	Sri Lanka	111056
Egypt	74599	Senegal	110242
Sri Lanka	68738	Perù	97128
Senegal	67510	Tunisia	95071
Bangladesh	65529	Polan	94200
Serbia	57826	Ecuador	79249
Pakistan	55371	Macedonia	63561
Nigeria	44544	Bulgaria	60129

Source: ISTAT, 2018

and Wealth (Henceforth, SHIW) from the Bank of Italy. The main purpose of the SHIW is to provide data on Italian household composition, age, education, labor market variables, income (for individuals and households), savings, consumption, and data on credit, transfers, and insurance. The survey included an extra set of questions for immigrants since 2006; we, therefore, aggregate six waves, up until 2016. Approximately 20000 individual respondents living in 8,000 households from about 300 Italian municipalities were sampled each wave. We form a panel using the identity of households interviewed in previous surveys (panel households) and end up with 47424 observations.

Chapter three of the thesis draws on analysis from an anonymized version of the database stored at the bank of Italy, containing detailed information on all the mortgages whose loans are above the threshold level of 75000 euro and quarterly data on interest rates charged by each bank on all mortgages originated between 2011 and 2016 for the 176 banks. After a filtering procedure, we end up with a sample of about 1 million observations.

## 1.5 Structure of the Thesis

The thesis incorporates two empirical chapters. Its' central investigation focuses on the level of the economic and financial integration of immigrants. The second chapter of the thesis looks at the main indicators of the economic and financial integration of immigrants including wealth position and financial market participation. In addition, to explain the wealth position, differences in the portfolio choices between immigrants and natives are also analyzed. In the third chapter, this thesis examines whether there exists any gap in the pricing of mortgages between immigrant and native borrowers in Italy. The final chapter provides an overview of the main findings, limitations of the study, and offers some policy discussion.

## 1.6 Situating the Study- Aims and Research Questions

To contextualize this study, a very brief outline of the main issues within each chapter is provided. We investigate multiple research questions, and a range of long run indicators of migrants' economic and financial integration: financial market participation, portfolio decisions and discrimination in mortgage lending. The rationale for examining these factors is that while previous work has found that they may have an effect on migrants' economic integration (Abdul-Razzak et al., 2015; Doiron and Guttmann, 2009; Hao, 2004), and there remain several gaps in our understanding of their impact on migrants' economic integration in Italy.

The strength of the study is that it examines the economic integration of immigrants from various angles by including analysis of variation in portfolio choices and financial inclusion between immigrants and their native counterparts over time. It also draws on two rich datasets that allow for an investigation of mechanisms that contribute to the present level of integration in Italy.

Chapter two of this thesis focuses on differences in wealth accumulation between immigrants and natives, and measures the likelihood of immigrants being financially included, and differences in portfolio choices. Measuring wealth position is important as researchers have argued that the net wealth position of immigrants is an important indicator of their economic integration (Cobb-Clark and Hildebrand, 2006; Sinning, 2007). Immigrant's incorporation in host society positively depends on the social, financial, and human capital they possess, and yet highly depends on ways that they allocate resources. Studying financial market participation and portfolio selection provides significant insights into how immigrants adapt to host society (Abdul-Razzak et al., 2015). Moreover, the analysis of different immigrant groups based on the cohort of arrival allows for understanding how the length of stay in Italy shapes integration. To date, the influence of immigrant status on economic outcomes is under-researched in Italy. Recently, Bertocchi et al. (2018), using SHIW data for the period 2006-2014, examine differences in financial behaviour, in particular, wealth holding and the allocation of assets. They report sizeable gaps

in both wealth holdings and financial decisions between immigrants and natives. However, to my knowledge, this is the first work that investigates financial market participation and portfolio decisions along to elucidate differences in wealth accumulation between immigrants and natives, which are the key indicators of immigrants' economic integration.

Chapter three of the thesis further expands on the understanding of the impact of immigrant status on home-ownership, focusing on the differential price of mortgages between immigrants and native Italians. Home-ownership indicates more complete integration within the host society and a major component of net wealth. Mortgage debt is the key to be a homeowner. Any discriminatory practices in mortgage lending against immigrants might result in social exclusion (Kara and Molyneux, 2017). Discrimination occurs when equally qualified people are treated differently based on some personal characteristics and other non-economic criteria like race, ethnicity, gender, and so on. It may consist of either turning down a loan application or varying the terms of transaction (Lacour-little, 1999). However, detecting discrimination in mortgage lending is typically troublesome to assess, since the drawback of immigrants could also be attributable to many other factors (OECD, 2013). This is the first research that addresses the pricing differences in mortgage between immigrants and natives on Italian data.

## Chapter 2

# Immigrants' wealth Position and Financial Integration

### 2.1 Introduction

Immigrants make up a growing share of the population worldwide. The contributions of immigrants for sustainable economic growth and development in both host and home countries are undeniable. Migrant's remittances fuel investment in education, health, sanitation, housing, and infrastructure development in home countries (OECD/ILO, 2018). Besides, they benefit host countries significantly through filling labor gaps, creating job opportunities as entrepreneurs and raising the gross domestic product (GDP) (McAuliffe and Ruhs, 2017). Immigrants leave their home countries, mostly, to pursue a higher standard of living and improve their well-being. Despite immigrant's notable contributions, still to what extent immigrants are economically integrated into the host societies is a matter of intense debate among economists and policymakers.

A key measure of predicting economic well-being is net wealth (Sinning, 2007). Immigrants' wealth position provides important insights into how immigrants are economically integrated into the host society and their financial well-being (Painter and Qian, 2016). Wealth provides economic security, improves quality of

living and creates opportunities for the future generation (Bauer et al., 2011; Cobb-Clark and Hildebrand, 2006). Furthermore, wealthier families have access to better schools and enhanced health facilities, can spend more time looking for a good job and live in neighborhoods characterized by lower levels of crime (Gittleman and Wolff, 2004). Net wealth indeed encompasses many economic and social integration processes of immigrants and is related to their well-being such as health, employment status, and income (Akresh, 2006; Hao, 2004; Painter and Qian, 2016). Thus, wealth position represents an immigrant's current economic standing and future prospects. On the flip side, wealth inequality between natives and immigrants provides important insight into their economic performance in the host society.

Economic research on the immigrants' labor market outcomes including gaps in earnings and employment status is well-established (Adsera and Chiswick, 2007; Borjas, 1994; Cancian et al., 1993; Clark and Drinkwater, 2008). Studies on labor market earnings, however, ignore other sources of income, such as savings, inheritance and return on investments. Whereas, focus on immigrants' wealth position relative to native-born provides a comprehensive view of their economic integration in the host society (Painter et al., 2015). Wealth depicts the economic situation more precisely than income as it supports both current and future consumption (Doiron and Guttman, 2009). There is evidence that the well-being of two families with the same level of income, but different wealth level is not homogeneous (Gittleman and Wolff, 2004). Wealth can generate more wealth in addition to interest and dividend income. It could be used as collateral for capital for new investments (Keister, 2000). Thus, wealth accelerates immigrant's economic integration and earnings assimilation into the host country (Doiron and Guttman, 2009).

Recent studies of immigrant's economic progress in host countries have also considered financial market participation as one key yardstick of economic and financial integration (Abdul-Razzak et al., 2015; Chatterjee, 2009a; Rhine and Greene, 2006). Financial markets provide important tools for enhancing welfare like the opportunity to transfer resources across time, make payments, mitigate risk, and fund investments. Lower rate of participation may contribute to the lower welfare (Osili and Paulson, 2008b). Additionally, having a relationship with mainstream financial



institutions assists with issues like limited credit access or high credit expenses by establishing creditworthiness. In our empirical analysis we focus on key indicators of financial market participation: ownership of bank or postal accounts because these represent entry-level financial assets with relatively less obstacle to participation (Abdul-Razzak et al., 2015).

Household's decision regarding how to allocate their resources is another driving force of wealth accumulation (Osili and Paulson, 2008a). Assets vary in their risk-return profile. For example, investment in forward-looking assets such as stock and other financial assets may risky but have the potential to generate higher income. Alternatively, ownership of the house indicates long-run earnings potential (Sinning, 2010). Portfolio choices of households influence the pace of economic integration of immigrants and its' effect persists across generations (Abdul-Razzak et al., 2015).

Italy provides an interesting case study in this regard because recently it has become a popular destination for immigrants. In 2015, Italy was the fifth most popular migrant destination in Europe (McAuliffe and Ruhs, 2018). It absorbed a good portion of international immigrants, about 10.4 percent of the Italian population are immigrants (OECD, 2018).

In Italy, a handful of studies examine immigrants' economic progress and provide a quiet consistent picture regarding the existence of an overall wealth gap between immigrants and natives (Abdul-Razzak et al., 2015; Bauer et al., 2011; Bertocchi et al., 2018). For instance, based on only the 2008 wave of the Survey on Household Income and Wealth (SHIW) data and the other two comparable data on household wealth holdings and asset ownership, Bauer et al. (2011) find a sizeable cross-country wealth gap between natives and immigrants in Italy, Germany and Luxembourg. Recently, Bertocchi et al. (2018) compare financial decisions between immigrants and natives by the means of the SHIW data for 2006 to 2014. They report a substantial gap in wealth and financial decisions between these two groups. Unfortunately, very little is known about differences in the portfolio decisions and financial market participation between immigrants and native counterparts. This paper aims at filling this gap in the literature. To the best of my knowledge, this is the first work that investigates extensively financial market participation and portfolio

decisions along to elucidate differences in wealth accumulation between immigrants and natives, which are the key indicators of immigrants' economic integration.

The Survey on Household Income and Wealth (SHIW) enables us to compare the wealth distribution of immigrant and native Italian households and their participation in the financial market. Specifically, we investigate:

1. How large are the wealth gaps between natives and immigrants?
2. How likely are immigrant households to be financially integrated as the Italian born ?
3. How do the portfolio choices of these two groups differ?

We can summarize our findings as follows. Immigrant households are less wealthy than Italian households. The median net wealth of native households is about €47386 higher than that of an immigrant. This gap increases as we move up the distribution. Random effect probit model estimation reveals that immigrants are 90 percentage points less likely to be financially included. We investigate households' portfolio choices considering seven variables: the decision to invest in risky assets and government securities, home ownership, holding a mortgage, holding informal debts, owning a business, and owning valuables. We find that immigrant status is negatively correlated with each of the outcomes except informal debt.

The rest of the article is organised as follows. Section 2 provides a brief background of literature. section 3 and 4 describe data and descriptive statistics. Section 5 and 6 we present our empirical findings on the native-immigrant differences in wealth position and financial inclusion. Section 7 provides the results of differences in portfolio choices. In section 8 we conduct some robustness check and section 9 provides some concluding comments.

## 2.2 Literature review

Most OECD countries encounter a rapid increase in the number of foreign-born inhabitants. A well-established fact is that immigrants often face adverse economic outcomes than natives in the host societies.

Early research documented immigration as a temporary phenomenon and their economic performance in the labor market such as earnings and employment gaps was the foci of these studies (Akresh, 2006; Chiswick, 1978, 1983; Duleep and Regets, 1997). Differences in financial outcomes have received less attention. Theories suggest that focusing on only income differences between natives and immigrants will provide an incomplete picture of their economic integration. However, in recent years as immigrants' duration of stay and contributions increased, there has been growing research interest in the analysis of economic integration of immigrants by looking at differences in wealth accumulation and financial market participation (Abdul-Razzak et al., 2015; Amuedo-Dorantes and Pozo, 2002; Cobb-Clark and Hildebrand, 2006; Hao, 2004).

Wealth is a stable indicator of a household's financial well-being and an essential foundation of social stratification. It can meet both long term and short term needs as its use as a transformative asset to create a more promising future for adults and children alike (Keister and Moller, 2000; Shapiro et al., 2004). A handful of Previous studies investigate the native-immigrant wealth inequity. This body of research presents evidence of extreme and persistent differences in wealth ownership between immigrants and natives in different countries (Bauer et al., 2011; Cobb-Clark and Hildebrand, 2006; Gibson et al., 2007; Hao, 2004; Shamsuddin and DeVoretz, 1998). On average immigrant households hold a lower level of wealth than their native counterparts (Cobb-Clark and Hildebrand, 2006; Hao, 2004; Sinning, 2007). Predictably, most studies in this category are focused on traditional immigration destination countries like the US, Canada, Germany, Australia as well as newer destination countries including Italy, Spain, etc (Bertocchi et al., 2018; Cobb-Clark and Hildebrand, 2006; Doiron and Guttmann, 2009; Hao, 2004; Shamsuddin and DeVoretz, 1998; Sinning, 2007).

In the US, studies find that foreign-born households accumulate less wealth than their native counterparts (Cobb-Clark and Hildebrand, 2006; Hao, 2004). Utilizing data from the Survey of Income and Program Participation (SIPP), Cobb-Clark and Hildebrand (2006) find that the median wealth level of US-born households is about two times higher than that of foreign-born. Factors like country of

origin, year of arrival have a significant impact on immigrant's overall net wealth and its components.

Studies from Canada also provide quiet a consistent picture with the US regarding the existence of an overall nativity wealth gap (Carroll et al., 1999; Shamsuddin and DeVoretz, 1998). For instance, Shamsuddin and DeVoretz (1998), using a life cycle framework on Survey of consumer finance (SCF) for 1977 and 1984, find an inverted 'U' shaped wealth-age profile for both Canadian and immigrant households. Immigrants who spent less than 8 years in Canada had a wealth level that was about half that of comparable Canadian. They conclude that the differences in wealth accumulation between these two groups disappear as immigrants' length of staying increases (need approximately 15 years of settlement in Canada to catch up to the mean wealth level of a Canadian-born household).

In Australia, Doiron and Guttmann (2009) use data from the 2002 HILDA survey and report that migrants have significantly less wealth than their Australian-born counterparts. Though the wealth gap reduces over time but is negative even for the migrant cohorts who have been in Australia for over 25 years. In Germany, Sinning (2007) also finds similar evidence.

Using data from the 2001 Household Savings Survey, Gibson et al. (2007) investigate wealth differences between immigrants and the New Zealand born. After controlling for age, education, inheritance, and income, they find that the differences in wealth between single migrants or mixed couples with New Zealand-born singles or couples is little. Nevertheless, migrant couples on average hold less wealth, and these gaps could be only partially explained by the aforementioned characteristics.

In a notable exception from the studies find significant nativity wealth gap, Hao (2004) utilizes Survey of Income and Program Participation (SIPP) data to compare immigrants and natives and finds that disparity in wealth accumulation by nativity status is modest compared with disparity by race-ethnicity and national origin. However, the author recognizes that SIPP data does not account for immigrants' wealth held in their home countries which may lead to a likely underestimate of the total wealth.

Within wealth literature, most scholarly work focuses on racial wealth inequality. This body of works consistently reports that blacks are less wealthier than whites (Altonji et al., 2000; Blau and Graham, 1990; Campbell and Kaufman, 2006; Keister, 2000). Make use of the 1976 National Longitudinal survey, Menchik and Jianakoplos (1997) find that the average wealth of black households is 20 percent of the average wealth of white households, and 23 percent when used 1989 survey of consumer finance. Blau and Graham (1990) utilize the 1976 and 1978 waves of the National longitudinal surveys of young men and women and report that on average young black families hold only 18 percent of the wealth of young white families, while black family's income is 64.9 percent of the average white families income. Altonji et al. (2000) utilize household data from the PSID to compare African-American and white American. Wealth is found to be strikingly higher for whites than blacks and less of the racial wealth gaps are explained by the differences in income and demographics. Campbell and Kaufman (2006) have shown that darker-skinned immigrants accumulate less wealth and less likely to own certain assets than white-skinned immigrants.

Besides racial wealth difference, there are numerous studies report wealth level varies among other ethnic groups. Killewald and Bryan (2016) have documented that, in the US on average, Hispanic and African Americans hold less wealth, have lower rates of home-ownership and experience smaller wealth benefits from it than white Americans. As Hispanics, Asians also have a lower level of wealth and wealth patterns are likely to vary based on country of origin and immigration status (Campbell and Kaufman, 2006).

Although not as prevalent as black-white household studies, differences in wealth accumulation based on gender also documented in the literature. Studies find consistent results as the racial wealth gap. On average, women hold less wealth than men. Women differ from men in earnings, saving rates and investment behavior. Women are more likely to invest in safer, lower yield assets which could contribute to wealth inequality between men and women (Sierminska et al., 2010; Yamokoski and Keister, 2006). Using the German Socio-Economic Panel (SOEP), Sierminska et al. (2010), find a significant gender gap of about 30000 euro for single individuals,

which is almost 50000 euro for married partners. Decomposition analyses indicate this wealth gap mostly driven by differences in observable characteristics between men and women mostly individual's own income and labour market experience.

Authors have expanded the studies of immigrants' economic progress and financial integration by highlighting the differences in financial market participation (Amuedo-Dorantes and Pozo, 2002; Cobb-Clark and Hildebrand, 2006). For instance, Rhine and Greene (2006) find that immigrants are more likely to be unbanked than natives in the US by comparing the ownership of transaction accounts. Having a relationship with formal financial markets mitigates obstacles for both immigrants' household and business financing through establishing credit history and enhancing access to the credit market. They conclude that immigrants' less education, poverty level, and family size have a positive correlation with the likelihood of being unbanked. Osili and Paulson (2004) stress that in the US compare to natives, immigrants are less likely to have savings or checking accounts. Although they recognize that lower saving could be driven by unobservable remittance flows that they cannot control for. Consistent with this, Osili and Paulson (2008b) report that immigrants from countries with institutions that more effectively protect private property are more likely to participate in the financial market of the United States. Abdul-Razzak et al. (2015) point out three classes of variables that influence immigrants' financial market behaviour into the host country. First, aside from characteristics like education, marital status, number of children that affect both immigrant and native households financial market participation decision, legal status, language proficiency, time spent in the host country are also influenced immigrant's decisions regarding financial market participation. Second, variables related to the country of origin like remittance behaviour, the chance of re-migration, experiences and perception acquired in the home country, etc. Third, variables related to the host country institution setting include cost, anonymity, documentations, so on. The paradox here is that limited financial market participation contributes to the lower wealth accumulation for immigrants. On the other hand, immigrants' financial market participation is lower because they hold less wealth.

An important point to understand the native-immigrant wealth gap is the

differences in portfolio choices of households. The literature on portfolio choices emphasizes relative risk-return profile, transaction costs and liquidity associated across assets as well as available financial information and preference of households in explaining financial choices. Painter and Qian (2016) report that wealth level varies across households as their choices of asset acquisition and portfolio composition shape households' overall wealth position. For instance, investment in business, stocks and mutual funds are assumed to generate a higher return than cash or home-ownership (Killewald et al., 2017). Financial assets like stocks, bonds are linked with the future and can be easily liquidated in times of financial hardship. These financial assets generate greater return and also risky as well. Thus, households with positive net wealth can enjoy more income in the form of dividend and capital gain compared to households with zero or negative net wealth. Past studies provide empirical confirmation that immigrants are less likely than natives to hold financial assets (Bertocchi et al., 2018; Cobb-Clark and Hildebrand, 2006). Amuedo-Dorantes and Pozo (2002), using the National Longitudinal Surveys (NLSY79) data conclude that financial asset ownership requires a certain level of sophistication to process available investment information and the US financial markets as well. Immigrant households are less likely to own a wide variety of financial assets: checking accounts, savings accounts, IRA/Keogh accounts and stock, and mutual funds compare to similar native-born households (Osili and Paulson, 2009). Likewise, Gittleman and Wolff (2004) and Keister (2000) find that whites have a higher rate of investment in risky assets like stocks, business and other financial assets which contribute to the racial gap in wealth.

Immigrant status and uncertainty of living a new country may lead to immigrants to hold onto cash rather than investing in bonds and stock (Painter and Qian, 2016). Seto and Bogan (2013) report that holding of risky assets like stocks, bonds by households influenced by country of origin. Potential explanations for the differences in portfolio choices between immigrants and natives might be income gap, information gap, education attainment, institutional quality in the host society (Abdul-Razzak et al., 2015; Chatterjee, 2009a). There is also evidence that the opportunity to access other financial markets is influenced by immigrant status, race, and other non-financial criteria (Albareto and Mistrulli, 2011; Alesina et al.,

2013; Black et al., 2003; Blanchflower et al., 2003). However, immigrants from countries with lower informational cost depict higher similarity with the US natives (Osili and Paulson, 2008a).

Researchers have also speculated that the native-immigrant wealth gap may arise from income differences. Immigrants and natives differ in their attachment in the labor market, such as occupational prestige and earnings (Akresh, 2006; Chiswick, 1978, 1983; Duleep and Regets, 1997). Borjas (2002) finds that the lower average income of the more recent immigrants has widened wealth gaps between immigrants and natives in recent years. Similarly, Barsky et al. (2002) and Campbell and Kaufman (2006) report income differences between blacks and whites a substantial contributor to the racial gaps in wealth. However, income differences alone not sufficient to explain the wealth gap as income and wealth are not highly correlated (Keister and Moller, 2000). In addition, families with the same income level show differences in wealth accumulation.

Home-ownership is an indicator of more complete incorporation into host societies for immigrants' and the largest component of wealth (Wolff, 2016). Differences in home-ownership have also been found to be crucial in explaining the persistent wealth gap between immigrants and natives. Borjas (2002) finds that immigrant households have lower home-ownership rates than native households. Using the German Socio-Economic Panel (SOEP), Sinning (2007) finds significant differences in overall wealth and various wealth components between German natives and immigrants, decomposition analysis suggests this gap to a sizeable extent explained by the disparities in home-ownership rates. Access to mortgages is essential to be a homeowner. Empirical studies on mortgage provide a quiet consistent picture regarding the existence of discrimination such as redlining, rejection of mortgage applications, differential pricing of mortgages against immigrants and other minorities in different stages of mortgage lending which prevent or reduce the rate of home-ownership for minorities. For instance, Munnell et al. (1996) augmented the original census HMDA data for Boston with additional information on the borrower including credit history, loan terms, unit and neighborhood attributes. Using the logit and linear probability model, they found that the probability of loan denial



for black and Hispanic applicants is almost three times higher than the white applicants after controlling for the key underwriting information. Diaz-Serrano and Raya (2014) find that immigrants pay higher interest rates for mortgages than native in the Spanish market even after controlling differences in creditworthiness and other factors. Empirical evidence shows also race, neighborhood and region influence home-ownership and wealth gain from it (Killewald and Bryan, 2016).

Studies suggest that education is associated with a higher level of wealth and rapid wealth accumulation (Keister, 2003; Yamokoski and Keister, 2006). Furthermore, immigrants with US education have the potential to accumulate higher wealth compared to those who completed education in their country of origin (Painter and Qian, 2016). There are two possible explanations: first, education is the proxy for prior income streams that not captured by the current income measure. Second, education level may relate with sophistication (financial literacy) regarding investment in risky assets (Kim et al., 2012). Wealth accumulation is closely related also to households' marriage patterns and saving behaviour. Empirical studies on saving behavior of American report that immigrants save less than natives and families with more children hold less wealth (Amuedo-Dorantes and Pozo, 2002; Cobb-Clark and Hildebrand, 2006). Amuedo-Dorantes and Pozo (2002) find that young immigrants in the US possess a lower level of wealth and precautionary saving than natives. However, Gittleman and Wolff (2004) find that an insignificant wealth gap between these two groups after adjusting for income, the saving rate differences.

Along With other facts, the immigration policies vary country to country which makes difficult to compare results across country (Doiron and Guttmann, 2009). However, a handful of studies make comparative analysis of the nativity wealth gap (Bauer et al., 2011; Mathä et al., 2011). Bauer et al. (2011) investigate the relative nativity wealth gap in Australia, Germany and the United State at the household level. Their findings reveal substantial cross-national disparity in the economic well-being between immigrants and natives that are largely explained by differences in income, education and demographic characteristics between these two groups of households. Abdul-Razzak et al. (2015) have made cross country comparisons between US and Italy also using only 2008 wave of the SHIW data.

They find that higher financial market participation in Italy.

To conclude, in this study we analyze for the first time investigates extensively the level of economic and financial integration of immigrants in Italy by looking at their wealth position, financial market participation, and portfolio choices which enable us to understand immigrant's current economic standing and prospects. By including the financial market participation of immigrants rather than only the wealth gap, we exploit some empirical advantages. Estimating financial inclusion relies much less on imputed response than information on wealth, as survey respondents are less likely to answer the questions related to the level of wealth instead of questions about financial market participation (Abdul-Razzak et al., 2015).

## 2.3 Data

In this study, we employ the Survey on Household Income and Wealth (SHIW)<sup>1</sup>, carried out by the Bank of Italy, for evaluating the economic integration of immigrants and differences in wealth.

The SHIW includes information about households' income, consumption, wealth, and demographic characteristics since 1962. The design of the SHIW is a two-stage stratified sample design. First, it stratifies the municipalities by region and demographic size and select 300 municipalities. Then by employing randomization, 8000 households (about 20000 individuals) are selected for each wave from official registers of residents of those municipalities to achieve samples that are representative of the population. The data are stochastically imputed to consider non-response. As information regarding the immigrant status of the respondents, year of arrival, etc available since 2006, therefore, we consider the last six waves between 2006 to 2016. In the SHIW data, part of the sample has comprised of households already interviewed in previous waves (panel households). Using the unique household id (nquest) we create a panel data for the sample period.

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<sup>1</sup><https://www.bancaditalia.it/statistiche/tematiche/indagini-famiglie-imprese/bilanci-famiglie/distribuzione-microdati/index.html>

Our empirical analyses are performed at the household level because the basic survey unit is the “household”, defined as a group of individuals regardless of their relationships, sharing the same dwelling and pooling all or part of their incomes. Moreover, the survey collects information on financial portfolios at the household level, not at the individual one. Our measures of total household net wealth are derived from wealth components that are either estimated at the household level or directly measured at the individual level and then aggregated to the household level.

The head of the household is identified as the major income earner, more precisely the person who is responsible for the financial and economic choices of the household. The SHIW data contains details of demographic information like household size, household head’s age, gender, marital status, education status and employment status. In addition to the immigrant status, we have the information about the immigrant household head’s years of arrival. Aside from demographic information, the SHIW contains economic and financial information like income, net wealth, invested amount in different assets and so forth<sup>2</sup>. We have also information about the risk preference of household heads’ managing financial investment.

## 2.4 Descriptive Analysis

In Table 2.1, we define all the variables used in this study. Summary statistics for households with a native and a foreign-born head, as well as t statistics for differences in mean are presented in Table 2.2. The sample contains 47424 households, of which 1831 households are immigrants, i.e., headed by foreign-born. We define a household as an immigrant if the household head is born outside Italy regardless of his/her current citizenship. To facilitate our analysis, naturalised household heads are identified as immigrants to reflect the cultural background rather than the present citizenship status. For most of the outcomes of interest, immigrant households exhibit mean values that are significantly different from their native counterparts.

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<sup>2</sup>Monetary amount are expressed in Euro.

Table 2.1: Definition of Variables

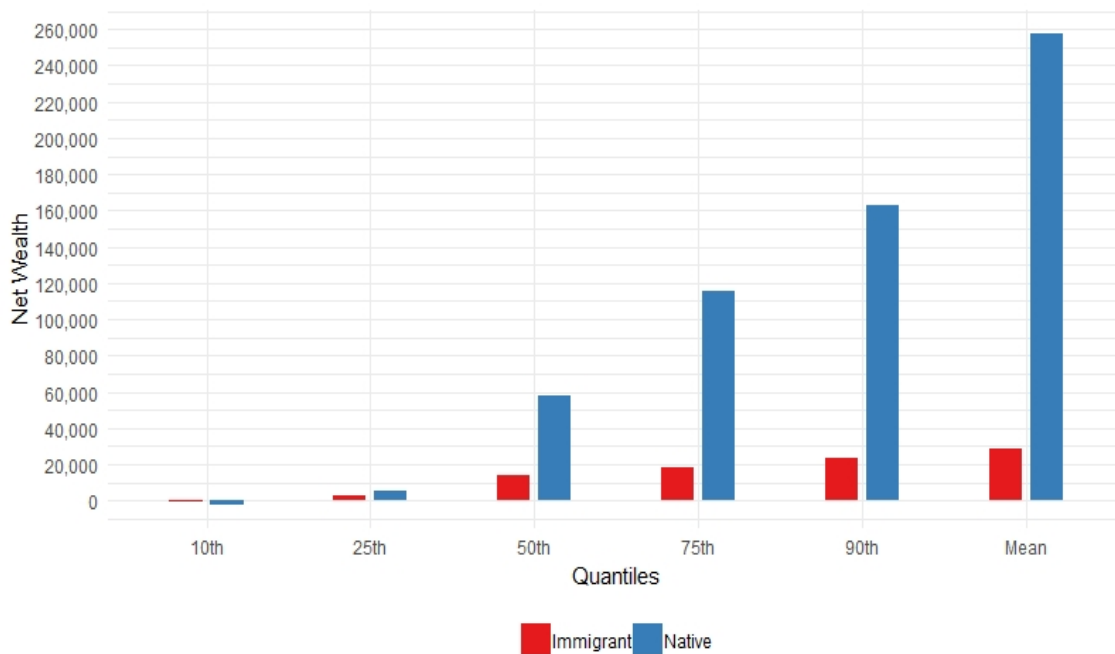
Variable	Description
Net wealth	Value of all real assets and financial assets minus financial liabilities, in €
Financial Inclusion	Dummy variable that takes value 1 if head of household have at least one bank or postal deposit, and 0 otherwise.
Immigrant Household	Dummy variable that takes value 1 if the household head is foreign born, and 0 otherwise.
Low Income	Dummy variable that takes value 1 if household income less than median income; 0 otherwise
Middle Income	Dummy variable that takes value 1 if the household income is in third quartile; 0 otherwise.
Upper income	Dummy variable that takes value 1 if the household income is in fourth quartile; 0 otherwise.
Family size	Number of Household members.
Male	Dummy variable that takes value 1 if the household head is male; 0 otherwise.
Age	Household head's age in years.
Single	Dummy variable that takes value 1 if the household head is single, 0 otherwise.
Married	Dummy variable that takes value 1 if the household head is married, 0 otherwise.
Divorced	Dummy variable that takes value 1 if the household head is divorced, 0 otherwise.
Widow	Dummy variable that takes value 1 if the household head is widow, 0 otherwise.
Low Education	Dummy variable that takes value 1 if the household head's highest education is primary education or no education at all, and 0 otherwise.
Medium Education	Dummy variable that takes value 1 if the household head's highest education is secondary school or college, and 0 otherwise.
High Education	Dummy variable that takes value 1 if the household head is head's highest education is university degrees at graduate or post-graduate level, and 0 otherwise.
Risk Aversion	Dummy variable that takes value 1 if risk aversion level is 4 (No risk, low return); 0 otherwise.
Net wealth negative	Dummy variable that takes value 1 if household net worth is negative, 0 otherwise.
Net wealth Zero	Dummy variable that takes value 1 if household net worth is zero, 0 otherwise.
Net wealth Quartile 1	Dummy variable that takes value 1 if household net worth is in quartile 1, 0 otherwise.
Net wealth Quartile 2	Dummy variable that takes value 1 if household net worth is in quartile 2, 0 otherwise.
Net wealth Quartile 3	Dummy variable that takes value 1 if household net worth is in quartile 3, 0 otherwise.
Net wealth Quartile 4	Dummy variable that takes value 1 if household net worth is in quartile 4, 0 otherwise.
Employed	Dummy variable that takes value 1 if the household head is either employee or self-employed; 0 otherwise.
Retired	Dummy variable that takes value 1 if the household head is retired; 0 otherwise.
Not employed	Dummy variable that takes value 1 if the household head is not employed; 0 otherwise.
Cohort of arrival	Set of dummy variables indicating decade of arrival in Italy. Pre-1980 = arrived before 1980 1980s = arrived between 1980 and 1989 1990s = arrived between 1990 and 1999 Post-2000 = arrived in 2000 or later
Region	Set of 20 dummies indicating the region of residence.

Table 2.2: Descriptive Statistics

Variables	Natives		Foreign born		t-stat
	Mean	Std.Dev	Mean	Std.Dev	
Net wealth (in thousand)	257.71	480.95	29.02	111.63	66.35***
Holding risky assets	0.17	0.38	0.026	0.129	44.123***
Home ownership	0.731	0.443	0.152	0.359	66.874***
Holding mortgage	0.099	0.298	0.240	0.427	-8.594***
Owning Business	0.121	0.327	0.057	0.231	11.489***
Holding informal debt	0.028	0.164	0.069	0.255	-7.052***
Holding Govt. security	0.092	0.289	0.009	0.093	32.551***
Holding Valuables	0.052	0.222	0.030	0.172	5.178**
Financial Inclusion	0.924	0.266	0.833	0.373	8.399***
Income	325.7	244.9	183.6	129.92	43.609***
Married	0.601	0.489	0.618	0.485	-1.059
Single	0.126	0.33	0.224	0.41	-9.91***
Widow	0.193	0.395	0.035	0.185	33.623***
divorced	0.0789	0.269	0.122	0.327	-5.527***
Family size	2.421	1.239	2.596	1.629	-4.546***
Age	60.139	15.542	41.474	10.056	75.868***
Employed	0.396	0.489	0.835	0.371	-48.933***
Not employed	0.227	0.419	0.159	0.366	7.709***
Retired	0.376	0.485	0.005	0.074	130.34***
Male	0.563	0.496	0.589	0.492	-2.26**
Low education	0.294	0.456	0.085	0.279	30.40***
Mid education	0.345	0.475	0.570	0.495	-19.12***
Higher education	0.361	0.480	0.344	0.475	1.462
Risk aversion	0.558	0.497	0.713	0.452	-14.35***
Cohort pre-1980			0.006	0.007	
Cohort 1980s			0.046	0.210	
Cohort 1990s			0.308	0.462	
Cohort post-2000			0.637	0.481	
Observations		45593		1831	

First of all, we define household net wealth as the sum of household's real assets (real estate, business equity and valuables) and financial assets (deposits, government securities, other securities and credit due from other households), net of financial liabilities (mortgage and other debts). Figure 2.1 and Figure 2.2, we present the average wealth position in selected quantiles and portfolio choices of immigrants and natives respectively. The unconditional mean net wealth for the immigrant households is only €29,020 against €256,771, with significant gaps for each component. Immigrants are more likely to report negative net wealth than natives. Moreover, fewer immigrants hold risky assets like stocks (0.26% against 17%), government securities (0.09% against 0.92%) and valuables (0.30% against 0.52%). Compared to natives, a smaller portion of immigrants own a house (15.2% against 73.1%) and or a business (0.57% against 12.1%).

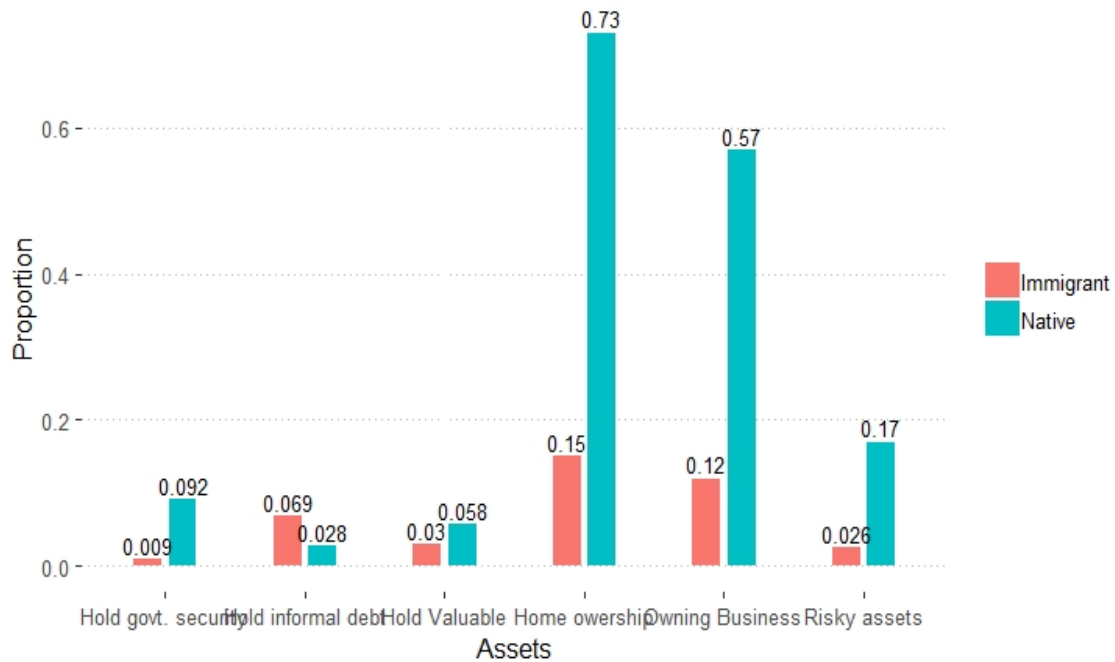
Figure 2.1: Mean and selected quantile values for net worth, 2006-2016



We proxy financial inclusion of households by their ownership of at least one bank or postal deposit account as holding a deposit account is the foundation to participate in mainstream financial markets (Rhine and Greene, 2006). The portion of households with a deposit account depicts financial integration is significantly lower for immigrants (83.3% vs. 92.4%). In addition to far less accumulated wealth, the average income in our sample for immigrants is lower than for native (€183060

vs €325700).

Figure 2.2: Mean values for sources of wealth, 2006-2016



In terms of demographic characteristics, on average, immigrant household heads are much younger than people born in Italy (41 years old against 60 years) and more likely to be male. The share of the married household head is almost identical for both immigrants and natives (61% against 60%), whereas the portion of single and divorced household heads is higher for immigrants than natives. In contrast to natives, immigrant households are likely to be larger in size. 83.5% of immigrant household heads are employed against 39.6% of the natives, while 15.9% against 22.7% are not employed, and 0.05% are retired compared to 37.6% natives.

The education pattern of immigrant and native household heads varies significantly. For 0.85% immigrants have a low-level of education against 29.4% of the natives. 57% of immigrant household heads as compared to 34.5% of native household heads have completed mid-level education. In contrast, the respective share of those having completed higher-level education is quite similar (34.4% and 36.1%). We construct a dummy variable called “Risk aversion”, that takes value 1 if the respondent prefers low returns, with no risk of losing the invested capital, 0 otherwise, in order to proxy for risk aversion in the financial decision. On average, natives heads are more risk averse than immigrants (71.3% against 55.8%). Nearly

half of the immigrants arrived in Italy in the year 2000 or afterward.

## 2.5 Empirical Analysis of wealth gap

From Table 2.2, we find some primary evidence that immigrants and natives have different levels of wealth. In this section, we investigate how the wealth level varies between households headed by immigrants and households headed by natives at particular points in the wealth distribution.

To understand how household's wealth levels are affected by immigrant status, it is necessary to model the determinants of net wealth. The skewed distribution of wealth to the right is one obstacle of modeling wealth. The existing literature typically relies on taking the natural logarithm of wealth to avoid the undue influence of extreme observations (Shamsuddin and DeVoretz, 1998), but a logarithmic transformation is inappropriate for variables with zero or negative values, such as in the case of net wealth. Therefore, to characterise the entire conditional wealth distribution, we use quantile regression techniques. It assists to gauge the extent to which several covariates related to individual and household characteristics explain nativity differences at various wealth quantiles rather than estimating the average gap. Indeed, quantile regression is the extension of linear regression. As a semi-parametric method, it makes no distributional assumption on the dependent variable. The estimator is more robust to outliers which are frequent in the higher tail of the wealth distribution (Gibson et al., 2007; Zhang et al., 2003).

This estimator allows us to describe how particular covariates are correlated with wealth and to infer the extent to which these covariates explain the nativity wealth gap at various wealth quantiles by accounting for both observed skewness in wealth distribution and the presence of zero or negative values. To estimate the nativity wealth gap at the  $q$ th quantile the model can be written as follows:

$$W_{it}^q = \beta_0^q + \beta_1^q I_i + X_{it} \beta_2^q + \tau + \eta + \epsilon_{it}^q \quad (2.1)$$



Where  $i$  denotes the household,  $t$  denotes the year, and  $q$  denotes a specific quantile of the wealth distribution.  $I_i$  is a dummy variable reflects the immigrant status of the head of household  $i$ . The estimate of coefficient  $\beta_1^q$  represents the wealth gap between immigrants and natives at the  $q^{th}$  quantile of their wealth distribution.  $X_{it}$  is a set of households and household heads' characteristics.

$$X_{it}\beta_2^q = \gamma_1 male + \sum_{k=1}^3 \gamma_{2+k-1} HHIncome + \gamma_3 age + \gamma_4 age^2 + \sum_{z=1}^4 \gamma_{5+z-1} HHmaritalstatus + \gamma_6 Familysize + \sum_{p=1}^3 \gamma_{7+p-1} education + \sum_{s=1}^3 \gamma_{8+s-1} HHemploymentstatus + \gamma_9 riskaversion$$

The first of these is a dichotomous variable, male, to control for possible differences in the attachment of the labor market between males and females. Then we take into account the level of disposable income including three dummies: low-income, mid-income, and upper-income. Previous studies find that income has a positive impact on the wealth level (Sinning, 2007). We expect positive sign for income. The next two components refer to the age and age squared of the household head. Following the life-cycle hypothesis, we would expect positive sign for the coefficient  $\gamma_3$  and a negative sign for the coefficient  $\gamma_4$ . Marital status reflects whether the household head is married, single, divorced or widowed; our reference category is single. We expect being married has a positive impact on net wealth. Family size indicates the number of household members. The effect of education on wealth accumulation is captured by the inclusion of three dummies: lower level of education, mid level education and higher level education; the reference category is the low level of education. Empirical evidence indicates level education is positively correlated with wealth (Bauer et al., 2011; Sinning, 2007). So we expect positive sign for mid-level and high-level education coefficients. The effect of employment status on wealth level is captured by three dummy variables: employed, not-employed and retired; the base category is employed. The sign and significance of the employment status could be mitigated in the presence of a strong welfare system, such as a public or state pension, unemployment benefits, etc. Finally, we expect a negative sign for

the coefficient of risk aversion as high risk generate high return and vice versa.  $\tau$  are time fixed effects, and  $\eta$  are macro-region fixed effects.  $\epsilon_{it}$  is the error term with usual properties.

Although we control for a rich set of controls as well as a specific proxy for the risk aversion of households, still some unobservable characteristics like skill, motivation, opportunity-seeking ability are excluded from our empirical strategy due to data unavailability. In table 2.3, we present the result from estimating quantile regression models for the 10th, 25th, 50th(median), 75th and 90th quantiles. The results are consistent with the descriptive results provided in the previous section.

Table 2.3: Net Wealth(in thousand) Quantiles for Immigrants and the native Italian, 2006-2016

	10th Q	25th Q	50th Q	75th Q	90th Q
Immigrant	-5.9275*** (0.3529)	-18.4400*** (0.7941)	-47.3863*** (1.6018)	-82.1141*** (3.4101)	-100.4408*** (5.2340)
Midincome	16.2174*** (0.6884)	79.3545*** (1.7679)	91.2917*** (1.6938)	107.9437*** (2.6501)	151.9639*** (4.8630)
Upperincome	123.1353*** (3.2121)	192.4271*** (2.0691)	239.3939*** (3.1270)	372.7268*** (6.6140)	684.4959*** (14.8127)
Family Size	-2.3453*** (0.1325)	-5.8891*** (0.2743)	-8.2404*** (0.5713)	-6.9224*** (1.1400)	-7.3262*** (1.8331)
Male	-0.1592 (0.2254)	2.8754*** (0.7017)	7.8303*** (1.4734)	15.1180*** (2.4405)	32.3190*** (3.9097)
Age	0.7947*** (0.0421)	2.4247*** (0.1371)	5.6151*** (0.2065)	7.4273*** (0.4419)	8.2810*** (0.5810)
Age-squared	-0.0047*** (0.0003)	-0.0131*** (0.0013)	-0.0330*** (0.0019)	-0.0429*** (0.0037)	-0.0435*** (0.0053)
Married	2.0304*** (0.3194)	9.4303*** (0.9122)	18.7587*** (1.9572)	15.6837*** (3.5672)	18.3990*** (5.3865)
Divorced	-3.9723*** (0.3374)	-11.6709*** (0.9018)	-18.6689*** (2.3802)	-13.1537** (4.0849)	-8.0144 (7.0263)
Widow	-2.2528*** (0.3271)	-7.1988*** (1.4036)	4.1095 (2.5226)	-1.4795 (3.6190)	-7.0644 (5.6732)
Midedu	3.6862*** (0.3106)	20.1567*** (0.9352)	33.2451*** (1.5687)	48.2927*** (2.5827)	58.6199*** (3.9868)
Higheredu	10.7576*** (0.6053)	40.6905*** (1.3614)	73.6815*** (1.9884)	104.7904*** (3.4484)	143.9649*** (6.3842)
Not-employed	3.0696*** (0.2647)	12.6354*** (0.7302)	24.2963*** (1.7629)	29.8697*** (3.0640)	43.1350*** (4.4752)
Retired	5.9590*** (0.3875)	29.5351*** (1.6480)	36.6582*** (2.1807)	30.4668*** (3.4653)	34.5631*** (5.8792)
Risk_averse	-3.1287*** (0.2470)	-9.6107*** (0.7134)	-22.8173*** (1.4541)	-35.3960*** (2.2714)	-46.1318*** (3.5411)
Time F.E	Yes	Yes	Yes	Yes	Yes
Region F.E	Yes	Yes	Yes	Yes	Yes
Num. obs.	47424	47424	47424	47424	47424

\*\*\*p < 0.001, \*\*p < 0.01, \*p < 0.05

The dependent variable is household net wealth. Even after controlling

for household and household heads' characteristics, our variable of interest shows negative and statistically significant coefficients for all estimated quantiles. For example, in the 10th quantile of wealth distribution, immigrants' net wealth is about €5900 less compared to natives. At the median, net wealth of immigrant households is estimated to be about €47000 lower than the median net wealth of natives. This gap is reached to about €100000 at the 90th quantile. The results indicate that immigrants with similar income, education and other characteristics to natives accumulate significantly lower level of wealth; this gap gradually increases as we move up the distribution. In most cases, other covariates have the expected sign. Household's wealth level increases with net income and age of household head. Being married has a larger impact on wealth accumulation than being single, whereas being separated or divorced and widowed reduce net wealth. Education has a positive and significant effect on the wealth of households. Compared to the low-level of education, household heads with mid and higher level of education can accumulate more wealth. The coefficients of employment status indicate that not-employed and retired household heads hold more wealth than employed household heads. As expected, risk aversion depicts a negative effect on wealth, which is increasing in quantiles.

These findings are consistent with the finding of previous studies. For instance, Mathä et al. (2011) find a substantial wealth gap at median in Italy. Using the 2006-2014 wave of SHIW data, Bertocchi et al. (2018) that report immigrants hold less wealth gap but only above the median of the wealth distribution. In the USA, using SIPP survey data, Cobb-Clark and Hildebrand (2006) find the nativity wealth gap which becomes larger as one moves up along the wealth distribution. Similar results were also found by Gibson et al. (2007) in New Zealand according to which immigrants have less wealth than natives.

## Heterogeneity by cohort of arrival

Earlier literature has documented that cohorts of arrival influence earning assimilation and wealth accumulation of immigrants' (Shamsuddin and DeVoretz, 1998).

Italy received several waves of immigrants in the last decade. In order to investigate the impact of the year of arrival on wealth accumulation, we replace the dummy for the immigrant status with a set of dummies indicating the year of arrival of the household heads. There are four indicator variables: arrive before 1980, in the 80s, in the 90s and in 2000 or after.

Table 2.4: Net Wealth(in Thousand) by Cohorts of Arrival of Immigrant Household Head

	10th Q	25th Q	50th Q	75th Q	90th Q
Mid income	16.2992*** (0.7633)	78.7779*** (1.7424)	90.1958*** (1.6782)	106.6303*** (2.5108)	151.6332*** (4.8688)
upper income	122.8544*** (3.2183)	190.9908*** (2.1402)	237.8543*** (3.1749)	370.6176*** (6.5523)	684.3543*** (14.9520)
Family size	-2.2797*** (0.1139)	-5.7613*** (0.3148)	-8.2275*** (0.6581)	-6.0235*** (1.0609)	-6.6273*** (1.8401)
Male	-0.1845 (0.2004)	2.9005*** (0.7752)	8.5588*** (1.5356)	15.4576*** (2.3155)	33.3034*** (4.1561)
Age	0.8016*** (0.0408)	2.5079*** (0.1519)	5.6492*** (0.2253)	7.3406*** (0.4148)	8.0866*** (0.6085)
Age-squared	-0.0048*** (0.0003)	-0.0137*** (0.0015)	-0.0333*** (0.0020)	-0.0424*** (0.0035)	-0.0425*** (0.0055)
Married	1.8910*** (0.3558)	9.2399*** (1.0720)	18.7420*** (2.1608)	15.2973*** (3.3721)	18.2261** (5.7898)
Divorced	-3.9448*** (0.3556)	-11.7134*** (1.1049)	-18.6991*** (2.6214)	-13.7337*** (3.9000)	-7.5673 (7.2908)
Widow	-2.2668*** (0.3134)	-7.3558*** (1.5915)	3.9813 (2.5984)	-1.1813 (3.4212)	-4.8326 (6.2678)
Mid edu	3.7916*** (0.3261)	21.1090*** (0.9785)	33.3285*** (1.7713)	48.4761*** (2.4174)	57.9666*** (4.0987)
Higher edu	10.8719*** (0.6502)	41.8829*** (1.4438)	73.6446*** (2.1830)	104.6823*** (3.2252)	143.2014*** (6.3936)
Not-employed	3.0454*** (0.2775)	12.4598*** (0.8258)	23.4167*** (1.9148)	29.7528*** (2.8963)	44.2419*** (4.7087)
Retired	5.9549*** (0.4008)	29.0225*** (1.6826)	35.2160*** (2.2673)	29.8063*** (3.3022)	35.0826*** (6.0342)
Risk averse	-3.1340*** (0.2605)	-9.5728*** (0.7528)	-22.8792*** (1.4608)	-34.9797*** (2.1762)	-46.0947*** (3.7845)
Immi-before80	-6.9033*** (0.7721)	-30.3460*** (4.0877)	-41.2782*** (4.0567)	-45.3814*** (12.6772)	-49.0837 (29.6682)
Immi-in80s	-4.3366*** (0.5997)	-20.3224*** (3.4175)	-54.7459*** (2.4930)	-91.0056*** (5.8651)	-119.9642*** (10.7265)
Immi-in90s	-5.9977*** (0.6154)	-22.3196*** (1.0797)	-55.1318*** (2.5620)	-94.2968*** (3.3795)	-114.7686*** (7.7531)
Immi-in2000s	-5.5169*** (0.7494)	-18.8253*** (0.8703)	-46.9848*** (2.0530)	-77.1082*** (3.8510)	-97.6649*** (6.3700)
Time F.E	Yes	Yes	Yes	Yes	Yes
Region F.E	Yes	Yes	Yes	Yes	Yes
Num. obs.	47424	47424	47424	47424	47424

\*\*\*p < 0.001, \*\*p < 0.01, \*p < 0.05

The results for the distribution of net wealth by cohorts of arrival are presented in Table 2.4. The results illustrate the follows: first, immigrants hold

significantly less net wealth than native, for all quantiles and cohorts. Second, as we move up the distribution within the cohort, wealth gaps become larger. However, compared to previous findings in Table 2.3, some disparities do appear. Third, across the cohort, the inequality in wealth tend to decline whereas immigrant household whose head entering was in the 1990s hold significantly less wealth than other immigrants for almost all quantile. These results are broadly consistent with the findings of Bertocchi et al. (2018) and Mathä et al. (2011). In general, wealth accumulation of immigrants seems varies significantly across cohorts, indicating the distinct stages of the economic integration of immigrants according to their cohort of arrival.

## 2.6 Financial Inclusion

There is a significant distinction between immigrants and natives in the percentage of households that are using financial services. A considerable portion of the population makes little use of even basic financial services. The study of the financial inclusion of households provides important insights on how immigrants financially adapt to host societies (Abdul-Razzak et al., 2015).

In this section we investigate to what extent immigrants are financially integrated in Italy, that is we look at the likelihood that an immigrant household is holding at least one bank or postal deposit account (Financial inclusion). We focus our discussion mainly on ownership of bank account as it is the most commonly held financial asset, and holding an account in a formal financial institution is the basic to participate in mainstream financial markets (Abdul-Razzak et al., 2015; Rhine and Greene, 2006).

Following Rhine and Greene (2006), we define the net utility of household  $i$  when they hold a transaction account in the period  $t$  as:

$$U_{it}^* = \beta' X_{it} + \epsilon_{it} + e_i \quad (2.2)$$

The decision to be financially included is then:

$$y_{it} = 1 \text{ if } y_{it}^* > 0 \quad (2.3)$$

The decision not to be financially included is influenced by the household head's socioeconomic and demographic covariates. The dependent variable is  $y_{it}$ , which is equal to 1 if the household holds a bank or postal deposit account and zero otherwise.

In model selection, we need to consider the followings: first, several covariates are time-invariant including gender, education, marital status. Second, the panel is very short (only 5 waves). These make a fixed-effects model or fixed effects probit model inestimable as we expect issues like incidental parameters problem. Though The static probit model with persistence embodied in the variant  $e_i$  incorporates the panel nature of the data, but latent heterogeneity remains to be specified. Thus, We will analyze financial inclusion with a random effects probit model. The probability that household head is financially included in the period  $t$  is:

$$Prob[Fin.Inclusion_{it} = 1|X_{it}] = Prob[y_{it}^* > 0|X_{it}] = \Phi(\beta' X_{it} \sqrt{1 - \rho}) \quad (2.4)$$

$\Phi$  is the cumulative distribution function (CDF) for the standard normal distribution and  $\rho$  is the cross-period correlation of the unobserved effects.

Household's financial inclusion is estimated using the following model:

$$FI_{it} = \alpha + \beta_1 I_i + X_{it} \beta_2 + \tau + \eta + \epsilon_{it} \quad (2.5)$$

Where  $FI_{it}$  is the decision to have an account for household  $i$  at time  $t$ . As before, dummy variable  $I$  indicating household's immigrant status. The estimate of the coefficient  $\beta_1$  measures the gap in financial market participation

between immigrant and native households by holding other characteristics fixed. Individual and household level controls including income level, family size, gender, age, marital status, education, employment status, wealth level, and risk aversion - are incorporated in  $X_i$ .  $\tau$  and  $\eta$  capture time and macro-region fixed effects. All reported standard errors have been corrected to account for heteroskedasticity.

Table 2.5 reports the estimates of the random-effects probit model. In the first column, we consider for only the immigrant status, in addition to time and macro-region fixed effects, and we find that the likelihood of having a transaction account is lower for immigrants than native households. In column 2 and 3, we control for income level, family size, gender, age, marital status and employment dummies and the size of the coefficient remain almost unchanged.

In our benchmark specification (column 4), we add control for wealth and risk aversion with other controls in specification 3 and find that even after controlling for characteristics, the likelihood of immigrant households being financially included is 90 percentage points lower than households headed by natives.

The likelihood to be financially included is expected to be lower for household heads who are younger and have a larger family size. Income has a positive correlation with financial inclusion. Households with higher income levels are most likely to have an account than household with lower income levels. Moreover, household heads who are married are more likely to be financially integrated than household heads who are single.

The estimation shows that with a higher level of education the likelihood of financial inclusion increases significantly. Households headed by someone with mid level of education are 36 percentage points more likely to own a bank or postal account compared to households whose head has low level of education. Additional educational attainment raises the likelihood of financial inclusion: household heads with high level of education is 90 percentage points more likely to maintain an account in the formal financial institutions compared to household heads whose head have low level of education.

Along with four positive net worth categories according to the quartile dis-

tribution, we also created two additional categories of net wealth- zero net wealth and negative net wealth. Households that have more liabilities than assets are included in the negative net wealth category. Our reference category for comparison is the zero net wealth. The findings depict that wealthier families are more likely to be financially included. Households in the 3rd wealth quantiles are 1.9 percent more likely to own a bank account than households with zero wealth, whereas households in the 4th quantile are 2.3 percent more likely to be financially included than households with zero wealth.

Consistent with other studies of financial inclusion behaviour of immigrants like Rhine and Greene (2006) and Osili and Paulson (2009), we do find that with a given level of wealth, education and other factors, immigrants are less likely to use basic banking services.

What might be the potential reasons for the lower financial market participation of immigrants? During the process of migration, immigrants hold their beliefs regarding the formal financial institutions acquired in their country of origin (Osili and Paulson, 2008b). Thus, the experience of the country of origin often influences their choice regarding using financial services in the host country. Immigrants from the country of origin with lower institutional quality may be less likely to use formal financial services in Italy. Some studies on low rates of financial market participation suggest that transaction and information costs are important for understanding these differences (Osili and Paulson, 2009).

In a nutshell, empirical findings suggest that households headed by the immigrant are less likely to use even basic financial services. Household and household head's individual characteristics such as wealth, income and education have a significant positive impact on the decision of participating in the formal financial market. Moreover, we assume that the effectiveness of immigrant's home-country institutions has a significant effect on immigrant financial inclusion in Italy. Unfortunately, our dataset does not allow us to test this hypothesis. We leave it to future research.



Table 2.5: Financial Inclusion of Immigrants

	1	2	3	4
Immigrant	-1.5960*** (0.1077)	-1.1546*** (0.0959)	-1.1915*** (0.0977)	-0.9040*** (0.0981)
Mid-income		1.2658*** (0.0721)	1.0076*** (0.0689)	0.8076*** (0.069)
Upper-income		2.0936*** (0.1354)	1.6023*** (0.131)	1.2662*** (0.1313)
Family Size		-0.0625*** (0.0224)	-0.0383* (0.022)	-0.0282 (0.0222)
Male		0.1846*** (0.0458)	0.0746 (0.0467)	0.1101** (0.0473)
Age		-0.0037** (0.0017)	0.0145*** (0.002)	0.0092*** (0.002)
Married		0.5156*** (0.0713)	0.6132*** (0.0711)	0.4996*** (0.0709)
Divorced		0.0394 (0.0806)	-0.0540 (0.0799)	-0.0302 (0.0823)
Widow		0.1572** (0.0741)	0.2801*** (0.0745)	0.2244*** (0.0747)
Mid edu			0.4462*** (0.0536)	0.3637*** (0.0541)
Higher edu			1.0849*** (0.0774)	0.9071*** (0.0768)
Employed			0.5188*** (0.0595)	0.5116*** (0.0596)
Negative net Wealth				1.1954*** (0.119)
Net wealth quantile1				1.5641*** (0.095)
Net wealth quantile2				1.7503*** (0.0995)
Net wealth quantile3				1.9326*** (0.1067)
Net wealth quantile4				2.2882*** (0.1316)
Risk averse				0.1006** (0.0412)
Time F.E	Yes	Yes	Yes	Yes
Region F.E	Yes	Yes	Yes	Yes
Observations	31,496	31,496	31,496	31,496

Apply random effect probit

Robust standard errors in parentheses

\*\*\*p < 0.001, \*\*p < 0.01, \*p < 0.05

## Heterogeneity in financial inclusion by the cohort of arrival

As we mentioned earlier, having relations with formal financial markets could guarantee easy access to all financial services like investment services, saving services, mortgage brokers, etc. In this section, we explore how the cohort of arrival impacts the likelihood of financial inclusion. Our assumption here is that immigrants who arrived in Italy earlier are more established than recent immigrants, they are more familiar with the financial system and institutions in Italy, and have better abilities to communicate in Italian. Thus, they are more likely to be financially included.

In Table 2.6 we present the estimates of financial inclusion by the cohort of arrival. We find that the likelihood of financial market participation is likely to vary significantly depending on the immigrant's cohorts of arrival. Overall, all the cohorts of arrival of immigrants indicate that they are less likely to participate in the formal financial markets compared to natives. However, we find a few important exceptions to the overall pattern that households headed by immigrants are less likely to own an account in the formal financial institutions, after controlling for demographic and other characteristics. The likelihood of participating in the formal financial market for immigrant household heads who arrived in Italy before 1980s is not statistically different than natives. More recent immigrants are instead less likely to have a bank or postal account although the likelihood of being financially included for immigrants is not increasing monotonically with time spent in Italy.

The explanations could work as follows: immigrants might have less economic resources and thus less need to use financial services. Furthermore, immigrants might be less familiar with formal financial markets. High transaction costs and geographical distance to banks may contribute to lower financial market participation for immigrants. Unfortunately, our data does not allow us to make any progress in sorting out these effects.

Table 2.6: Financial Inclusion of immigrants by Cohort of arrival ,2006-2016

	1	2	3	4
Immi-before80	-0.167 (0.262)	-0.151 (0.251)	-0.281 (0.250)	-0.129 (0.267)
Immi-in80s	-0.986*** (0.301)	-0.758*** (0.278)	-0.912*** (0.283)	-0.607** (0.290)
Immi-in90s	-1.092*** (0.174)	-0.742*** (0.155)	-0.851*** (0.155)	-0.560*** (0.157)
Immi-in2000s	-1.957*** (0.116)	-1.480*** (0.105)	-1.508*** (0.105)	-1.216*** (0.106)
Midincome		1.256*** (0.0721)	0.995*** (0.0689)	0.800*** (0.0688)
Upperincome		2.082*** (0.136)	1.587*** (0.131)	1.260*** (0.131)
Family size		-0.0736*** (0.0223)	-0.0484** (0.0219)	-0.0382* (0.0221)
Male		0.177*** (0.0459)	0.0633 (0.0468)	0.0996** (0.0472)
Age		-0.00584*** (0.00168)	0.0125*** (0.00204)	0.00762*** (0.00203)
Married		0.528*** (0.0714)	0.624*** (0.0712)	0.510*** (0.0708)
Divorced		0.0367 (0.0811)	-0.0624 (0.0805)	-0.0383 (0.0824)
Widow		0.167** (0.0742)	0.288*** (0.0746)	0.231*** (0.0745)
Midedu			0.446*** (0.0539)	0.363*** (0.0542)
Higheredu			1.082*** (0.0772)	0.903*** (0.0764)
Employed			0.544*** (0.0594)	0.530*** (0.0596)
Negative wealth				1.164*** (0.119)
Net wealth Quantile1				1.548*** (0.0943)
Net wealth Quantile2				1.714*** (0.0987)
Net wealth Quantile 3				1.891*** (0.106)
Net wealth Quantile 4				2.248*** (0.131)
Risk averse				0.102** (0.0412)
Time F.E	Yes	Yes	Yes	Yes
Region F.E	Yes	Yes	Yes	Yes
Observations	31,496	31,496	31,496	31,496

Robust standard errors in parentheses

## 2.7 Portfolio Choices

As immigrant's net worth is affected by the asset allocation and portfolio choices, it is worthy of analyzing assets included in the household portfolios. Now the question is what particular advantage can be found analyzing household's portfolio choices over net wealth?

Comparative return, transaction cost, risk preference and liquidity of assets are some of the reasons that influence the portfolio choices of households (Osili and Paulson, 2009). Households may allocate their wealth differently based on liquidity, risk-return profiles associated across different asset types. It would be rational to expect that immigrant and native households' portfolio choices could also differ due to issues like a selective migration process, the potential for return migration, cultural bias, earning risk, etc (Cobb-Clark and Hildebrand, 2006). In this section, we analyse the effect of immigrant status on portfolio choices. We estimate the following model for each household portfolio decision:

$$A_{it}^q = \beta_0^q + \beta_1 I_i + X_{it} \beta_2 + \tau + \eta + \epsilon_{it} \quad (2.6)$$

Where  $A_{it}^q$  is a dummy variable indicate the household portfolio decision. As before,  $I_i$ ,  $X_{it}$ ,  $\tau$  and  $\eta$  capture immigrant status, a vector of household and household head's characteristics, time and macro region fixed effects.

We estimate the model over using a random effects probit model. The results are presented in Table 2.7. The results depict the manner in which immigrants and natives hold their wealth is significantly different. Households headed by the immigrant are less likely to own different financial assets. The immigrant status is negatively related to all portfolio choices apart for holding informal debt. The likelihood of holding risky assets is 1.39 basis points lower for immigrants compare to natives even after controlling for all covariates. Immigrants are also less likely to own a house or a business than native Italians. Holding mortgage and government securities is also less likely for them. The manner in which households hold their wealth is strongly related to income and education. Higher income level and education

are positively associated with the participation decision except for holding informal debt. The coefficient of risk aversion indicates a negative correlation with participation decision only exception for holding mortgages. Our findings here are consistent with the literature. For instance, Sinning (2007) shows that in Germany immigrants has lower degree of portfolio diversification than their native counterparts. Cobb-Clark and Hildebrand (2006) also find that asset ownership rates including housing are relatively lower for immigrants in the US. In sum, compared to investing in risky assets that may generate high returns, immigrants may prefer to invest in assets that are more liquid and/or provide immediate benefits. Meanwhile, some constraints like the lack of financial resources, investment knowledge, risk tolerance affect immigrant's portfolio composition. Differences in how immigrants make their financial portfolio composition reflect their integration patterns, which eventually determine their wealth position as well (Painter and Qian, 2016).

## 2.8 How robust our findings?

### Inverse hyperbolic sine transformation

As we mentioned earlier, the use of wealth data poses special challenges because of the skewness of the wealth distribution, which often leads researchers to apply data transformation in order to meet the normality assumption that is the basis of many statistical procedures. Many researchers use log transformation in order to get a log-normally distributed dependent variable (Shamsuddin and DeVoretz, 1998). However, the log transformation is inappropriate in the presence of negative and zero values. In wealth data, a significant portion of households reports zero (1059 observations) and negative wealth (1265 observations).

In this section, we adopt an alternative data transformation that may appropriate to deal with non-normality in wealth data: the inverse hyperbolic sine (IHS) transformation- denoted as  $(\sinh^{-1})$ . In addition to deal with skewness, it retains zero and negative values that assists explore sensitive changes in the distri-

Table 2.7: Random effect Probit- Asset portfolios

VARIABLES	Holding risky assets	Home Ownership	Holding Mortgage	Owning business	Holding Informal debt	Holding govt security	Holding valuable
Immigrant	-1.393*** (0.133)	-3.473*** (0.132)	-0.252* (0.142)	-0.911*** (0.126)	0.137* (0.0709)	-1.135*** (0.166)	-0.00646 (0.0861)
Mid income	0.755*** (0.0365)	1.410*** (0.0491)	0.0566 (0.0599)	0.613*** (0.0507)	-0.477*** (0.0476)	0.659*** (0.0397)	0.424*** (0.0382)
Upper income	1.400*** (0.0422)	2.261*** (0.0645)	-0.0322 (0.0707)	1.374*** (0.0605)	-0.668*** (0.0600)	1.016*** (0.0465)	0.723*** (0.0435)
Family size	-0.118*** (0.0166)	-0.000497 (0.0237)	0.185*** (0.0267)	0.236*** (0.0216)	0.104*** (0.0170)	-0.105*** (0.0188)	-0.0966*** (0.0157)
Male	0.200*** (0.0321)	0.0736 (0.0484)	0.0380 (0.0572)	0.0954** (0.0480)	0.0321 (0.0387)	-0.0400 (0.0344)	-0.205*** (0.0326)
Age	0.0115*** (0.00153)	0.0499*** (0.00227)	-0.0560*** (0.00316)	-0.0133*** (0.00228)	-0.0243*** (0.00177)	0.0191*** (0.00168)	-0.00533*** (0.00148)
Married	0.0151 (0.0508)	0.453*** (0.0765)	0.773*** (0.097)	0.0449 (0.0749)	0.0054 (0.0597)	-0.0873 (0.0554)	0.175*** (0.0513)
Divorced	-0.0513 (0.0624)	-0.631*** (0.0890)	0.592** (0.142)	0.095 (0.109)	0.363*** (0.0762)	-0.117* (0.0640)	0.0498 (0.0655)
Widow	-0.121* (0.0624)	-0.0381 (0.0890)	0.300** (0.142)	-0.208* (0.109)	0.128* (0.0762)	-0.176*** (0.0640)	-0.0165 (0.0655)
Mid-edu	0.450*** (0.0464)	0.377*** (0.0635)	0.196** (0.0952)	0.124* (0.0728)	-0.0959* (0.0505)	0.314** (0.0465)	0.0644 (0.0472)
Higher-edu	1.060*** (0.0504)	0.981*** (0.0740)	0.510*** (0.101)	0.0326 (0.0772)	-0.196*** (0.0586)	0.593*** (0.0505)	0.339*** (0.0493)
Employed	-0.120*** (0.0380)	-0.385*** (0.0538)	0.544*** (0.0638)	1.304*** (0.0523)	-0.158*** (0.0430)	-0.156*** (0.0423)	0.135*** (0.0379)
Risk averse	-0.508*** (0.0257)	-0.130*** (0.0354)	0.165*** (0.0441)	-0.147*** (0.0357)	-0.0441 (0.0344)	-0.178*** (0.0281)	-0.311*** (0.0282)
Time F.E	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Region F.E	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	47,424	47,424	32,883	47,424	47,424	47,424	47,424

\*\*\*p < 0.001, \*\*p < 0.01, \*p < 0.05

bution. The IHS transformation can be expressed as

$$ihs(x) = \log(\sqrt{x^2 + 1} + 1) \quad (2.7)$$

Where  $x$  presents the variable of interest ( $x$ ) and  $ihs(x)$  is the transformed version of the variable. A scale parameter ( $\theta$ ) can be added to the IHS equation, which adjusts the proportion of the values along the  $x$ -axis into a linear function and the proportion to which these values mimic the natural logarithm (Pence, 2006)<sup>3</sup>.

$$\begin{aligned} g(z_t, \theta) &= \sinh^{-1}(\theta z_t) / \theta \\ &= \log(\theta z_t + (\theta^2 z_t^2 + 1)^{1/2}) / \theta \end{aligned} \quad (2.8)$$

We estimate the following model:

$$\sinh^{-1}(W_{it}) = \alpha_0 + \gamma I_i + Y_{it}\beta + X_{it}\lambda + \tau + \eta + \epsilon_{it} \quad (2.9)$$

In Table 2.8 our basic OLS results are presented. In column (1) we control for the immigrant status of the household only, in addition to time and region effects, and we find that immigrants hold 5.37 percent less wealth than their native counterparts, with the coefficient significant at the 1% level. In column (2), we add the controls for income whose coefficients are highly significant and positive, indicating that households with higher income are also wealthier than low income households, and the coefficient for immigrant drops to about -4.03. In column (3), we add a number of other controls for including family size, male, age and age-squared which make the coefficient for immigrant fall to -3.36. Column (4) is the full specification, we include additional control for marital status, level of education, employment status, risk aversion and all the other controls as in specification (3), the coefficient of immigrant almost does not change, indicating immigrant households possess relatively lower wealth level than native counterparts. Not surprisingly, net wealth is positively associated with the household's level of income and education. On the other hand, larger family size and risk aversion of households reduce wealth

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<sup>3</sup>where we set  $\theta = 1$ .

Table 2.8: Inverse hyperbolic transformed Net Worth for Immigrants and the Natives

	(OLS)	(OLS)	(OLS)	(OLS)
Immigrant	-5.370*** (0.143)	-4.302*** (0.142)	-3.336*** (0.145)	-3.306*** (0.146)
Midincome		1.932*** (0.0428)	2.190*** (0.0461)	1.822*** (0.0471)
Upperincome		3.013*** (0.0376)	3.394*** (0.0494)	2.732*** (0.0540)
Family size			-0.168*** (0.0207)	-0.177*** (0.0239)
Male			0.0438 (0.0379)	-0.261*** (0.0447)
Age			0.0799*** (0.00848)	0.0953*** (0.00891)
Age-squared			-0.000354*** (0.00006)	-0.000408*** (0.00006)
Married				0.241*** (0.0663)
Divorced				-0.841*** (0.0940)
Widow				0.0410 (0.0714)
Midedu				0.385*** (0.0542)
Higheredu				1.043*** (0.0561)
Not-employed				-0.408*** (0.0702)
Retired				0.101* (0.0542)
Risk averse				-0.408*** (0.0373)
Time F.E	Yes	Yes	Yes	Yes
Region F.E	Yes	Yes	Yes	Yes
Observations	47,424	47,424	47,424	47,424
R-squared	0.083	0.166	0.192	0.206

Robust standard errors in parentheses

\*\*\*p < 0.001, \*\*p < 0.01, \*p < 0.05



accumulation. Other findings are consistent with our previous findings. Although we use many controls, we must admit that the wealth gap may arise for some unobservable factors (like skills or immigrant's wealth in the home country) that we cannot account for.

## Wealth gap by financial inclusion

The analysis so far does not distinguish the economic well-being between migrants who are financially included and those who are not. In this section, we consider two subgroups for only immigrants: one group includes immigrants who are financially included and the other group those who are not. Then we look at their wealth position compared to their native counterparts. Our hypothesis is that overall immigrant households hold less wealth than natives <sup>4</sup>. Specifically, wealth inequality is larger between financially excluded immigrants and natives, and smaller between financially included immigrants and natives. Table 2.9 reports the number of financially included and excluded immigrants and their mean wealth position. The *t* statistics for differences in mean provides primary evidence that financially included immigrants hold more wealth than financially excluded ones.

Table 2.9: Wealth holding by financially included and not-included immigrants

	Fin.Included Immi	Fin.excluded Immi	Diff
Mean wealth	€33983.01	€7248.52	€26734.5***
Sample size	1017	204	

To examine how the financial inclusion of household heads contributed to the wealth inequality we make use of two approaches. The first one is OLS regression where we apply inverse hyperbolic sine transformation in order to deal with the skewness and meet normality assumption. The second one is the quantile regression.

We first run regression on both sub-samples of data where our dependent variable is net wealth and variable of interest is immigrant (Immigrants who are

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<sup>4</sup>The share of financially excluded natives is negligible, so we compare both immigrants sub-groups with all natives

financially included and Immigrants who are unbanked <sup>5</sup>). Then we add controls for income to see if any wealth inequality can be accounted for by income differences, then we add additional controls for family size, age, sex of head, marital and employment status, level of education and risk profile. We use the same controls for the median regression as well.

In Table 2.10 we report the results of OLS regression. We find that immigrant households who are financially included hold on average 2.6 percent less wealth than natives. Whereas, the gap is 6.08 percent for unbanked immigrants after controlling for characteristics. By comparing the coefficients of immigrants in both models, we can draw a conclusion that in general compared to natives on average immigrants hold less wealth; among the immigrant population, immigrants who are financially included accumulate more wealth than immigrants who is unbanked.

In Table 2.11 we report the estimation results from the median quantile <sup>6</sup>. These results corroborate the descriptive results reported in Table 2.9. It can be clearly seen that in both samples, natives have significantly higher wealth accumulation than immigrants. Not surprisingly at the median level, the wealth inequality between natives and financially excluded immigrants is higher compared to native-financially included immigrants.

The coefficients of immigrant indicate that natives possess €42000 higher wealth than financially included immigrants whereas the different is €43500 for financially excluded immigrants. As our previous findings, Variables include age, income, employment status, education enhance wealth, while explanatory variables that reduce wealth are the family size and risk profile. In sum, immigrants who are participating in the formal financial market are in a strong wealth position compare to immigrants who are not.

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<sup>5</sup>Unbanked refers households without any bank or postal account

<sup>6</sup>The Full analysis is presented in the Appendix

Table 2.10: Net wealth position by Financial Inclusion of Immigrant household head, 2006-2016

	Model 1 (OLS)	Model 2 (OLS)
Immigrant	-2.618*** (0.128)	-6.081*** (0.264)
Upper income	2.683*** (0.0683)	2.647*** (0.0679)
Midincome	1.770*** (0.0584)	1.741*** (0.0581)
Family size	-0.184*** (0.0244)	-0.180*** (0.0249)
Male	-0.307*** (0.0512)	-0.269*** (0.0509)
Age	0.0942*** (0.00991)	0.0978*** (0.00998)
Age-squared	-0.0004*** (8.34e-05)	-0.0004*** (8.36e-05)
Married	0.225*** (0.0779)	0.257*** (0.0782)
Divorced	-0.887*** (0.0968)	-0.890*** (0.0966)
Widow	0.0127 (0.0906)	0.0350 (0.0899)
Midedu	0.395*** (0.0633)	0.376*** (0.0626)
Higheredu	1.049*** (0.0701)	1.047*** (0.0697)
Not-employed	-0.448*** (0.0694)	-0.478*** (0.0691)
Retired	0.129* (0.0688)	0.0983 (0.0682)
Risk averse	-0.459*** (0.0466)	-0.453*** (0.0463)
Time F.E	Yes	Yes
Region F.E	Yes	Yes
Observations	31,292	30,479
R-squared	0.189	0.189

Table 2.11: Quantile regression, Q=50

	Financially Included Immi	Financially Excluded Immi
Immigrant	-42.8035*** (2.2397)	-43.4958*** (2.9853)
midincome	91.7021*** (2.1465)	93.3470*** (2.2323)
upperincome	238.1897*** (3.8897)	238.4749*** (3.982)
Family size	-8.1386*** (0.8308)	-8.7529*** (0.9034)
Male	5.0153** (1.9063)	5.7464** (1.9826)
Age	5.6634*** (0.2719)	6.0448*** (0.2724)
Age-squared	-0.0318*** (0.0025)	-0.0344*** (0.0025)
Married	17.5776*** (2.5713)	19.9482*** (2.6845)
Divorced	-21.9161*** (3.4286)	-23.0230*** (3.7761)
Widow	1.3161 (3.3686)	2.5426 (3.4328)
Mid edu	35.2099*** (2.2678)	35.4109*** (2.42)
Higher edu	74.7274*** (2.8808)	79.6204*** (3.1097)
Not-employed	18.4575*** (2.3204)	19.2996*** (2.5419)
Retired	31.3738*** (2.8624)	29.5818*** (3.0098)
Risk averse	-29.2206*** (1.9217)	-28.6516*** (1.9808)
Time F.E	Yes	Yes
Region F.E	Yes	Yes
Num. obs.	31292	30479

## 2.9 Discussion and Conclusions

A central question facing researchers and policymakers is the degree of economic integrating of immigrants, especially in countries, like Italy, where the share of the foreign-born population is increasing. Wealth accumulation and financial inclusion represent key aspects of immigrants' both ability and progress to successful economic adaptation into host societies. We examine the extent to which immigrants are economically integrated in Italy using the bank of Italy's household survey for the 2006 to 2016 period.

Our empirical findings reveal persistence wealth inequalities between immigrant and native households. The gaps cannot be explained by the differences in income, demographic and other household characteristics. Besides we do not observe particular differences in wealth accumulation within the immigrant population based on the different cohorts of arrival.

When we turn our attention to the immigrants' financial market participation and find that immigrants are less likely than the native-born to own at least an transaction account, which is a primary-level financial asset with low restriction to participation. Persistent limited use of financial services contribute to the immigrant-native wealth gaps and influence the pace of economic adaptation of immigrants in Italy (Abdul-Razzak et al., 2015). Potential reasons for significantly lower financial market participation for immigrants could be cultural bias, lack of financial education, host country settings includes transaction costs, documentation requirements, minimum balance requirements.

Analyses of immigrants' investment choices that are linked with the future, provide valuable insight into the mechanisms that contribute to larger wealth inequality. Compared to otherwise similar native-born households, Italian immigrants are less likely to own a wide variety of financial assets and real assets such as stocks, own a house, business, valuables. These differences in portfolio choices may lead to the widening wealth inequalities between immigrants and natives and persist across generations. Some studies have pointed out lack of resources, sophistication to use available financial information, disparate treatment in credit markets

in explaining the low level of investment in different asset types (Abdul-Razzak et al., 2015; Chatterjee, 2009b; Diaz-Serrano and Raya, 2014). In addition, natives are more likely to learn about investment and portfolio choices from their parents and/or family networks which increases their likelihood of financial inclusion than immigrants.

Analyses of differences in wealth position, financial inclusion, and portfolio choices between immigrants and natives, shed light on the current level of the economic integration of immigrants and their future prospect in Italy. Our findings suggest that there is lack of notable advances toward economic integration of immigrants in Italy and additional policies which might help to ease the process of integration and contribute to reducing the wealth inequality through promoting of financial products especially for immigrants, easy access to the credit markets, and the removal of obstacles to the access to the credit markets.

Although we may have answered some questions about immigrant wealth and how their financial decision differ from natives, our findings leave many avenues for future research open. For example, it would be interesting to see how wealth gaps and integration differ between first generation and second generation immigrants. Similarly, immigrants' saving behaviour and remittances have a strong influence on the immigrants' wealth accumulation path, especially for immigrants from poor countries, are needed to be examined which we leave for future research. Aside from the above reasons, inheritance and other inter-generational transfer more likely to play an important part in the wealth gap between immigrants and natives.

# Chapter 3

## Immigrants and Mortgage Pricing: Evidence from Italy

### 3.1 Introduction

Discrimination in mortgage lending against minorities has been a longstanding question in academic and policy debate. Discrimination occurs when equally qualified people are treated differently based on some personal characteristics and other non-economic criteria. It may consist of either turning down a loan application or varying the terms of transaction (Lacour-little, 1999).

Mortgage debt is a key element of home-ownership. It is a right to expect equitable treatment from banks and other lending institutions. Any discrimination in the access to mortgage financing creates barriers to home-ownership, contributing to low minority home-ownership rates and growing wealth disparity (Bayer et al., 2014).

Immigrants make up a growing share of the population in many countries. Home-ownership is vital, especially for immigrant communities to build wealth. It is also a signal of financial inclusion in the host country. Restricted access in any form to mortgage lending may lead to social exclusion (Kara and Molyneux, 2017). Italy is one of the popular destinations of Immigrants for the last couple of decades. It has

turned from an emigration country into an immigration country. In 2018, about 10.4 percent of the Italian population are immigrants (OECD, 2018<sup>1</sup>). In contrast to the US where anti-discrimination laws like fair housing act 1968, the Home Mortgage disclosure act 1975 exist, neither Italy nor the rest of Europe has specific laws to protect minorities from discrimination in housing and lending markets. This implies that the Italian mortgage market is less regulated and protected especially for minorities against discrimination.

Previous evidence suggests that ethnicity, gender, and other non-financial criteria influence credit pricing (Black et al., 2003; Blanchflower et al., 2003; Cheng et al., 2011; Courchane and Nickerson, 1997). Earlier studies on mortgage pricing mainly focus on the US and find the presence of discrimination and inequalities in both access to mortgages and pricing based on non-economic grounds (Bayer et al., 2017; Black et al., 2003, 1978; Cheng et al., 2015).

In Italy, a handful of studies examine the credit pricing against minorities and provide a quiet consistent picture of disparate credit pricing as other developed countries. For instance, Albareto and Mistrulli (2011) using central credit register data for 2004-2007 find that migrant entrepreneurs pay more for their credit than native Italian. Alesina et al. (2013) also find the same evidence against women entrepreneurs compared to their male counterparts. Previous investigation was mostly firm level and focused on the pricing of overdraft credit which is short term in nature. Until now, very little is known about the differential in mortgage pricing in the Italian mortgage market against minorities. Our analysis seeks to close this gap in the literature. We study mortgage (credit) pricing differences between immigrants and natives.

Building on this evidence, we investigate: i) Whether the pricing of mortgage loans differs for immigrants and natives in the Italian housing market. ii) If disparate pricing exists, to what extent such treatment is due to market forces or can be caused by discrimination.

We find that, on average, immigrants are charged almost 30 basis points

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<sup>1</sup>See the OECD Migration Database, <https://www1.compareyourcountry.org/migration/en/1/390/datatable>



more for their mortgages compared to their native counterparts. A clear explanation for this finding could be that immigrants are riskier borrowers, but the disparity remains significant after controlling for a variety of risk factors. In order to investigate further the possible explanation of the interest rate gap, we use the Oaxaca-Blinder decomposition method. It reveals only 22 percent of this gap can be attributed to differences in observable individual and mortgage characteristics. We also use propensity score matching which reveals that the effect of being an immigrant causes a rise in mortgage cost by 17-20 percentage points.

Pagano and Jappelli (1993) report that lending institutions are more likely to charge higher interest rates to the immigrants. It is not unusual that a priori loan officers might consider immigrants as risky borrowers, especially when they are less financially integrated. We find that pricing differences go down for borrowers with credit history. The interest rate gap may, therefore, arise from informational asymmetry.

If immigrants have the same risk profile as natives then differences in interest rates could be explained by the fact that banks discriminate against immigrants. Banks might consider immigrant status as a signal of additional unobservable risks. To compensate for those risks, banks charge higher interest rates to immigrant borrowers. Although we control for a host of variables related to risks, loan and personal characteristics, there may exist unobservable factors that determine the interest rate gap. We must acknowledge the possibility that our results might be affected by the omitted variable bias. For instance, the interest rate gap could arise from the differences in the quality of the mortgages or residential location choice between immigrants and natives. Studies find that immigrants and natives differ substantially in their labor market outcomes especially earnings (Chiswick, 1978, 1983). Given this constraint, it is possible that immigrant's mortgages may feature lower qualities like located in crowded areas, bad decoration or problems with neighborhood crime/safety. A further explanation is a better quality of the co-borrower. A native co-borrower might have a larger income, wealth and a better job position than an immigrant co-borrower. Nevertheless, we seek to provide a better understanding of the pricing of mortgage credit for immigrants and natives in Italy which

we hope will help to inform public policy.

The remainder of the paper is organized as follows: Section 2 provides a brief background on the mortgage pricing and discrimination literature. Section 3 discusses the Italian mortgage market. The details of the data sources are discussed in section 4. Section 5 presents the summary statistics and description of variables. In section 6, we present our empirical findings on the mortgage pricing for immigrants and natives. Section 7 and 8 provides the results of Oaxaca-Blinder decomposition and propensity score matching. Section 9 conducts a robustness check. The last section concludes the paper.

## 3.2 Conceptual framework and literature

### 3.2.1 Economic theories of discrimination

Economic theory provides two main explanations for why discrimination takes place. The first explanation hypothesizes that discrimination arises due to personal prejudices against a certain minority without an economic basis (Becker, 1971). If lenders are prejudiced, they forgo profits by preferring not to interact with immigrants. Arrow et al. (1973) and Phelps (1972) suggest the second theory of discrimination, known as statistical discrimination. It assumes that in the presence of asymmetric information, an unbiased individual use race or ethnicity as a proxy for creditworthiness. According to Becker's theory, discriminated individuals pay for the "taste for discrimination" through higher equilibrium prices, whereas in statistical discrimination, outcomes are affected by the average performance of the group the individual belongs to. However, in a discriminated economic transaction, disentangling the nature of discrimination is not feasible (Diaz-Serrano and Raya, 2014). A further and, not mutually exclusive explanation is lack of affinity between native loan officers and natives caused discrimination. Loan officer's comfortability to deal with minorities, skill to understand the way minority borrowers communicate, less effort to determine their creditworthiness or to help meet underwriting criteria may attribute to discrimination (Turner, 1999). On the other hand, studies provide evidence that the

cultural proximity between borrowers and loan officers increases the loan approval rate and the amount of credit (Fisman et al., 2017; Kim and Squires, 1998).

### 3.2.2 Empirical literature

Racial and ethnic discrimination and its' effect have been consistently documented in studies of mortgage lending, mainly focused on the United States. Empirical studies on mortgage discrimination can be classified based on their focus into three main groups: the probability of loan denial, redlining and disparate mortgage pricing against minorities. First, there is a broad literature documenting the possibility of disparate treatment in the mortgage approval process based on race/ethnicity. For example, minority households are more likely to be rejected and offered less attractive terms for mortgages than whites (Black et al., 1978; Ondrich et al., 1999; Schafer and Ladd, 1981). Studies found race (gender) dummies are significantly positive which implies minorities are less likely to get a loan, all else being equal. Though, interpreting these findings as “discrimination” is indistinct. The main concerns are omitted variables bias, data error, endogenous explanatory variables and incorrect specification issues. On the contrary, Miller (1982), Maddala and Trost (1982) and Horne (1994) did not find evidence of racial discrimination. Munnell et al. (1996) augmented the original census Home Mortgage Disclosure Act (HMDA) data for Boston with additional information on the borrower including credit history, loan terms, unit and neighbourhood attributes. Using logit and linear probability models, they found that the probability of loan denial for black and Hispanic applicants was almost three times higher than the typical white borrowers after controlling for the key underwriting information. More recently, Kara and Molyneux (2017) investigate whether access to mortgage finance is influenced by ethnicity in the UK mortgage market, using propensity score matching. They find black households are less likely to obtain mortgages when compared to white households.

Second, the empirical literature also addresses the issue of redlining. Studies find that based on where a person resides both probabilities of credit grant and credit fund are influenced. The case of high probability of credit denial is called

“process-based redlining”, while less granted loan amount (supply of credit) is known as “outcome-based redlining”. From previous studies, no precise conclusion can be drawn regarding the presence of redlining. Using Boston Fed study data, Hunter and Walker (1996), Tootell (1996) and Ross et al. (2004) address process-based redlining. Hunter and Walker (1996) find evidence of redlining. Tootell (1996) and Ross et al. (2004) report indirect redlining where lenders favour applicants from CRA protected area neighbourhoods if they have private mortgage insurance. The outcome-based redlining studies find a lower level of credit flows to minority neighbourhoods than for predominantly white neighbourhoods (Bradbury et al., 1989; Schafer and Ladd, 1981; Shlay, 1989). Further, using Houston data, Andrew Holmes (1994) find lower supply of credit to the racial composition of census tract including a measure of neighbourhood default risk in model. However, Hutchinson et al. (1977) and Bradbury et al. (1989) report racial redlining, while Ahlbrandt Jr (1977), Bentston (1981) and Benston and Horsky (1992) did not find evidence of redlining.

Finally, in the empirical literature on mortgage credit, studies also examine the disparate pricing between minority and non-minority borrowers which is directly related to the question we tackle. Minority borrowers are much more likely to face higher costs for the mortgage even where factors such as income levels, credit scores, loan to value ratios and other relevant variables are controlled for (Bayer et al., 2014; Black et al., 2003; Courchane and Nickerson, 1997). Courchane (2007), using data provided by lenders and an endogenous switching regression model reports the annual percentage rate (APR) price premium for wholesale originators for both prime and subprime loans in most cases. Boehm and Schlottmann (2007), using AHS data examine the extent to which difference in the interest rates obtained by homeowners of different ethnicity and income level can be explained by differences in characteristics of the borrowers, the proper and loan itself. Cheng et al. (2015) find with respect to mortgage interest rate, “black borrowers on average pay 29 basis points more than comparable white borrowers,” with an even larger discrepancy for black women. Hanson et al. (2016) analyse mail sent to mortgage loan originators asking for loans and conclude African American sounding names effectively reduced an applicant’s credit score by 71 points. Though, Crawford and Rosenblatt (1999) find no evidence of discrimination in the study of mortgage loan pricing differentials

by race. Furthermore, they find no significant effects of race on the interest rate charges relative to the lenders' daily market rates, or rate movement between lock in and closing dates.

Limited empirical studies, however, test directly the disparate pricing against immigrants. Diaz-Serrano and Raya (2014) find that immigrants pay 18 basis points higher interest rates for mortgages than natives in the Spanish market even after controlling differences in creditworthiness and other factors. Cavalluzzo and Cavalluzzo (1998) and Blanchflower et al. (2003) tend to examine the link between race and probability of loan denials in the market for small business loans and provide evidence of higher denials rate for African Americans. In Italy, using central credit register data, Alesina et al. (2013) report that micro firms run by women pay more for credit in the absence of any evidence that women are riskier borrowers than men. Albareto and Mistrulli (2011) do find that migrant entrepreneurs pay for credit than the non-migrant counterparts. They conclude this gap shrinks but does not disappear as credit histories lengthen. However, Italian empirical literature does not consider a major household finance market, mortgage. In large part, this is due to lack of data availability that includes information both on loan performance (cost of credit, delinquency rate) and information on immigrant's country of origin. Our analysis seeks to fill this gap in the literature.

### 3.3 Italian Mortgage Market

Before turning to the empirical analysis, it is worthwhile to know some stylized facts about the Italian mortgage market, especially its size and characteristics.

Compared to other European countries, the size of the Italian mortgage market is smaller despite having a high home-ownership rate. The total household debt amount is 63 percent of disposable income compared to 95 percent in the euro area and 103 percent in the US (Guiso et al., 2017). According to the Survey of Household Income and Wealth (SHIW) data, only 12 percent of households have a mortgage, half of the average figure for households in the euro area. The median

Loan to Value ratio is 50 percent, with a median loan amount of 95000 euro and 15 years median loan duration. Because of inefficiencies and slower judicial process in the Italian mortgage market, debt collection and repossession are found time consuming (4 to 6 years) compared to the similar EU countries (1 year) (Jappelli et al., 2018). However, in spite of the less developed mortgage market, Italian household's investment in the housing market increased significantly from 46 percent in 1961 to 70 percent in 2014. Interestingly, in contrast to other developed mortgage markets, financing is not going that much to younger ages. As a consequent, the people in Italy become a homeowner much later in life ( between 40 to 45 years) (Chiuri and Jappelli, 2003).

In Italy, the two most common types of contract are: (1) an adjustable-rate mortgage (ARM) where the bank charges a spread over an underlying benchmark rate, usually 1 to 3 months Euribor ; (2) a fixed-rate mortgage (FRM) where an interest rate and installments are fixed when the contract is signed for the whole length of the mortgage. The theoretical literature prediction is that the choice between ARM and FRM should depend on the cost and risk involvement with these loan products. In addition to cost and risk, the characteristics of mortgage originating banks also influence the choice between ARM and FRM (Foà et al., 2015). Using the Central Credit Register data, they conclude that based on the type of funding banks rely on, they manipulate the choice of borrowers between ARM and FRM. In our data, just over 41 percent of the mortgages issued are FRMs. The Italian regulator sets the maximum loan to value ratio at 80 percent, banks are required to hold additional regulatory capital in case of exceeding this threshold.

Figure 3.1 reports the average interest rate charged on FRM and ARM. Figure 3.2 depicts the average FRMs and ARMs rate for immigrants and natives. They are significantly different. The average ARM rate is lower than the average FRM rate. Borrowers with ARM benefited more from the interest rate drop than FRMs. When interest rate drops, FRMs adjustment is relatively lower thus generate more profit for the bank.

If immigrants were granted more FRMs than natives then the mortgage

Figure 3.1: Average Fixed rate vs Adjustable rate

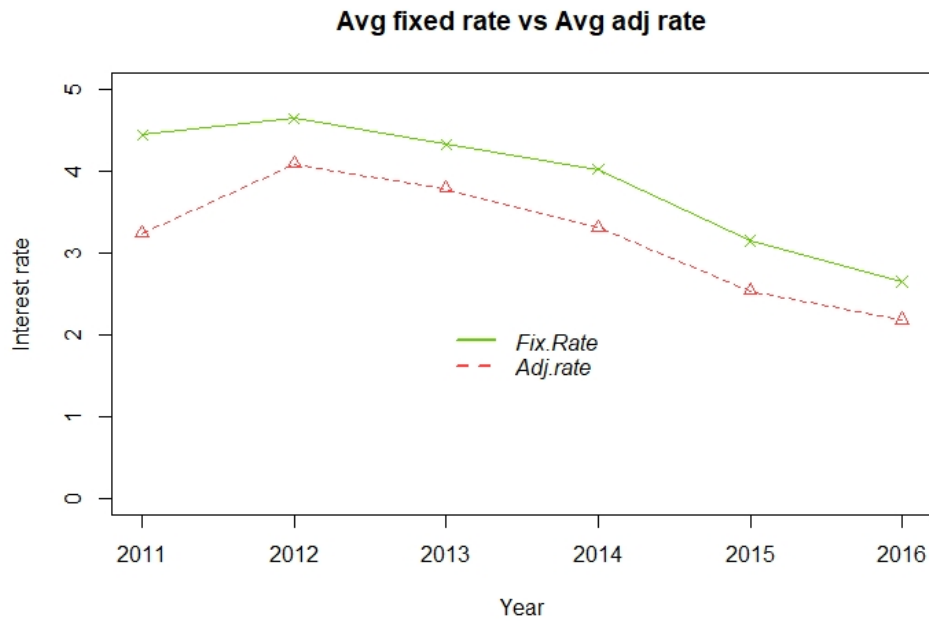
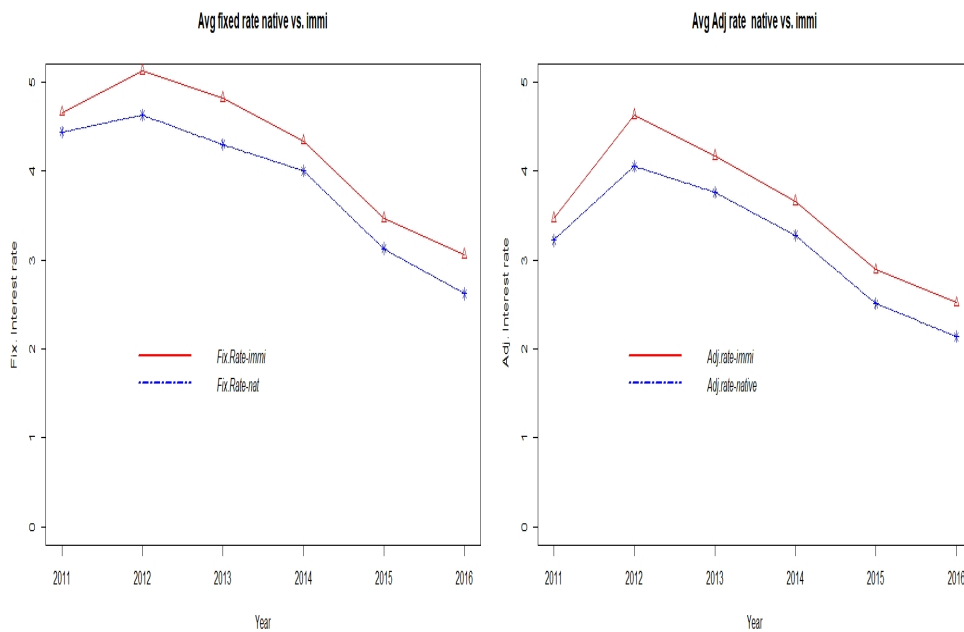


Figure 3.2: Comparison of the mortgage rates between immigrants and natives



rate differential between these two groups might explain by the differences in mortgage types selection. We check the probability of choosing FRM for immigrants, by

estimating the following probit equation:

$$\begin{aligned}
 Prob(FRM_i) = & \alpha + \gamma Imm_i + \tau Loansize_i + \lambda Credithistory_i + \omega Age_i + \eta Female_i \\
 & + \mu Coint_i + \psi Cohabitation_i + \epsilon_i \quad (3.1)
 \end{aligned}$$

Table 3.1: Probit model

	Marginal effect	Coefficient
Immigrant	-0.0942	-0.2437*** (0.0056)
Loan size (log)	-0.0923	-0.2390*** (0.0030)
Credit history	0.0024	0.0063*** (0.0003)
Age	0.0002	0.0005*** (0.0001)
Female	-0.0093	-0.0242*** (0.0036)
coint	0.0409	0.1061*** (0.0033)
Cohabitation	-0.0158	-0.0408*** (0.0040)
Pseudo R-squared		0.81%
Num. obs.		945618

In Table 3.1, the coefficient of Immigrant indicates that all other things being equal, we find that immigrants are less likely to choose "FRM". This implies that the interest rate differential between immigrants and natives does not arise from the difference in the choice of the type of mortgages.

### 3.4 Data

The data we use come from anonymized version of the database stored at the bank of Italy. The database contains information on all loans granted to each borrower whose loans are above the threshold of 30,000 euros (before January 2009, 75,000 euros; no threshold required for the bad loan) originated by all Italian banks and foreign banks operating in Italy. It also includes information on interest rates charged on each loan granted by a subset of 176 banks. This subset includes all main banking



groups active in Italy and covers more than 90 percent of the market. Detailed information on the type of loan (FRM and ARM), the loan size at origination, date of loan granted, credit history, and a number of characteristics of the borrowers are also available in the database. In addition, we have the identity of each bank originating these mortgages. We have obtained quarterly data on all mortgages originated between 2011 and 2016 for the 176 banks and pooled in a unique dataset.

The original data set has complete records on around 1 million mortgages where the number of immigrants is much lower (58,718) than native (941,947). In a contract, along with the single borrower, multiple borrowers also participated which later we denote as co-borrower contracts. We also separately carry out our estimation for the single and multi-borrower contracts. After a filtering procedure, we end up with a sample of 980,713 observations relative to 24 quarters from March 2011 to October 2016<sup>2</sup>.

### 3.5 Summary Statistics

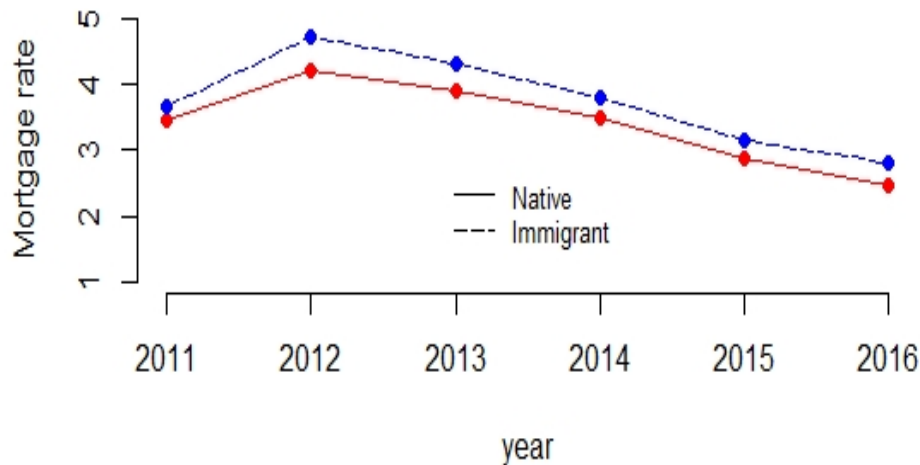
Table 3.2 depicts an overview of all variables used in this paper. An immigrant borrower is a foreign-born borrower regardless of his present permanent status of residency; all other borrowers are classified as native borrowers. A summary of our sample data is presented in Table 3.3. The single borrower contracts are defined as loans granted to one borrower whereas the co-borrower contracts are loans granted to more than one borrower. In our data, the proportion of single and co-borrower contracts is almost equal (50.1 percent vs. 49.9 percent). The unconditional mean mortgage rate for immigrants in our sample is 27 basis points higher than that for natives (3.48 percent vs. 3.21 percent). Including at least one native as a co-borrower (Imminat) reduces the average cost to 12 basis points. Figure 3.3 plots the average mortgage rate for immigrants and natives for each period between 2011 and 2016. The graph reveals that on average mortgage costs for immigrants in each

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<sup>2</sup>To exclude outliers, data have been trimmed to the top and bottom one percentile of the interest rate distribution. We also exclude the contracts for which the initial duration is less than 5 years because their numbers were too small to draw any reasonable and consistent conclusion. It implies that all the loan contracts we consider have maturity more than 5 years but data on the exact duration of each contract is not available

period are higher than that of natives.

Figure 3.3: Average yearly mortgage rate



In general, a fixed mortgage rate could be considered as insurance against interest rate volatility. As we discuss earlier the average fixed mortgage rates are higher than the adjustable mortgage rate. An explanation might be the sluggish adjustment of the interest rates on FRM in the Italian mortgage market. ARM rates are adjusted within a year, and the interest rate on FRM are fixed at-least for 10 years. In our data, while the adjustable-rate dropped quite significantly between 2012 to 2016, the adjustment of the FRM was more sluggish, consequently generating more profit for the banks. In summary, less incentive to renegotiate FRMs despite the drop in official interest rate makes it costly. In both FRM and ARM cases, immigrants' cost of mortgages is higher than natives. Both immigrants and natives borrow more often using adjustable-rate mortgages compared to fixed-rate mortgages.

Usually, loan size is commonly viewed as market power to the borrowers (Black et al., 2003). Bigger loan size implies more funding options and lower costs. The average loan amount in our sample for natives is higher than immigrants (€140297 vs €125360). The loan size for natives is higher than immigrants which is statistically significant. But we do not know whether it is due to credit rationing

or to the fact that simply immigrants ask for a relatively smaller amount of loans. Furthermore, as expected in co-borrower contracts, the average loan size is higher than single borrower contracts.

Table 3.2: Variable names and definitions

Variables	Definitions
TAEG(Rate)	Interest rate charged to individual $i$ by bank $j$ on mortgage lending.
Immigrant	Dummy variable that takes 1 if the borrower is foreign born, 0 otherwise
ImmiNat	Dummy variable that takes 1 if in a contract has both immigrant and native, 0 otherwise
Age	Borrower age in Years
Loan Size	Amount of outstanding loans (in log)
Coint	Dummy variable that takes 1 if there is co-borrower in loan contract, 0 otherwise.
Credit history	1 if borrower has previous record in the database, 0 otherwise.
Fixed	1 if loan is fixed rate, 0 otherwise
Female	1 if the borrower is female, 0 otherwise

Credit history of borrowers is used as a proxy for risk and it is given by the number of quarters since the first appearance in the database. The mean credit history for the immigrants is 1.121 years, which is significantly less than that of natives (2.314 years). However, 66 percent of sample data has no credit history. As expected the portion of immigrant borrowers without credit history is higher than natives with no credit history (81 percent vs. 65 percent). To deal with this issue, instead of using credit history as a continuous variable, we express it as a dummy.

In terms of borrower characteristics, data indicate that immigrants are slightly younger than natives <sup>3</sup> (40.2 years vs. 41.5 years). Not surprisingly, males and females do not participate evenly in mortgage lending (21 percent vs 32 percent). Overall, 47 percent of loan applications have both male and female borrowers <sup>4</sup>. In terms of mortgage preference, both immigrants and natives prefer mortgage with initial duration(*durata*) of more than 5 years.

In our dataset the number of loan contracts granted to the immigrants (exclude contracts where both immigrant and native participate together) are 58717<sup>5</sup>

<sup>3</sup>In case of co-borrower contracts, we use maximum age among the borrowers in the contract.

<sup>4</sup>Although we did not present summary statistics for gender in the table, results are available from the authors upon request.

<sup>5</sup>Include both single and co-borrower contracts.

Table 3.3: Summary Statistics

variables Names	Full sample		Single borrower cont.		Co-borrower cont.	
	Mean	SD	Mean	SD	Mean	SD
Mortgage Rate(TAEG) (in%)						
1. Native	3.21	1.16	3.16	1.15	3.27	1.15
2. Immigrant	3.48	1.09	3.34	1.09	3.59	1.07
3. ImmiNat	3.36	1.11			3.36	1.12
Fixed Interest rate (in %)						
1. Native	3.313	1.22	3.27	1.22	3.36	1.22
2.Immigrant	3.623	1.11	3.47	1.16	3.75	1.06
3.ImmiNat	3.488	1.16			3.49	1.16
Adjustable Interest rate (in %)						
1. Native	3.138	1.1	3.08	1.11	3.2	1.09
2. Immigrant	3.409	1.07	3.28	1.05	3.51	1.07
3. ImmiNat	3.27	1.07			3.27	1.07
Loan amount (log)						
1.Native	11.742	0.46	11.697	0.46	11.792	0.45
2. Immigrant	11.658	0.38	11.647	0.45	11.666	0.32
3. ImmiNat	11.795	0.43			11.794	0.43
Credit History (in year)						
1.Native	2.314	4.25	2.75	4.37	1.83	4.08
2.Immigrant	1.121	2.98	2.06	3.79	0.41	1.91
3.ImmiNat	1.829	3.94			1.96	4.18
Age (in year)						
1.Native	41.456	10.43	39.99	9.61	43.06	11.03
2.Immigrant	40.231	8.544	39.8	8.92	40.55	8.23
3. ImmiNat	42.699	9.371			42.7	9.37
Number of observations	980713		491562		488861	

Table 3.4: Test of mean differences of observable characteristics between Immigrants and Italian

Variable names	Full sample		
	Native	Immigrant	Diff
Mortgage Rate (TAEG) (in %)	3.21	3.48	0.27**
Fixed Interest Rate (in %)	3.314	3.623	0.31**
Variable Interest Rate (in %)	3.136	3.408	0.272**
Loan Size (log)	11.742	11.658	0.084**
Credit History (in year)	2.314	1.121	1.193**
Age (in year)	41.456	40.231	1.225**
Number of observations	980713		

In table 3.4, we tabulate the mean differences between immigrants and natives on some key variables. The result from an unconditional t-test shows that the difference between immigrants and natives in terms of our outcome variable, average mortgage rate, is statistically significant. This serves as suggestive evidence regarding the presence of differential pricing of the mortgage against immigrants. However, we also find significant differences in terms of loan size, credit history and proportion of loan granted on fixed and variable interest rates. Hence, before making any conclusions on the existence of disparate pricing between immigrants and natives, econometric analyses have to take into account these differences in observable characteristics.

### 3.6 Econometrics strategy and results

From Table 3.4 we find primary evidence that the interest rates charged on immigrant borrowers are different from that of native borrowers. In this section, we examine to what extent interest rates differ between immigrants than natives for mortgage credit. We assume the cost of mortgage credit is determined by the following linear relationship:

$$r_{ijkt} = \beta' X_{ijt} + \lambda I + m_k + U_t + b_j + \epsilon_{ijkt} \quad (3.2)$$

Where the dependent variable ( $r_{ijkt}$ ) is the interest rate charged on the granted mortgage loan to the individual (i) by bank (j) in province (k) in quarter (t).  $I$  is a dummy variable reflects the immigrant status of borrowers. The estimate of coefficient  $\lambda$  represents the interest rate gap between immigrants and natives borrowers.  $X_i$  is a set of mortgage and borrower's characteristics.

$$\beta' X_{ijt} = \beta_1 \text{Imminat} + \beta_2 \text{C.history} + \beta_3 \text{Loansize} + \beta_4 \text{Coint} + \beta_5 \text{Age} + \\ \beta_6 \text{Age.squared} + \beta_7 \text{Female} + \beta_8 \text{Fixed}$$

The first of these is a dummy, *Imminat*, to control for possible differences in the interest rate due to the participation of natives as co-borrowers. Then we take into account the credit history of borrowers including dummy *C.history*. Previous studies find that having credit history contributes to reducing the interest rate differential between immigrants and natives (Albareto and Mistrulli, 2011). Thus we control for credit history to ensure that mortgage rate differential between immigrants and natives not due to the lack of immigrant's credit history and expect negative sign for credit history. The effect of loan size on interest rate is captured by the inclusion of a dummy called *Loan size*. Black et al. (2003) report that loan amounts positively associated with the applicant's market power. We expect negative sign for the coefficient of loan size. To capture the effect of having co-borrower in the contract we included *Coint* dummy. The next two components refer to the age and age squared of the household head. Following the life-cycle hypothesis, we would expect negative sign for the coefficient  $\beta_5$  and positive sign for the coefficient  $\beta_6$ . A dichotomous variable, *female*, is included to control for possible differences in mortgage rate arise from the gender of the borrowers. Dummy variable, *fixed*, reflect where the mortgage rates are fixed or variable throughout the duration of the contract. We expect positive sign for the coefficient  $\beta_8$  as fixed-rate mortgages are costly than adjustable-rate mortgages.  $(b_j)$  are the bank specific effects,  $(m_k)$  are province fixed effects and  $(u_t)$  are time fixed effects. More in detail, we include 24 dummies, one for each quarter, 111 dummies for provinces, and 176 dummy variables for banks to control for possible heterogeneity across time, locations and banks.

In Table 3.5, we present the results from OLS estimation. The mortgage interest rate is the left hand side variable. We use all the variables describing the characteristics of the borrowers, loans, and risks which are available in the data set. The results are consistent with the descriptive results provided in the previous section. In the first column, we control for only immigrant and *Imminat*, in addition to time, bank and province fixed effects, and we find that immigrants pay 37 basis points more for their mortgages compared to natives. The coefficient of *Imminat* is positive and significant. It implies that contracts where natives participate as co-borrowers with immigrants, charged higher compared to contracts where all

Table 3.5: Basic regression results

Variables	(1)	(2)	(3)	(4)	(5)
Immigrant	0.371*** (0.00386)	0.348*** (0.00385)	0.346*** (0.00353)	0.302*** (0.00605)	0.269*** (0.00702)
Imminat	0.152*** (0.00500)	0.146*** (0.00499)	0.111*** (0.00468)	0.116*** (0.00468)	0.129*** (0.00482)
C.history		-0.0178*** (0.000243)	-0.00973*** (0.000246)	-0.00933*** (0.000248)	-0.0105*** (0.000254)
Loan size(log)			-0.222*** (0.00253)	-0.221*** (0.00253)	-0.223*** (0.00251)
coint			0.107*** (0.00210)	0.0976*** (0.00215)	0.104*** (0.00220)
Age			-0.0141*** (0.000577)	-0.0143*** (0.000578)	-0.0169*** (0.000592)
Age-squared			0.000132*** 0.00006	0.000135*** 0.00006	0.000165*** 0.00006
Female			-0.0136*** (0.00255)	-0.0125*** (0.00256)	-0.0105*** (0.00262)
Fixed			0.788*** (0.00239)	0.789*** (0.00239)	0.670*** (0.00230)
coint*immi				0.122*** (0.00728)	0.144*** (0.00752)
C.history*immi				-0.124*** (0.00963)	-0.149*** (0.00993)
Largebank					-0.0605*** (0.00206)
Largebank*immi					0.132*** (0.00698)
Time FE	YES	YES	YES	YES	YES
Province FE	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	NO
R-squared	0.331	0.335	0.422	0.422	0.393
Observations	979,048	979,048	979,048	979,048	979,048

Robust standard errors in parentheses.

\*\*\*p < 0.001, \*\*p < 0.01, \*p < 0.05

borrowers are natives.

In column (2), we add credit history whose coefficient is highly significant and negative, and the coefficient for immigrant drops to about 0.35. Credit history dummy is used as a proxy of the amount of information gathered by lenders. As expected, the coefficient of credit history indicates borrowers having credit history are charged lower than borrowers without credit history.

In column (3), we add a host of other controls, which includes borrower's age, age-squared, coint, gender, and type of loan interest rate. The coefficient of loan size is negative. As we discussed earlier, it implies that larger loans have lower mortgage rates. We include borrower's age (Age) as a proxy of wealth and publicly available information. The coefficient of age is negative. It means banks consider young borrowers riskier than older borrowers. This finding is consistent with Chiuri and Jappelli (2003) found in their study. The coefficient of "Coint" is highly significant and positive, implies that having at-least a co-borrower in a contract increases the cost of mortgage credit. Generally one may argue additional income, wealth, credit history of co-borrowers make a co-borrower contract less risky than a single borrower contract to the banks. Therefore, it is more likely to charge the lower price for Co-borrower contracts. On the flip side, anecdotal evidence suggests that if the co-borrowers in a contract are unemployed or the loan's down payment is below 20 percent of the selling price of the property, the banks ask for private mortgage insurance (PBI). Therefore, PBI might explain the interest rate gap between co-borrower contracts and single borrower contracts. We also control for the type of mortgage rate. Borrowers pay more for selecting fixed-rate mortgages than adjustable-rate mortgages. This is consistent with the findings of Diaz-Serrano and Raya (2014). It might be explained by the fact that borrowers are more risk averse and hence prefer to pay a premium for fixed rate mortgages in order to insure themselves against market and interest rate volatility. Surprisingly, the result we find regarding the female dummy is contradicting with literature. Clearly, we can not investigate this further due to lacking of data.

In column (4), we include the same controls as in specification (3), with (i) two interaction terms: Coint\*immi and C.History\*immi. Our empirical findings



illustrate that co-borrower mortgage contracts are on average more expensive than single borrower loans. And even more expensive when co-borrowers are all immigrants as opposed to natives. The coefficient of interaction term  $c.history*immi$  is negative. This suggests that immigrants with credit history pay a lower rate compared to immigrants without credit history. Having credit history helps reduce the information asymmetry between immigrants and banks. However, the differential interest rate is still significant and positive (0.302).

The estimates reported in Column 5 consider additional terms: a dummy variable for large banks and its' interaction with immigrants to check the effect of bank characteristics on mortgage pricing<sup>6</sup>. The results of the estimate show that large banks charge lower interest compared to banks those are originated fewer mortgages and immigrants do not benefit by granted mortgages from large banks as they need to pay higher than borrowing from other banks.

These results are consistent with the findings of previous studies. For example, Albareto and Mistrulli (2011) find that immigrants pay 70 basis points more for overdraft than their native counterparts. Diaz-Serrano and Raya (2014) report a gap of 15 basis points between immigrants and natives in mortgage pricing in Spain.

Although we control for a large number of variables, we must admit that differential mortgage rates may be due to some unobservable factors that we cannot control for. The interest rate differential documented here is more likely to indicate statistical discrimination than racial discrimination. One should keep in mind that banks evaluate the creditworthiness of a borrower based on soft information which lenders get through day to day interaction with the borrowers (Alesina et al., 2013). This implies that immigrants may, at least partially, compensate for the lack of interaction with banks.

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<sup>6</sup>We consider top 10 banks in terms of granting mortgage loans as Large bank, about 55 percent of the loans granted by these banks.

### 3.7 Oaxaca-Blinder Decomposition Analysis

After inequalities in the mortgage pricing are measured, a natural step is to explain them. In this section, we apply the three-fold Oaxaca-Blinder decomposition to explain the interest rate gap between natives and immigrants. The aim of the Oaxaca-Blinder decomposition is to explain how much of the mean interest rate difference across two groups is due to group differences in explanatory variables, and how much is due to differences in the magnitude of the regression coefficients (Blinder, 1973; Oaxaca, 1973).

Using "oaxaca" package in the R statistical programming environment, we calculate the Oaxaca-Blinder decomposition (Hlavac, 2014). Figure 3.4 depicts the estimation results for each variable, along with error bars that indicate 95 percent confidence intervals. In the endowments component, most variables appear to have a statistically insignificant (or only marginally significant) influence, with the exception of *coint* and *credit history*. It seems that a significant portion of the immigrant-native mortgage rate gap is driven by group differences in the proportion of borrowers with credit history and the choice of co-borrower contracts (*coint*). Similarly, most variables are either insignificant or show only marginal significance in the coefficients component. The only variable which is clearly statistically significant is "loansize". As Figure 1 makes clear, differences in the regression coefficients on "loansize" account for the decisive portion of the interest rate differential. In the context of linear regression, the mean mortgage rate can be expressed as

$$\bar{r}_G = \bar{X}'_G \hat{\beta}_G + \epsilon_G \text{ and } G \in i, n \quad (3.3)$$

Where  $\bar{r}_G$  is the mean mortgage interest rate for Group  $G \in i, n$ . Where  $i$  represents immigrant and  $n$  represents native.  $X$  matrix contains: Loan size, age, *coint*, *credit history*, *fixed*, *female* and *mixgender*.<sup>7</sup> Hence,

$$\Delta \bar{r} = \bar{r}_i - \bar{r}_n$$

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<sup>7</sup>For single borrower contracts, we drop *coint* and *mixgender*.

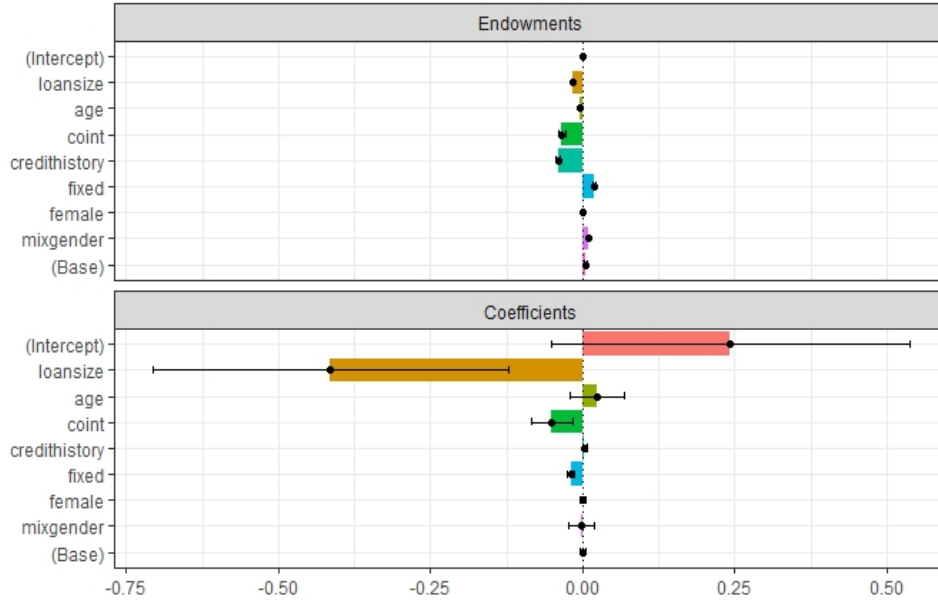
can be written as:

$$\bar{r}_i - \bar{r}_n = \bar{x}_i \hat{\beta}_i - \bar{x}_n \hat{\beta}_n \quad (3.4)$$

Equation 3.5 is the threefold Oaxaca-Blinder decomposition of the mean mortgage rate difference. The interest rate gap decomposes into three parts: (1) endowments: the contribution of differences in explanatory variables between two groups; (2) coefficients (not explained): a part that due to group differences in the coefficients. It is used as a proxy for the discrimination; (3) Interaction: a part of the gap caused by differences in explanatory variables and coefficients occur at the same time.

$$\Delta \bar{r} = (\bar{x}_i - \bar{x}_n) \hat{\beta}_n + \bar{x}_n (\hat{\beta}_i - \hat{\beta}_n) + (\bar{x}_i - \bar{x}_n)' (\hat{\beta}_i - \hat{\beta}_n) \quad (3.5)$$

Figure 3.4: The endowments and coefficients components of a threefold Oaxaca-Blinder decomposition



In Table 3.6, we present the result of the threefold decomposition. The differential interest rate is 0.2693<sup>8</sup>. The results of the decomposition analysis indicate that endowments only account for 21.8 percent of the gap in the mortgage rate. On the other hand, about 80 percent of the observed difference in the interest rate does

<sup>8</sup>we exclude Co-borrower contracts where at least one co-borrower is native.

Table 3.6: Oaxaca-Blinder Decomposition of the mortgage rate gap between immigrants and Natives

Variables	Full sample	Single borrower	Co-borrower
Mean Interest rate -Immigrant	3.48	3.3404	3.5855
Mean Interest rate -Native	3.2107	3.1566	3.2704
Estimated gap	0.2693	0.1838	0.3151
Endowments	0.0587 (0.003) 21.80%	0.0259 (0.002) 14.10%	0.0285 (0.005) 9.04%
Coefficients (Different treatment)	0.2155 (0.004) 80%	0.1568 (0.007) 85.30%	0.2667 (0.006) 84.64%
Coefficient (interaction)	-0.0049 (0.002) -1.80%	0.0011 (0.002) 0.60%	0.0199 (0.005) 6.32%
Observations	945618	490491	454859

not depend on the observable characteristics of the two groups, and the remaining -1.08 percent is accounted for by the interaction of endowments and coefficients. In order to detect whether these results may vary by the number of borrowers in the contracts, we perform the same decomposition for single and multi-borrower contracts. The results do not vary significantly with respect to the results obtained for full the sample. However, in both cases, endowments explain less than 20 percent of the gap.

### 3.8 Propensity Score matching

So far, our analysis finds disparities in mortgage pricing which can be an indication of existing statistical discrimination. In this section, we apply the most widely used propensity score matching (PSM) (Rosenbaum and Rubin, 1983) technique based on a unidimensional balancing score of observations to compare immigrant and native borrowers who are ex-ante very close in terms of the observable characteristics including loan size, Age, credit history, gender, type of loan contract, and type of interest rate. Matching techniques assist to get covariates balance and thus aid in

estimating causal effects in studies lacking randomization <sup>9</sup>.

Applying PSM we simply compare the outcomes of two groups- one is the treatment group and another is the control group that is not being treated. Following Alesina et al. (2013), if we assume that there are no significant differences in unobservable characteristics between the two matched groups of borrowers, then the observed differential mortgage interest rate can be attributed to the effect of having received the treatment, in this case to being an immigrant borrower.

For matching, we first run a logit model for predicting the probability that an individual borrower is in the treatment group (Immigrant). The estimated probability is called propensity score.

$$\Pr(\text{Immigrant} = 1 | X) = \frac{\exp(\beta_0 + \beta_1 \text{Loan size} + \beta_2 \text{Age} + \beta_3 \text{Credit History} + \beta_4 \text{Female} + \beta_5 \text{Coint} + \beta_6 \text{Fixed})}{1 + \exp(\beta_0 + \beta_1 \text{Loan size} + \beta_2 \text{Age} + \beta_3 \text{Credit History} + \beta_4 \text{Female} + \beta_5 \text{Coint} + \beta_6 \text{Fixed})} \quad (3.6)$$

Based on individual propensity score we match immigrant-native borrowers who are ex-ante very close in terms of observable characteristics so that the differences in mortgage pricing between them can be attributed to the treatment effect. One advantage of matching over regression is flexibility. In matching, the effect of covariates on the outcome need not be linear, since the matching method estimates the effect of treatment by matching borrowers with the same covariates. However, we are aware that there are unobservable factors that influence the mortgage rate charged on these two groups.

There are many matching algorithms that can be used. In this study, following Dehejia and Wahba (2002), we match the borrowers based on the nearest neighbor with replacement with a caliper<sup>10</sup> of 0.25 using 'MatchIt' package (King et al., 2011). The near-neighbor matching produces matches that result in the lowest mean differences between groups (Randolph and Falbe, 2014).

Figure 3.5 plots the histograms before and after matching. The histograms

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<sup>9</sup>As a note, matching is not an estimation process, rather a way of pre-processing data (Iacus et al., 2009).

<sup>10</sup>Measure of the distance of two groups in terms of propensity scores can be matched

before matching on the left differ significantly between immigrants (treated) and natives (control). The histograms on the right are identical after the matching.

Average treatment effect on treated (ATT) is the key indicator that measures the differences in mortgage rates between immigrants and natives. Table 3.7 contains the average treatment effect in which we match treated borrowers (immigrants) respectively with one, four, and eight corresponding non-treated borrowers (natives).

Table 3.7: The matching procedure: Average Treatment Effect

No.of controls matched	Entire Sample		Trimmed Sample	
	Average treatment effect (ATT)	Standard error	Average treatment effect (ATT)	Standard error
n = 1	0.1726***	0.0065	0.1387 ***	0.018
n = 4	0.1967***	0.0065	0.1919***	0.0179
n = 8	0.2044***	0.0064	0.1843***	0.0183

The findings show that for a borrower, on average, the effect of being an immigrant induces a rise of 17-20 basis points in the mortgage cost. If we restrict the analysis to those borrowers with a propensity score matching between 0.1 and 0.9, the interest rate differential remains almost identical. Comparing these results with our baseline estimates, we find that the Propensity score matching estimates are much lower. This may suggest that part of the effect we found could be explained by some observable characteristics.

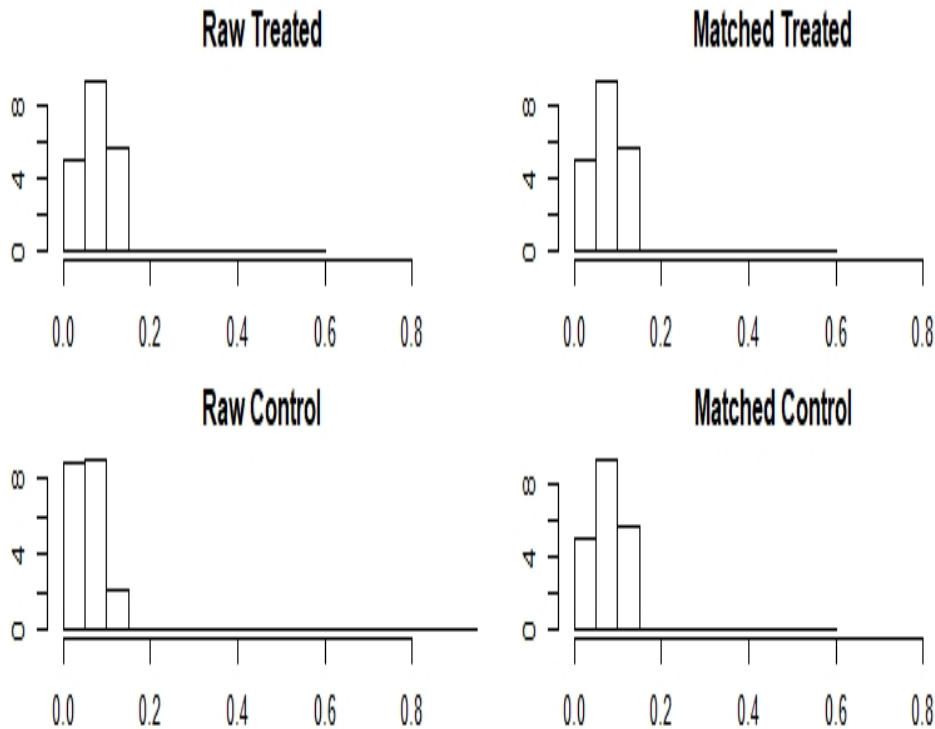
As we mentioned earlier, matching is the method of preprocessing data. To matched data, any method can apply that might to the raw data to estimate causal effect (Iacus et al., 2012). In our matched data that got applying propensity score matching, we have equal number of immigrants and natives who have close observable characteristics. As an additional exercise, now we check whether our previous findings from OLS estimation change to the match data.

In Table 3.8, regression results on matched data show the differential interest rate still persists and consistent with our regressions on the full sample. The coefficients of immigrant ranges between 23 to 30 basis points. The coefficients of other variables are almost unchanged. However, the interest rate charged on male

Table 3.8: Regression results- Matched data

	1	2	3
Immigrant	0.2993*** (0.0052)	0.2342*** (0.0075)	0.2379*** (0.0087)
Loan size	-0.2290*** (0.0061)	-0.2267*** (0.0061)	-0.2266*** (0.0061)
Age	-0.0028*** (0.0003)	-0.0028*** (0.0003)	-0.0028*** (0.0003)
Coint	0.1394*** (0.0061)	0.0817*** (0.0078)	0.0828*** (0.0079)
Credit history	-0.1705*** (0.0065)	-0.1675*** (0.0065)	-0.1626*** (0.0088)
Fixed	0.8305*** (0.0061)	0.8296*** (0.0061)	0.8297*** (0.0061)
Female	-0.0119 (0.0071)	-0.0113 (0.0071)	-0.0113 (0.0071)
Coint*immi		0.1177*** (0.0098)	0.1151*** (0.0103)
Credit history*immi			-0.0104 (0.0127)
Time F.E	Yes	Yes	Yes
Province F.E	Yes	Yes	Yes
Bank F.E	Yes	Yes	Yes
Adj. R2	0.4755	0.4762	0.4762
Num. obs.	115050	115050	115050

Figure 3.5: Histograms of propensity scores before and after matching



and female is not statistically significant.

## Coarsened Exact Matching

Two assumptions of PSM, namely the ellipsoidal symmetry of covariates and the correct specification of the model might be criticized. As an additional robustness check of our matching results, we apply another multidimensional matching called coarsened exact matching (Henceforth, CEM). CEM is a monotonic imbalance bounding matching method which ex-ante categorizes original covariates into user-defined intervals then prune observations that have no close matches on pre-treatment covariates in both treatment and control groups (Iacus et al., 2012).

The estimate casual effect such as sample average treatment effect on treated (SATT) is calculated by comparing the outcomes of two groups and is usually less model dependent<sup>11</sup>. The cem package in the R statistical programming environment (Iacus et al., 2009) was used to conduct the matching. "cem" pro-

<sup>11</sup>Less dependent on the model specifications



vides an automated implementation of the coarsened exact matching and provides standard output including unidimensional measures of imbalance (L1), SATT and summary.

Table 3.9 and Table 3.10 report the differences in covariates before and after matching. The overall imbalance is given by the L1 statistics. Perfect global imbalance is indicating by L1=0 and larger values of L1 indicate larger imbalance in covariates between two groups, with maximum L1=1 which indicates complete separation (Iacus et al., 2012). In our case before matching the overall imbalance is L1=0.59, which includes imbalance with respect to the joint distribution of covariates. After applying the matching technique, the imbalance drops to 0.46.

Table 3.9: Univariate Imbalance Measures: Before matching

	<b>L1</b>	mean	min	25%	50%	75%	max
Age	0.085	1.294	-15	-0.25	0.5	2	12.75
Loan size	0.000001	0.087	-2.30	0.055	0.094	0.135	0.69
Credit history	0.1527	1.178	0	0	0	3	0
Coint	0.075	-0.075	0	0	-1	0	0
Fixed	0.0845	0.084	0	0	0	0	0
Male	0.0756	0.075	0	0	0	1	0

Multivariate Imbalance Measure: L1=0.590

Percentage of local common support: LCS=5.4%

Table 3.10: Univariate Imbalance Measures: After matching

	<b>L1</b>	mean	min	25%	50%	75%	max
Age	0.0307	0.0237	0	0	0.25	0	-2
Loan size	0.108	-0.037	0.589	-0.043	-0.083	-0.071	-0.001
Credit history	0.016	-0.005	0	0	0	0	0
Coint	0	0	0	0	0	0	0
Fixed	0	0	0	0	0	0	0
Male	0	0	0	0	0	0	0

Multivariate Imbalance Measure: L1=0.4628

Table 3.11 presents the SATT estimates using two coarsened exact match-

Table 3.11: Sample Average Treatment Effect on the Treated

SATT (point estimate)	Method	Number of obs.
0.2169*** (0.006)	Restricted K-t-K match	114890
0.2250*** (0.0048)	Automated coarsening	930540

ing algorithms. In case of automated coarsened matching, SATT is the simple weighted difference of means in mortgage interest rates (in k2k no weights are require). The SATT estimate using cem is between 21 and 22 basis point, which is about 3 basis points higher than SATT estimated using PSM.

## 3.9 How robust are the results?

In the previous section, we find that immigrants pay more than natives. As a robustness check, we carry out separate analyses for single borrower contracts and co-borrower contracts. The ratio of single and co-borrower contracts in our dataset is 49:51.

### 3.9.1 Single Borrower Contract analysis

In Table 3.12, we present the results of the interest rate differential between immigrants and natives in single borrower contracts. Our findings are in line with the results of the previous regressions. However, the range of differential interest rates between immigrants and natives is between 22 and 30 basis points, which is lower than our full sample estimates.

In the first column, we control for only immigrant status, in addition to time, province and bank fixed effects, and we find that immigrant borrowers pay about 25 basis points more than natives with the coefficient significant at the 1% level. In column (2), we add credit history and loan size whose coefficients are highly significant and negative and make the coefficient of immigrant fall to 0.22. In column 3 and column 4 we add a number of other controls and interaction term include age, gender, type of mortgage rate and  $c.history*immi$ . The coefficient for immigrant reaches to about 0.30.

In column 5, to capture the differences among immigrants based on their origins on the mortgage rate gap, we replace the dummy of immigrant with a set of dummies indicating their continent of origin. As before, our reference category

is native Italians. The estimation reveals that there is always an interest rate gap for immigrants, for all continents. If we compare across the continent of origin groups, the gap tends to higher for immigrants from Asia, followed by Africa, Central America, Europa, South America, Oceania and North America. However, we recognize that our dataset does not allow us to control for other variables including labor market performance, level of education, etc. Thus we are unable to investigate further the interest rate difference across borrowers from different continents. From our basic estimates, we do not find many changes in other controls from our basic estimates for the full sample.

### 3.9.2 Co-borrower Contract Analysis

In this section, we estimate the interest rate differential between immigrant and native borrowers for their mortgages in the Co-borrower contracts. The results are presented in Table 3.13. We find that the interest rate differential varies between 38 basis points and 44 basis points even after controlling for other effects in Co-borrower contracts<sup>12</sup>. One would expect Co-borrower mortgage contracts might be charged comparatively a lower interest rate since they are supposed to be less risky due to combine risk profile and income. However, we observe that immigrants pay higher for the co-borrower contracts which is approximately 10 basis points more compared to single borrower contracts. A possible explanation for this striking result could be that immigrants might charge additionally for private mortgage insurance in cases such as loan down payment is less than 20 percent of the sales price of the property, unemployed Co-borrower, etc.

With regard to some of our key explanatory variables, the estimated impact is much lower now as opposed to the full sample. For instance, the negative impact of the loan size is lower now. Similarity for the credit history. Whilst for "Fixed", the impact is relatively stable. A major difference is the estimated sign if all of the borrowers are female, the sign implies that females are now charged higher unlike in the previous estimate for both the single borrower sample and full sample. However,

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<sup>12</sup>We exclude immigrant borrower's continent of origin from analysis as we can not segregate it when immigrants from different continents participate in a co-borrower contract.

Table 3.12: Single borrower contract Analysis

Variables	(1)	(2)	(3)	(4)	(5)
Immigrant	0.254*** (0.00589)	0.228*** (0.00580)	0.247*** (0.00541)	0.301*** (0.00639)	
C.history		-0.0151*** (0.000339)	-0.0138*** (0.000343)	-0.0134*** (0.000346)	-0.0134*** (0.000346)
Loan size (log)		-0.286*** (0.00356)	-0.235*** (0.00338)	-0.235*** (0.00338)	-0.234*** (0.00338)
Age			-0.00687*** (0.000916)	-0.00677*** (0.000916)	-0.00670*** (0.000916)
Age-squared			0.00007*** 0.00001	0.00007*** 0.00001	0.00006*** 0.00001
Fixed			0.792*** (0.00348)	0.792*** (0.00348)	0.792*** (0.00348)
Female			-0.0231*** (0.00265)	-0.0233*** (0.00265)	-0.0229*** (0.00265)
Chistory*immi				-0.146*** (0.0113)	-0.142*** (0.0113)
Europa					0.296*** (0.00734)
Asia					0.377*** (0.0160)
Africa					0.316*** (0.0188)
North America					0.127*** (0.0305)
Central America					0.331*** (0.0460)
South America					0.278*** (0.0166)
Oceania					0.187*** (0.0556)
Time FE	YES	YES	YES	YES	YES
Province FE	YES	YES	YES	YES	YES
Bank FE	YES	YES	YES	YES	YES
R-squared	0.318	0.334	0.407	0.407	0.407
Observations	490,491	490,491	490,491	490,491	490,491

Robust standard errors in parentheses.

\*\*\*p < 0.001, \*\*p < 0.01, \*p < 0.05

the positive sign of the female coefficient is consistent with previous studies that show that females pay more their credit than males (Alesina et al., 2013; Cheng et al., 2011).

Table 3.13: Co-borrower contract analysis

Variables	(1)	(2)	(3)	(4)
Immigrant	0.435*** (0.00501)	0.3881*** -0.005	0.427*** (0.00461)	0.431*** (0.00473)
Imminat		0.107*** (0.005)	0.1227*** (0.0046)	0.1227 (0.0003)
C.history		-0.0126*** (0.000363)	-0.00661*** (0.000358)	-0.00652*** (0.000360)
Loan size(log)		-0.255*** (0.00408)	-0.204*** (0.00377)	-0.204*** (0.00377)
Age			-0.0234*** (0.000796)	-0.0234*** (0.000796)
Age-squared			0.000213*** (0.00008)	0.000213*** (0.00008)
Fixed			0.790*** (0.00328)	0.790*** (0.00328)
Female			0.0712*** (0.00969)	0.0751*** (0.00969)
C.history*Immi				-0.0579*** (0.0184)
Time FE	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Observations	488,548	488,548	488,548	488,548
R-squared	0.349	0.361	0.438	0.438

Robust standard errors in parentheses.

\*\*\*p < 0.001, \*\*p < 0.01, \*p < 0.05

### 3.9.3 Mortgage Pricing: SHIW data

Some researchers might include additional control for variables like Loan to value ratio, loan to income ratio, borrower's level of education, etc to have a more suitable framework for the analysis of differential mortgage pricing. Conventional wisdom in the mortgage lending suggests that loan to value (LTV) ratio and loan to income (LTI) ratio are positively associated with the mortgage interest rate. Anecdotal evidence suggests that borrowers with higher education attainment could have more bargaining power than borrowers with less or no education. Despite the richness

of our dataset which includes credit information of all granted loans (for our analysis period, 2011-2016), some additional controls for risk and bargaining power of borrowers may omit.

As an additional robustness check, we utilize the Survey on Household Income and Wealth (SHIW) data which is also maintained by the Bank of Italy. Primarily, it contains details information about households' income, consumption, wealth, and demographic characteristics. In addition, mortgage holding information is also available. The information on LTV is only available since 2014. Therefore, We can comprise two latest waves and end up with a sample of 1136 observations after a filtering procedure. The unconditional mean mortgage rate for foreign-born borrowers is about 28 basis points more than that for their native counterparts (3.94% vs 3.66%).

To estimate the mortgage rate differential, the model can be written as follows:

$$r_{i,j,t} = \alpha + \beta immi_i + \lambda loansize_{i,t} + \phi LTI_{i,t} + \rho female_{i,t} + \psi fixed_{i,t} + \gamma LTV_{i,t} + \eta age_{i,t} + \sigma agesquared_{i,t} + \Omega lowedu_{i,t} + \tau_t + \mu_j + \epsilon_{ijkt}$$

Table 3.14 reports the results of the OLS estimation. In our empirical model, we control for time and macro-region fixed effects in all columns<sup>13</sup> Empirical findings indicate that immigrants are, *ceteris paribus*, charged higher than natives. The interest rate differential varies between 42 to 52 basis points which are consistent with our findings using CR data. The interest rate gap persists even after controlling for a set of mortgage, risk and borrower's characteristics including income to loan ratio, level of education, loan to value ratio. Possible explanations for these results could be that immigrant borrowers receive disparate treatment from lenders compared to native borrowers.

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<sup>13</sup>In the SHIW data, the information about banks is not available. Therefore, we are unable to include bank fixed effects in our empirical model.

Table 3.14: Mortgage rate gap between Immigrant and Natives (SHIW data)

Variables	(1)	(2)	(3)	(4)
immigrant	0.427*	0.518**	0.478*	0.443*
	(0.258)	(0.253)	(0.247)	(0.251)
Loan amount		-0.00004***	-0.00003***	-0.00003***
		(9.01e-07)	(8.89e-07)	(9.18e-07)
Loan to income ratio		0.325***	0.274***	0.288***
		(0.0807)	(0.0793)	(0.0834)
Female			0.0108	-0.0001
			(0.110)	(0.110)
Fixed			0.830***	0.829***
			(0.113)	(0.113)
LTV				0.000944
				(0.00227)
Age				0.0159
				(0.0368)
Age-squared				-0.0002
				(0.0003)
Low-edu				0.396
				(0.271)
Time F.E	Yes	Yes	Yes	Yes
Region F.E	Yes	Yes	Yes	Yes
Observations	1,136	1,136	1,136	1,136
R-squared	0.084	0.134	0.175	0.177

\*\*\*p < 0.001, \*\*p < 0.01, \*p < 0.05

### 3.10 Discussion and Conclusions

In this study, we first time examine the pricing differences in mortgage lending between immigrants and natives using Italian data. More specifically, we use the unique database maintained by the Bank of Italy to test whether immigrant borrowers are charged higher interest rates on their mortgages compared to their native counterparts for 2011-2016. We also contribute to extending the growing literature on mortgage pricing by including a separate analysis of both the single borrower and co-borrowers contracts.

According to the results of the empirical analysis, immigrants pay 30 basis points more for their mortgages than natives in Italy. This difference persists even after controlling for a host of characteristics of the borrowers, mortgages, and risks. Moreover, the interest rate gap seems to be increased for co-borrower contracts compared to single borrower contracts. Using the PSM we compare mortgage pricing of immigrant borrowers and native borrowers who are very similar in terms of their observable characteristics. On average, we find the effect of being immigrants induces a rise of 17-20 basis points in the mortgage price.

We could think about two possible explanations of the pricing difference of mortgages between natives and immigrants. One is statistical discrimination, immigrants being riskier than natives, in the sense that banks may consider the weak economic and labor market integration of immigrants in Italy: therefore they are suspicious about the creditworthiness of the immigrant borrowers and charged higher. The second one is that immigrants may not as good as natives at bargaining for good deals due to lack of language skills, financial literacy, wealth position, etc.

We recognize that mortgage pricing may be related to other factors including the loan to value ratio, the income of the borrowers, etc. Unfortunately, our dataset does not allow us to control for all risks, thus we have been unable to control for these variables in the empirical model. Nevertheless, using another dataset, the SHIW, we separately analyze mortgage pricing between natives and immigrants and control for the variables that are omitted from the CR data. We find empirical evidence that immigrants charge higher for their mortgages compared to native



Italians.

Despite possible limitations of our methodology and data, we still argue that more work needs to be done to explain the differences in home-ownership rates and mortgage pricing between immigrants and natives as the size of the immigrant community and their contribution has increased in Italy. Fair opportunity to access the mortgage market is essential to integrate economically and socially. Besides improving the banks' ability to deal with immigrants, the regulator's monitoring is also essential in this regard.

# Chapter 4

## Conclusions

Like other European countries, immigration is the prime source of population growth in Italy. This, together with the economic downturn and its impact on sustainable economic growth, have served to heighten the importance of the degree of the economic integration of immigrants. Although in recent years research on immigrants in Italy has expanded, there are still gaps in our understanding regarding the level of economic progress of foreign-born. Using both confidential and publicly available data, this thesis contributes to existing literature on the economic integration of immigrants by focusing on the immigrant's wealth accumulation and sources of economic inequalities in Italian society.

As we mentioned earlier, integration is a multi-dimensional process and economic integration here we focus on. The first research question, posed in chapter two of this thesis, asked how large is the wealth gap between immigrants and natives? Immigrants largely move to improve their economic standing or well-being. Economic integration is one of the central processes of migrant integration and offers valuable insights into their other forms of integration including social, political and cultural. Economic integration of immigrants has several related measures, including income, occupational status, home-ownership, etc. But the most complete measure among these is wealth (see chapter 2 for more details).

Wealth is essential for all household to be economically secured and to

generate opportunities for next generations (Shapiro et al., 2013). A focus on the wealth position of immigrant households highlights how immigrants are economically integrated into the host society and gives a unique perspective on their financial well-being (Painter et al., 2015). Using a representative survey of Italian households, SHIW, we find that immigrants have much lower wealth accumulation than natives for the period 2006 to 2016. To discover the major drivers of such sizeable wealth inequality, we tested a wide range of possible explanations, including household financial inclusion, portfolio choices and disparate treatment in the mortgage market.

We propose some explanations of wealth inequality. Financial market participation represents one crucial feature of economic integration (Chatterjee, 2009b). Financial markets offer tools to transfer resources across time and countries, make payments and investment opportunities for future income. A low rate of participation in the financial market may lead to lower welfare (Osili and Paulson, 2008a). Our estimation results depict that immigrants are less likely than otherwise similar natives to participate in the financial market. Potential explanations for the lower financial inclusion of immigrants might be lack of resources, cultural bias, high transaction costs and, so on.

Portfolio allocation choices are also important for a number of reasons to explain wealth inequality between immigrants and natives. Households may invest their resources in a wide variety of assets including housing, stocks, bonds, savings accounts, etc. Assets vary by risk, return, and liquidity characteristics across different asset types. So the pace of wealth accumulation and the degree of economic integration depend to a great extent on households' portfolio composition. There are many reasons to believe that the portfolio choices of immigrants may differ substantially compared to natives. We find that immigrants are less likely to own a wide variety of financial assets and durable goods: stocks, business, home, informal debt, and valuables when compared with the control group of natives. Ownership of financial assets, for example, stock ownership, embodies a certain level of sophistication in the individual's economic participation (Chatterjee, 2009b) and linked with the future (Abdul-Razzak et al., 2015). These findings suggest that the wealth inequality between native and foreign-born households may remain across generations.

Having a deep insight into the differences in investment choices between immigrants and natives can assist in formulating future policies and programs aimed to narrow the gap in wealth accumulation and integration.

Homes are the largest investment that all households make and by far the principal component of household's wealth composition. Any barriers to the access to mortgage credit would clearly inhibit the ability of immigrants to be a homeowner and their integration as well. Previous studies find that immigrant households are subject to issues like redlining, discriminatory mortgage lending practices, restricted access to credit, etc which create a blockage to the home-ownership path (Diaz-Serrano and Raya, 2014; Shapiro et al., 2013). Not surprisingly, our analyses find that in Italy immigrants pay 30 basis points more for mortgages than natives even after controlling for borrower and mortgage characteristics. We believe that this disparate pricing of mortgage contributes to lower home-ownership for immigrants.

## Final Remarks

The whole process of integration is not necessarily a universal, smooth or conflict-free process. Migrant's stocks in Italy are incredibly diverse with respect to their socio-economic background. Some immigrants are from high educated and wealthy countries, whereas some are from the poorest countries. These differences contribute to the pace of integration among different groups of immigrants. Overall, our empirical findings suggest that immigrant's economic and financial integration in Italy is proceeding sluggishly and yet there remain significant challenges to the successful economic integration of immigrants. Comprehensive government policies may accelerate their economic advancement. We acknowledge the fact that full incorporation in both host society and the economy requires more than one generation. Due to data unavailability, we are unable to address this issue. We keep it for future research.

Investment choices especially ownership of financial assets has a substantial effect on the wealth accumulation process and enormous contribution in the

immigrant-native wealth gaps. Investment decisions of households depend on the accessibility to stock markets and the ability to best use available financial information (Chatterjee, 2009b). Low ownership of financial assets and low financial market participation for immigrants compared to natives might be due to, at least a part, their lack of financial education. Some immigrants have cultural aversion to debt (Cackley, 2010), some may be unaware of the available financing options, or may not be able to identify the products and services that best meet their needs (Terry and Lindsay, 2017). Financial literacy programs aiming to create better financial awareness among immigrants may facilitate to develop the confidence to effectively use the banking system and their investment market participation and quicker economic integration into the host society (Durana, 2016).

Clearly, home-ownership is one of the biggest drivers of the wealth gap between immigrants and natives and indicators of economic integration (Turner, 1999). In order to provide equal opportunity to accumulate wealth and integrate, fair mortgage and lending policies and housing policies need to be enforced and strengthened. For example, in the US, laws include Fair Housing Act (1968), the Equal Credit Opportunity Act (1974), the Home Mortgage Disclosure Act (1975), the Community Reinvestment Act (1977), and the Financial Institutions Reform, Reregulation, and Enforcement Act (1989) are intended to protect minorities from discrimination in the mortgage and housing markets (Diaz-Serrano and Raya, 2014). These laws were found effective to increase fair opportunities for middle-income minorities (Lacour-little, 1999).

A cultural mismatch between borrowers and loan officers affect may also immigrants' access and outcomes to the credit market (Albareto and Mistrulli, 2011; Fisman et al., 2017). Institutions with bilingual services and materials may be more prepared to work with immigrants (Terry and Lindsay, 2017). For example, having multilingual and multicultural staff may enhance cultural proximity as they are more likely to better understand immigrants' alternative risk profiles and product requirements, which might be prophylactic against disparate treatments in mortgage and other credit lendings. Programs like *Juntos Avanzamos* (Together We Advance), a program of the National Federation of Community Development Credit Unions in



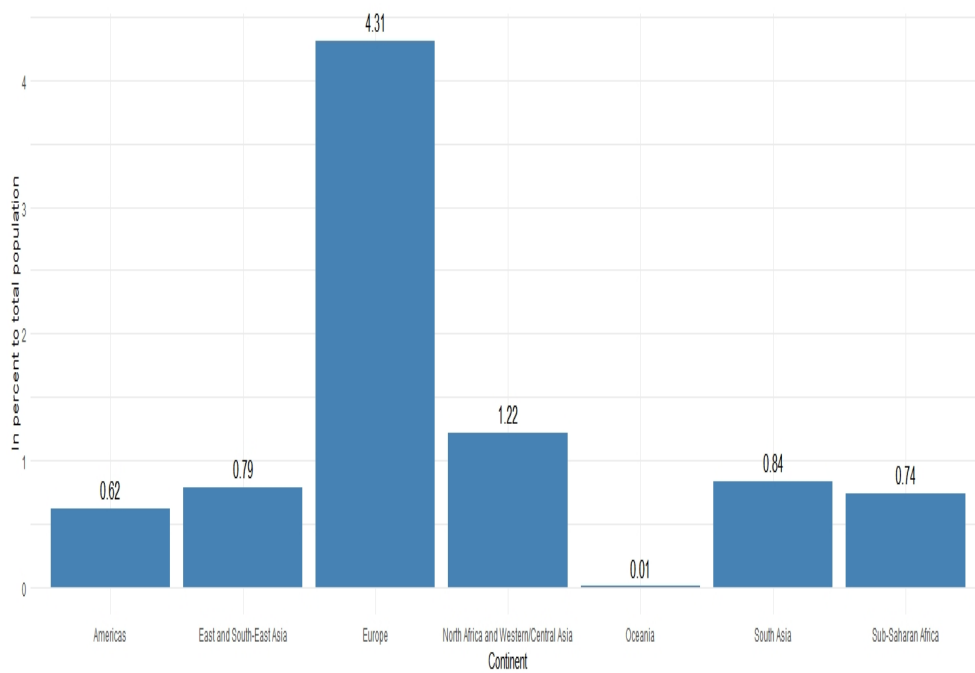
the US to remove barriers to financial opportunities for people living in distressed and underserved communities, might ease financial integration of immigrants in Italy as well.

# Appendix A

## Appendix- Chapter1

### A.1 Immigrant stock by origin

Figure A.1: Origin Continents



Source: ISTAT, 2018

## A.2 Migrant inflows to Italy, 2000-2017

Table A.1: Migrant inflows, 2000-2017

Year	Size of migrant inflow
2000	192557
2001	172836
2002	161914
2003	424856
2004	394756
2005	282780
2006	254588
2007	515201
2008	496549
2009	406725
2010	424499
2011	354327
2012	321305
2013	279021
2014	248360
2015	250465
2016	262929
2017	301071

Source: OECD



### A.3 The contribution of foreign-born to total population in Italy, 2009-2018

Table A.2: Share of foreign-born population in Italy

Year	Share of foreign-born
2009	9.8
2010	9.7
2011	9.6
2012	9.6
2013	9.5
2014	9.6
2015	9.7
2016	9.9
2017	10.2
2018	10.4

Source: OECD

# Appendix B

## Appendix- Chapter2

## B.1 Wealth gap between Financially included immigrants and Financially excluded immigrants

Table B.1: Net Wealth: Native vs. Financial Included Immigrants, 2006-2016

	10th Q	25th Q	50th Q	75th Q	90th Q
Immigrant	-5.2826*** (0.5334)	-16.5318*** (1.1594)	-42.8035*** (2.2397)	-77.2330*** (4.1676)	-97.5328*** (8.3502)
Midincome	16.3081*** (0.9945)	79.1084*** (1.852)	91.7021*** (2.1465)	113.2680*** (3.7272)	160.6289*** (5.941)
Upperincome	121.8650*** (3.6001)	190.5404*** (2.5506)	238.1897*** (3.8897)	367.6045*** (7.8252)	671.5243*** (17.9302)
Family size	-2.3177*** (0.1517)	-6.2768*** (0.3923)	-8.1386*** (0.8308)	-5.5025*** (1.315)	-7.7969** (2.7198)
Male	-0.5650* (0.2298)	0.7778 (0.9319)	5.0153** (1.9063)	9.6297** (3.0048)	32.2498*** (5.367)
Age	0.7704*** (0.0681)	2.2993*** (0.1527)	5.6634*** (0.2719)	7.2933*** (0.5192)	8.1414*** (0.9066)
Age-squared	-0.0045*** (0.0005)	-0.0121*** (0.0015)	-0.0318*** (0.0025)	-0.0398*** (0.0044)	-0.0376*** (0.0078)
Married	2.2834*** (0.4046)	11.1377*** (1.3455)	17.5776*** (2.5713)	11.3464** (4.386)	20.9904** (8.0125)
Divorced	-3.4671*** (0.4387)	-11.4429*** (1.1379)	-21.9161*** (3.4286)	-18.5106*** (5.3007)	-5.4667 (9.154)
Widow	-1.7650*** (0.3476)	-6.5837*** (1.683)	1.3161 (3.3686)	-4.7159 (4.761)	-7.1827 (7.4561)
Midedu	3.3022*** (0.3766)	19.0388*** (1.3188)	35.2099*** (2.2678)	45.2908*** (3.3303)	62.3211*** (5.5068)
Higheredu	9.9655*** (0.8834)	40.1533*** (1.7319)	74.7274*** (2.8808)	101.2258*** (4.0799)	143.3351*** (8.1585)
Not-employed	2.3682*** (0.307)	9.6551*** (0.9702)	18.4575*** (2.3204)	26.5353*** (3.8523)	40.3919*** (6.337)
Retired	5.2202*** (0.4419)	28.7260*** (2.1819)	31.3738*** (2.8624)	25.3131*** (4.3976)	23.3392** (7.7597)
Risk averse	-3.2524*** (0.33)	-10.3669*** (0.9805)	-29.2206*** (1.9217)	-47.0238*** (3.0195)	-59.2857*** (4.8917)
Time F.E.	Yes	Yes	Yes	Yes	Yes
Region F.E	Yes	Yes	Yes	Yes	Yes
Num. obs.	31292	31292	31292	31292	31292

Table B.2: Net Wealth: Native vs. Financial Excluded Immigrants, 2006-2016

	10th Q	25th Q	50th Q	75th Q	90th Q
Immigrant	-3.2718 (1.9725)	-14.6091*** (2.1211)	-43.4958*** (2.9853)	-69.2236*** (5.3717)	-77.1178*** (11.6326)
Midincome	18.5121*** (1.2144)	83.7939*** (2.0493)	93.3470*** (2.2323)	113.2059*** (3.5922)	157.5106*** (5.9524)
Upperincome	126.2983*** (3.6186)	191.6681*** (2.4697)	238.4749*** (3.982)	364.3076*** (8.176)	664.0823*** (17.884)
Family size	-2.2992*** (0.2207)	-6.0927*** (0.3957)	-8.7529*** (0.9034)	-5.7551*** (1.4592)	-8.7500** (2.7207)
Male	-0.2838 (0.25)	2.0414* (0.975)	5.7464** (1.9826)	12.2977*** (3.0932)	34.1259*** (5.4388)
Age	0.8749*** (0.0826)	2.4658*** (0.1694)	6.0448*** (0.2724)	8.3804*** (0.5254)	9.3602*** (0.8503)
Age-squared	-0.0052*** (0.0006)	-0.0131*** (0.0016)	-0.0344*** (0.0025)	-0.0474*** (0.0044)	-0.0472*** (0.0073)
Married	2.1266*** (0.5296)	10.4477*** (1.3658)	19.9482*** (2.6845)	10.6445* (4.8412)	26.1951*** (7.7186)
Divorced	-3.5788*** (0.5272)	-13.0080*** (1.0724)	-23.0230*** (3.7761)	-22.7911*** (5.9923)	-5.497 (9.8441)
Widow	-1.7292*** (0.4952)	-7.2695*** (1.5537)	2.5426 (3.4328)	-5.2132 (5.0379)	-3.0787 (7.68)
Midedu	3.0062*** (0.45)	18.6271*** (1.335463)	35.4109*** (2.42)	44.7390*** (3.4018)	63.7690*** (5.6223)
Higheredu	11.1520*** (1.1148)	42.2605*** (1.8923)	79.6204*** (3.1097)	106.4733*** (4.2944)	150.9446*** (8.407)
Not-employed	3.6323*** (0.3928)	11.0052*** (0.8804)	19.2996*** (2.5419)	25.8467*** (3.9311)	37.4580*** (6.3904)
Retired	6.1561*** (0.4831)	27.3341*** (2.0648)	29.5818*** (3.0098)	20.7934*** (4.4336)	19.2905* (7.839)
Risk averse	-3.3962*** (0.3581)	-10.9377*** (1.034)	-28.6516*** (1.9808)	-47.2890*** (3.0084)	-59.5475*** (5.0003)
Time F.E.	Yes	Yes	Yes	Yes	Yes
Region F.E	Yes	Yes	Yes	Yes	Yes
Num. obs.	30479	30479	30479	30479	30479

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