Does Italian Make More 'Italians'? Linguistic Skills and Immigrants' Adaptation

Abstract (200 words)

We investigate linguistic barriers to immigrants' adaptation. Although robust evidence exists for several European and North-American countries, knowledge gaps persist for non-Anglophone countries to effectively demonstrate the role played by destination language to drive immigrants' incorporation into their hosting societies.

Using the Official National Survey on Social Conditions and Integration of Immigrants living in Italy, our aim is to measure whether and at what extent deficiency in communication and comprehension skills in Italian affects immigrants' adaptation, looking at their economic and cultural outcomes: labor market status, the language spoken at home and with relatives, the language spoken with friends and to talk about important issues.

The problem of endogeneity, unobserved variables correlated with both immigrants' language proficiency and adaptation outcomes, is addressed using instrumental variable estimation, leveraging presumably exogenous variations generated by the immigrants' age of arrival and knowledge of destination language during their childhood. The clustering of immigrants' mother tongue provides us estimates of origin identity effects to assess the power of destination language as one of key factors of integration process. Findings reveal existing linguistic barriers to immigrants' incorporation into Italian society, but the magnitude on cultural indicators differs from labor market outcomes, by mother tongue and gender.

Preliminary and Incomplete. Please, do not circulate.

1. Introduction

Several aspects of the migration experience, both at individual and community level, require an adjustment or an adaptation to cope with the continuous tension generated by *immigrants' being in-between* the origin and the destination countries. In shaping this process, language is a key factor to drive immigrants' interactions with the economic and cultural environment of the hosting societies.

National legislations define linguistic communication skills as a fundamental requirement for immigrants to permanently reside in the destination country. The British "Borders, Citizenship and Immigrant Act", for instance, clearly rules the principle that citizenship is a privilege to be earned under a system: immigrants' efforts to achieve the rights of British citizenship are monitored and English proficiency is awarded points to speed up the naturalization process. In France, immigrants must agree to go through language training and courses to learn the cultural values of the French society, in order to sign the integration contract and obtain the permit to reside in France.

Nevertheless, the legal statement of skills in destination language as a necessary condition for naturalization does not *de facto* determine the cultural incorporation of immigrants into the hosting societies. Whereas immigrants' proficiency in the destination language certainly attests a certain level of knowledge, the language spoken in the private sphere qualifies *de facto* the language *that makes a person feel at home*. For this reason, the language spoken at home or with relatives and the language spoken with friends, are significant indicators of an individual's cultural identity, personal affinity and homogeneity with cultural enclosures.

A large literature has already investigated the effects of linguistic skills on labor market outcomes of immigrants in several receiving countries, including Australia (Guven and Islam, 2015), Canada (Piqué, 2001; Warman et al. 2015) and the United States (Borjas, 1994; Bleakley and Chin 2004, 2010). Robust evidence also exists for a number of European countries, such as Germany (Dustmann 1994; Dustmann and van Soest 2001, 2002), the United Kingdom (Dustman and Fabbri 2003; Miranda and Zhu 2013a, 2013b), Spain (Budra and Swedberg 2012; Di Paolo and Raymond 2012) and the Netherlands (Yao and van Ours 2015). Other authors have addressed the relationship between proficiency in destination language and ethnic networks (Chiswick and Miller, 1996) as well as immigrants' engagement in economic political and social domains to empirically discuss transnationalism and assimilationist theories (Geurts and Lubbers, 2019). However, knowledge gaps persist concerning the role of language in both the labor market and cultural adaptation of immigrants' in the Italian society (Bednarz, 2017; Gilardoni et al. 2017; Ambrosini, 2011).

This paper seeks to fill this gap and explores the role played by destination language on immigrant adaptation in Italy. Both labor market and cultural adaptation outcomes are investigated, using immigrants' employment status and the usage of the destination language in the private sphere (namely with the family and relatives, or with friends), respectively. Our analysis distinguishes between different domains of language proficiency, namely understanding, speaking, reading and writing skills, providing interesting policy implications on what public investments would bring most benefits to support immigrants' integration.

Italy represents an interesting case study for several reasons. Firstly, its legal framework: in 2010, the Italian Integration Agreement (D.P.R. 14 September 2011, n. 179) introduced the mechanism of formative credit points: immigrants should demonstrate language skills in Italian to achieve eligibility for a long-term residence permit. Under the European multi-annual financial framework 2014-2020, the European Union has supported integration actions through a dedicated funding (the Asylum Integration Migration Fund); 179 million (out of 394 million, which represents the total financial allocation to Italy) has been earmarked by Italian government for the development of a national program focused on language training, civic orientation, facilitating access to the labor market, exchanges with the host society and intercultural dialogue. The governance of integration policies in Italy is coordinated at the central level; yet, its implementation is demanded to local authorities and differences in practices may result in inconsistencies or discrepancies in the application of procedures at the regional level. Secondly, Italy is characterized by super-diversity (Vertovec, 2007) of the immigrant population: more than 195 different nationalities are represented among the authorized immigrant population living in Italy at the beginning of 2018 (Istat, 2019) whose mother tongues exhibit very different levels of proximity to Italian. Thirdly, the past literature has mainly focused on Anglo and Franco-phone countries, or nations with a long history of colonialism (such as Spain and the Netherlands), where many immigrants generally come from the former colonies and have been exposed to the destination language before experiencing migration. This shapes different implications for social adaptation in Italy, where most immigrants arrive with no or poor knowledge of Italian.

Learning a language is an investment in human capital linked with demographic characteristics, such as age, sex and education, but also with personal motivations, efforts and ability. This link between language skills and other forms of human capital (Berman et al. 2000), which are in turn also correlated with unobservable individual characteristics, may simultaneously affect language skills and immigrants' labor market and cultural adaptation, generating endogeneity problems. Furthermore, whether the exclusive use of the mother tongue could create linguistic enclaves in labor market, working interactions in the destination language could reversely contribute to the improvement of language skills (reverse causality).

To tackle these issues, we leverage presumable exogenous variation in the level of proficiency in the destination language generated by the age at arrival. According to a well-established literature, children, who are exposed to a new language in the earliest period of their life, are more likely to achieve language proficiency when they become adults (the 'critical age hypothesis' of Lenneberg, 1967). As learning ability decreases with age, immigrants who arrive at a later age (after the 'critical age' period, identified around 11 years old in the literature) can have much more problems in achieving a good language command, whereas, similarly to those who arrive at younger ages, immigrants with a pre-immigration exposure to the destination language, gain proficiency more easily (Guven and Islam, 2015). Yet, immigrants usually arrive in Italy with poor proficiency in Italian, which is less spoken abroad in comparison with other languages; this causes initial problems of immigrants' interactions that could consistently affect their future incorporation into the Italian society.

Our method accounts for potential endogeneity problems, simultaneously modelling both the language skills and adaptation outcomes. Motivated by the 'critical age hypothesis', a *non-linear transformation* of age at arrival and its interaction with the exposure to the Italian language during their childhood, are used as presumably exogenous factors affecting language proficiency to economically define the model. Our identification strategy extends the approach proposed by Yao and van Ours (2015), assessing the effect of language proficiency on cultural adaptation outcomes and clustering by mother tongue linguistic profiles.

The empirical analysis is based on the Official National Survey on Social Conditions and Integration of Immigrants residing in Italy (Istat, 2012); the survey sample size exceeds 25,000 individuals, which allows us to work with estimation samples larger than those commonly used in the past literature. This allows us to explore effect heterogeneity along different demographic dimensions, notably gender and language.

Results confirm that low skills in Italian are negatively associated with all dimensions of adaptation, but the magnitude of the effects on the cultural indicators differs from the labour market outcomes. Immigrants with deficiency in communication skills (speaking) are more likely to be unemployed than to keep the mother tongue as the common language spoken at home and with friends (in other words, their probability to be employed decreases by 42 percent points while the decrease in the probability to speak Italian at home or with friends is approximately 30 percent points).

Chinese native speakers exhibit the lowest probability to be linguistically integrated in the Italian society (-54 percent points to speak Italian with friends), but deficiency in understanding Italian has no impact on their labour market outcomes: they are more likely to have a job (+21 percent points) than Portuguese and Spanish immigrants, whose mother tongues are closer to Italian.

We demonstrate that the effects of poor proficiency on adaption outcomes differ by the type of linguistic skill. Difficulties in communication (understanding and speaking) have higher impacts than other cognitive abilities (reading and writing) among all immigrants, irrespectively to the structural closeness between immigrants' mother tongue and Italian; yet, deficiency in writing Italian has more influence on employment status among Spanish and Portuguese native speakers than among Arabic speakers.

We make three main contributions to extend the existing literature. First, we investigate the impact of language proficiency on both labor market and social adaptation, showing how cultural dimensions differ from economic one for linguistic groups that enjoy a high level of labour market adaptation living in linguistic enclaves. Second, we provide estimated impacts by type of linguistic ability, assessing differences between communication (understanding and speaking) and cognitive skills (reading and writing) on employment and cultural adaptation process. Third, we explore heterogeneity effects by gender and linguistic group.

Our findings offer a significant contribution to the causal understanding of the role of Italian language in the immigrants' adaptation process to support the development of more targeted policy interventions. Evidence that deficiency in Italian varies by gender and linguistic profile should be considered to design *foreign language learning* programs focusing on specific skill improvement to effectively facilitate immigrants' economic and social incorporation into Italian society.

The paper is organized as follows: section 2 sets the framework of the analysis and introduces methods adopted by previous studies to deal with selected adaptation outcomes; section 3 describes data providing first parameter estimates; section 4 defines the empirical strategy; section 5 comments our main results. Effect heterogeneity by gender and linguistic group are explored in section 6. Section 7 reports a robustness check where identification is not based on the critical period but on compulsory schooling laws. The final section draws conclusions.

2. The role of language in the immigrants' adaptation process

Language is more than a means of communication: as an expression of culture, language preserves the belonging to a cultural identity, transmitting its cognitive heritage to new generations. Integration convers multiple linguistic patterns related to the public and private sphere of immigrants. The public sphere is characterized by the use of the official language or *de iure*, i.e. the language spoken by institutions and national authorities (Termote, 2008). The use of language in the context of private relationships determines the language *de facto* spoken by individuals, such as the mother tongue and the language spoken at home, which refers to the language that persons speak most often at home or with relatives (for persons living alone, the language spoken at home is the language in which they feel most comfortable), and the language spoken with friends. Transfers from the language of origin (or mother tongue) to the language of destination countries are able to capture immigrants' acculturation dynamics, mirroring their belonging to a new national identity; by contrast, the lack of linguistic transfers gives evidence of a weak assimilation and poor incorporation in the hosting countries. At macro level, these linguistic dynamics show how linguistic proximity between origin and destination languages boosts success in the adaptation process (Richmond, 1999). Demographers have defined the *1.5 immigrant generation* to differentiate immigrants arrived in the hosting countries during their childhood from immigrants arrived as adults (first immigrant generation) and from immigrants born in the hosting countries (second generation). The distinction is particularly relevant when referring to individual human capital development because it is the place where persons grow up that shapes their future attitudes and behaviours (Piore, 1979).

According to Lenneberg's *critical period hypothesis* childhood is the period when the cognitive psychologic capacity is highest (Lenneberg, 1967); after the *critical period*, learning ability in the acquisition of a second language declines. Linguistic proficiency in the destination language is the key-condition for immigrants' incorporation: without sufficient language skills, other professional skills may be irrelevant (Chiswick and Miller, 1992). Development theories of identity formation have argued how the age at arrival affects the acculturation and social assimilation process (Erikson, 1968), also due to disparities in educational trajectories. In this respect, immigrant children arrived after primary school, are likely to have difficulties in mastering the destination language. Literature on child cognitive skills' development proposes a sort of middle childhood, called the concrete operational stage between ages 7 and 11 (Ginsburg and Opper, 1988), when children start thinking about concrete events using logical reasoning abilities, but they still have difficulties with abstract conceptualisation.

Several studies have applied instrumental variables (IV) techniques to investigate the causal effects of language proficiency on labour market outcomes such as employment status and wages. Since the study of Chiswick and Miller (1995), the IV approach has been applied to investigate the potential endogeneity of English proficiency on immigrants' outcomes, sometimes with not very credible instruments. Bleakley and

Chin (2004) marked the start of a new generation of studies that based identification on the *critical period hypothesis*. The authors were the first to use as an instrument for language proficiency the interaction between two variables: the first is a non-linear transformation of age at arrival based on the critical period hypothesis arrived in the United States before age 11,[1] the second is a dummy for being an immigrant from a non-English speaking country. The same identification strategy was followed later by other studies (e.g., Bleakey and Chin, 2010, Miranda and Zhu, 2013a, 2013b)[2]. Other researchers used slight variants of the same strategy. Yao and van Ours (2015), for instance, use as an instrument the interaction between age at arrival (not transformed taking into account of the critical period) and a dichotomous variable for growing up not speaking Dutch. Findings from studies using IV strategies based on the critical age period and its variants are generally consistent across countries and languages and point to statistically significant positive effects of language proficiency on immigrants' earnings (Bleakey and Chin, 2004, 2010; Budra and Swedberg, 2012; Di Paolo and Raymond, 2014; Miranda and Zhu, 2013a, 2013b; Yao and van Ours, 2015, but only for females). By contrast, strong evidence does not exist on the effect on employment status or cultural outcomes. Yao and van Ours (2015), for instance, report no effect on employment status for both genders. Bacalod and Rangel (2017) adopt a multi stage model of childhood to assert that the age at arrival and linguistic distance to English have a interactive effect on the skill formation of child migrants over their adult skill accumulation process. Using Norwegian administrative registries, Hermansen (2017) reveals how the timing of childhood immigration has causal effects on immigrants' later-life outcomes. Yet, findings for countries whose official languages are widely internationally spoken (such as English, French and Spanish) or where vehicular languages are known by the majority of the population (e.g. English in the Netherlands) cannot be easily generalizable to countries like Italy, whose language is much less spoken and taught abroad, and languages such as English and French are known by a minority of the native population[3].

3. Data and descriptive statistics

Our empirical analysis is based on the Official *National Survey on Social Conditions and Integration of Immigrants residing in Italy*, conducted in 2011-2012, which is at present the most recent official survey conducted in Italy including demo-linguistic profiles of immigrant population. The sample is composed of more than 25,000 individuals, out of which: 21,030 are immigrants (17,545 as first generation and 2,834 as second

[1] Namely, the non-linear transformation is defined as the maximum between age at arrival-11 and zero.

[2] These later studies used age 9 instead of 11 as the critical age.

[3] Since English is widely spoken, it can be used as a vehicular language and the lack of knowledge of the destination language (Dutch) may entail a lower employment penalty compared to countries like Italy.

generation) without Italian citizenship; 4,010 are born in Italy (from parents born abroad) and have the Italian citizenship.

The analysis is conducted on immigrants aged 15 to 64 years old, in order to exploit language barriers to integration referring to immigrants in economically active age groups. This restriction allows us to focus on the population targets that mainly benefit from linguistic skills in terms of future incorporation (Chiswick, Lee and Miller, 2002). For the purpose of the survey, immigrants are defined as people with a migration background, i.e. those with non-Italian parents and who were born in Italy or abroad.

3.1 Language proficiency

The survey questions related to linguistic ability measures are formulated as follows: *Do you have difficulties understanding the Italian language? Do you have difficulties speaking the Italian language? Do you have difficulties reading the Italian language? Do you have difficulties writing in the Italian language?* Proficiency is self-assessed: respondents must choose one of four possible answers: *no difficulty*, *few*, *quite*, *a lot of difficulties*. We use an indicator for each type of linguistic skill defined as a dummy variable which equals one for immigrants that report *a lot* or *quite* difficulties, and zero for immigrants that report to have *few* or *no difficulty*.

Table 1

Proficiency in Italian of immigrants by mother tongue

	N. obs	**Weight**	
Sample	18,196	3,662,431	
Linguistic group			
Italian	207	42,487	2%
French	492	119,117	5%
Spanish	1,091	275,276	11%
Portuguese	230	51,164	2%
English	359	77,453	3%
Arabic	2,522	507,436	21%
Chinese	573	129,287	5%
Other	12,722	2,460,211	

Proportion of immigrants reporting difficulties in Italian language

Linguistic group	**Understanding**	**Speaking**	**Reading**	**Writing**
French	9 %	11 %	20 %	22 %
Spanish	3	3	7	18
Portuguese	1	2	8	13
English	16	16	23	35
Arabic	16	21	29	35
Chinese	44	48	60	62
Other	10	12	19	27
N. obs		16.114		
Cluster by mother toungue		87		

Although the country of origin is relevant for geographical reasons (greater distances are linked with fewer expectations of return migration), the mother tongue is relevant for cultural distances. Cultural proximity with Italian can be associated with a stronger motivation of immigrants to invest in their integration in Italy.

Table 1 reports linguistic proficiency in Italian by language group. Distinguishing by type of language skill, immigrants report to have higher communication skills (understanding and speaking) than other linguistic abilities (reading and writing). Not surprisingly, proficiency is higher among Portuguese and Spanish mother tongue immigrants, which exhibit shorter linguistic distances from natives,[4] and lower among Chinese and Arabic language groups. The poorest linguistic skills are reported by Chinese immigrants, of which 44%, 48%, 60% and 62% report having understanding, speaking, reading and writing difficulties, respectively.

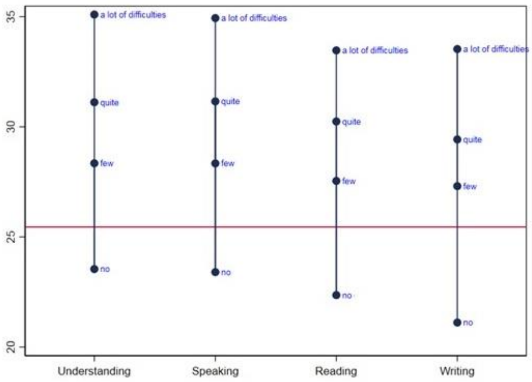
3.2 Age at arrival and language proficiency

Literature (Section 2) has well established immigrants' age at arrival in the host country as a determinant of their language skills: children, who are exposed to a new language in the earliest period of their life, are likely to more easily achieve language proficiency when they become adults; immigrants, who arrive at a later age, are likely to face much more problems in achieving a good language command.

Figure 1

[4] Linguistic distance is a measure of the difference between the origin and destination language. An index of linguistic distance was developed by Chiswick and Miller (1998). Hart-Gonzalez and Lindemann (1993) introduced a set of language learning scores (a low value of the score indicates a high level of difficulty to learn a foreign language) and the linguistic distance was the reciprocal of the language score.

Linguistic skills of migrants living in Italy by mean age at arrival



The figure displays the mean age at arrival of immigrants for each level of proficiency and by type of linguistic skill (understanding, speaking, reading and writing). Immigrants with high levels of proficiency in writing and reading are arrived at younger age (21-22 years) in comparison with immigrants with high levels of proficiency in understanding and speaking (23 years). The mean age at arrival among immigrants with low skills in understanding and speaking Italian is 34 years.

Figure 2

Kernel density plot of age at arrival by language skill

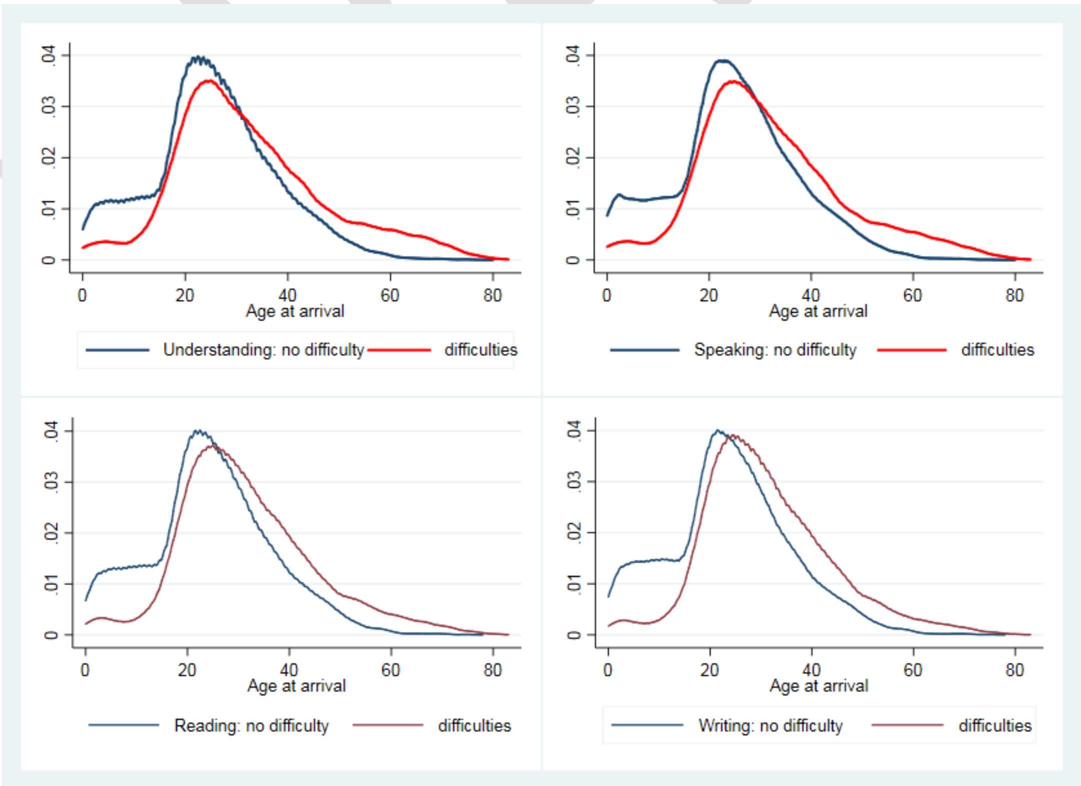


Figure 2 illustrates the age-at-arrival distribution by linguistic skill. Immigrants take advantage of the age-at-arrival abilities reporting a higher proficiency in Italian; the effects of a later age of arrival are clear on all skills and particularly on writing ability.

Nevertheless, age at arrival has also been recognised as an important factor of immigrants' adaptation process. Looking at the labour market dimension, immigrants' arrived as adults are likely to face much more problems in the labour market compared to those who have arrived as children. Consequently, referring to Dutch language, Yao and van Ours (2015) assumed that non-language effects of age at arrival on labour market performance are the same for the two types of immigrants.

Figure 3

Kernel density plot of age at arrival by labour market outcome

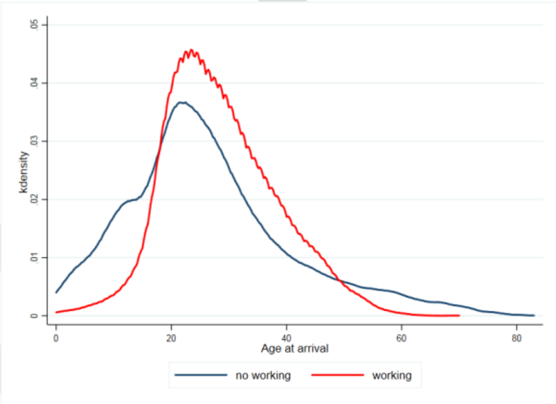


Figure 3 shows the age-at-arrival specific distribution of our sample by labour market outcome. The shape of the subpopulations suggests that employed immigrants mainly arrive in Italy between 20 and 30 years, whilst unemployed immigrants more distributed by age-group. No accurate details are available on the reason for immigration; yet, Figure 2 seems to reflect main categories of residence permits granted by immigrants: for work (the red line) , for family reunification and education (the blue line). Indeed, immigration at younger and older ages could capture immigration of family members. According to Italian legislation, family reunification is a right of immigrants legally reside in Italy and can be applied for children under 18 years old and parents aged aver 65 or dependents that have no support in their country of origin.

The impact of age at arrival on the cultural adaptation is measured by three indicators: the language commonly spoken at home, the language commonly spoken with friends, and the language spoken with friends to talk about important issues.

Figure 4

Kernel density plot of age at arrival by language commonly spoken at home

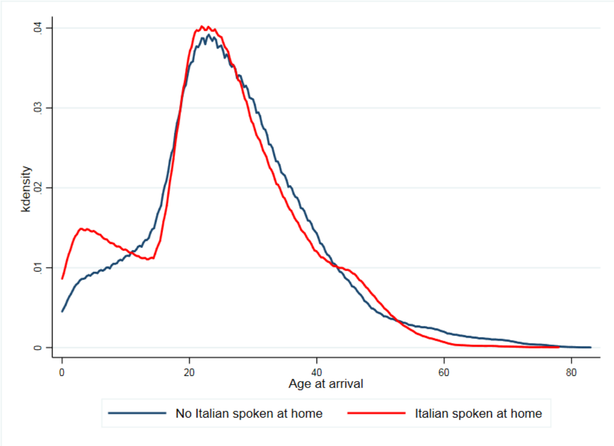
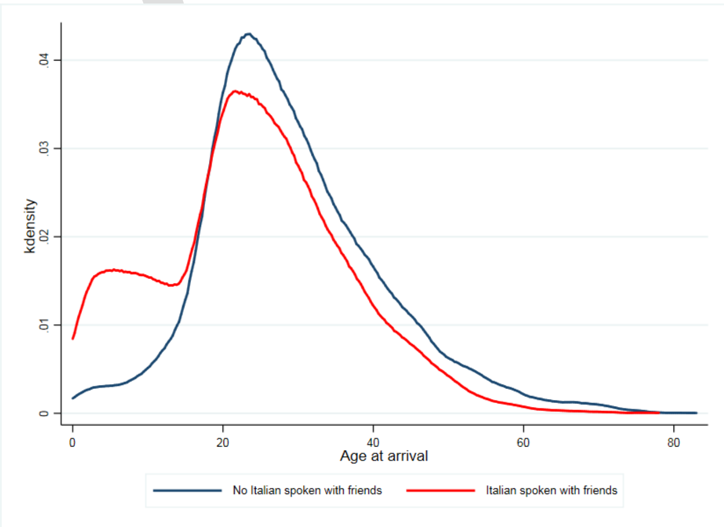


Figure 4 illustrates the language spoken at home with respect to age at arrival. The distribution of the two subpopulations differs for the younger classes of age (< 20 years old) and from 45 to 55 years. Immigrants who speak Italian at home arrive in Italian at younger age than immigrants who maintain their mother language as common language spoken at home and their immigration rate at ages 45 – 55 are higher compared with immigrants speak their mother tongue at home. After age 55 the disproportion is reversed showing the propensity of immigrants who speak Italian at home to stably reside in Italy.

Figure 5

Kernel density plot of age at arrival by language commonly spoken with friends

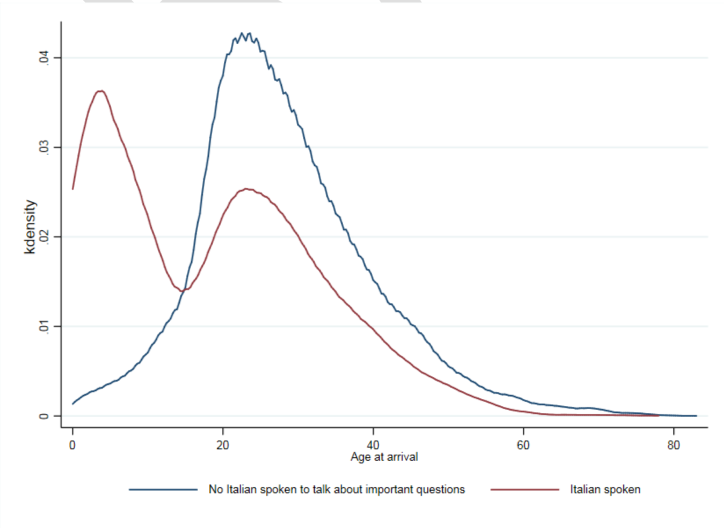


Differences are more relevant considering the language commonly spoken with friends. The attitude to maintain native language speaking with friends sharply increases with the age of arrival. This indication reflects the private sphere of interactions external to the family members: immigrants arrived at older ages could be less open to relationship with Italians and more linked with their community of origin. Contrarily, the patters of immigrants arrived at younger ages could mirror the effects of the formal education in Italian: they benefit of Italian-learning potential at arrival and the acquisition of capabilities demanded from Italian educational system facilitating interactions and assimilation of Italian culture.

Figure 6 shows the kernel density plot for immigrants that commonly use Italian to talk about important issue. This variable allows us to qualify the relationships between friends. In particular, it helps to categorize the interpersonal distance: the use of Italian for important topics of conversation indicates a positive, confidential and trustable mood between talkers. The density by age at arrival differs for immigrants that talk in Italian, presenting the highest concentrations for immigrants arrived during their childhood. This trend confirms the *age at arrival* related effects on social communication: exposing immigrants to interactions with native speakers in Italian, the educational system appears also effective in supporting individual social development. By contrast, immigrants arrived at older ages prefer their mother tongue in their private conversation when important topics should be addressed, despite the fact that they may use Italian in other conventional communication.

Figure 6

Kernel density plot of age at arrival by the language spoken with friends to talk about important issues



This evidence gives us the motivation to instrument linguistic skills and age at arrival for investigating adaptation outcomes.

4. Empirical model

In order to assess the causal effect of language proficiency on the selected indicators of immigrant adaptation, we set up a simultaneous equation model composed of two equations.

The first is the adaptation outcome equation; the outcomes have been formally described in Section 4. The second equation refers to the individual level of proficiency in Italian language. Therefore, separately modelling each linguistic skill, a dummy variable is set to 1 when immigrants report difficulties in understanding, speaking, reading and writing, respectively, and zero otherwise. This implies a separate two-equation model for each outcome variable and linguistic skill mentioned above.

The model is "triangular": the adaptation outcome equation includes the endogenous language proficiency dummy (i.e. the dependent variable of the second equation) as an independent variable, whereas the endogeneity is generated by the potential correlation between the error terms of the two equations.

The model reads as follows:[5]

$$O_{ij} = \beta_o + \beta_1 L_{ij} + \beta_2 X_{ij}^{O} + u_{ij} \qquad (1)$$

$$L_{ij} = \alpha_o + \alpha_1 Z_{ij} + \alpha_2 X_{ij}^{L} + \varepsilon_{ij} \qquad (2)$$

where

i individual subscript

j Individual's mother tongue subscript

O_{ij} dichotomous outcomes (dummy variables) which alternatively represent:

- employment status, which equals one if the immigrant is employed and zero otherwise
- language commonly spoken at home, which equals one when Italian is the most often language spoken at home or with relatives by immigrants and zero otherwise
- language commonly spoken with friends, which equals one when Italian is the most often language spoken with friends by immigrants and zero otherwise
- language spoken with friends to talk about important issues, which equals one when immigrants talk in Italian and zero otherwise

L_{ij} self-reported level of language proficiency of individual *i* of mother tongue *j*, by skill in:

- understanding
- speaking

[5] The model is estimated using the command cmp developed by Roodman (2011) for conditional recursive mixed-process estimators.

- writing
- - reading

X_{ij}^{O} vector of individual characteristics included in the outcome equations:

- demographic variables (quadratic in age, sex and highest educational qualification)
- pre-migration variables (official language of the country of birth, mother tongue, Italian as language spoken at childhood, father's education;[6] knowledge of Italian language before arrival, marital status at arrival, working status before arrival, education completed at home)
- - arrival and post-migration variables (quadratic in age at arrival, Italian macro-region of residence)

X_{ij}^{L} vector of individual characteristics included in the language skill equations. It includes the same variables as X_{ij}^{O} except for the quadratic in age at arrival, which is replaced by a non-linear transformation of it, based on the critical age hypothesis as described in the next section

u_{ij}, ε_{ij} error terms.

The model allows for a non-zero correlation between u_{ij} and ε_{ij} (ρ_{ij}). In particular, in this model the test $\rho_{ij} = 0$, corresponds to an exogeneity test of the linguistic skills in the outcome equations. To maintain consistency across the different models, we always focus on the estimates obtained from the two-equation system, even when exogeneity is not rejected. In this latter case, indeed, the estimates continue to be consistent.

For the sake of comparison, we will also include in the results the estimates of a simple probit model of equation (1), in which potential endogeneity is not addressed.

4.1. Model identification: the exclusion restrictions

Given the dichotomous nature of the (potentially endogenous) indicator of language skills and of the outcome variables, we assume joint normality of the error terms u_{ij} and ε_{ij}. Thus, the two-equation system (1)-(2) is formally identified by a distributional assumption. However, exclusion restrictions are generally considered necessary to ensure an *economic* identification independently of such statistical assumptions. To identify the causal effects of Italian proficiency on labour market and cultural adaptation, the model follows Lenneberg's work (1967) on the *critical period hypothesis* of language acquisition: due to biological constraints, children have a higher ability to achieve linguistic proficiency than adults. On top of the biological constraints, due to the compulsory schooling laws in place in most countries, we expect that those who arrive in the host country at earlier ages achieve at least

[6] Maternal education is not provided in the survey.

some basic level of scholarization in the host country language and are more likely to master it.

Following the literature, we use a non-linear transformation of immigrants' age at arrival as an excluded instrument, based on the conceptualization of the critical period of language acquisition. In order to increase its predictive power, and to add a further exclusion restriction, we also control for childhood knowledge of the Italian language, defining a new variable that is the interaction between the two variables, as follows (see Bleakley and Chin, 2004, 2010; Miranda and Zhu, 2013a,b; Yao and van Ours 2015):[7]

$$\tilde{A}_{ij} * It_{ij}$$

where

It_{ij} dichotomous indicator for Italian language spoken during the childhood

$\tilde{A}_{ij}$ max $(0, A_{ij} - 10)$. This variable is equal to the difference between age at arrival A_{ij} and 10, if the age at arrival is greater than 10 years old; it is equal to zero, if the age at arrival is equal or lower than 10 years old.

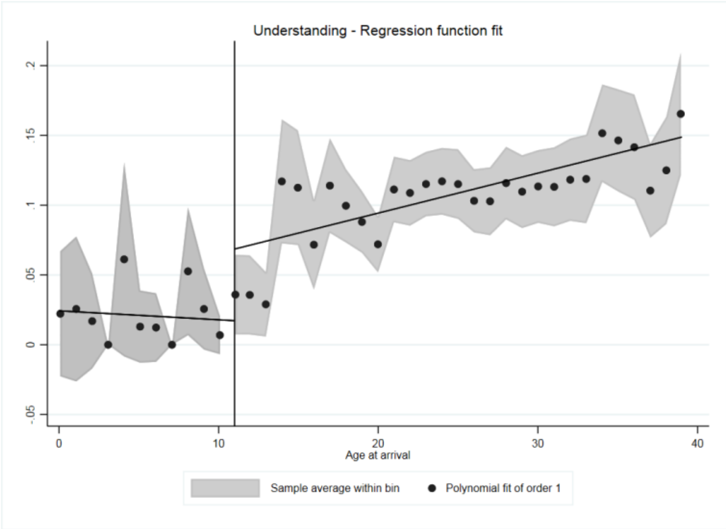
The excluded instrument $\tilde{A}_{ij}$ assumes a *non-linear* level of proficiency for immigrants arrived after the critical age versus immigrants arrived before the critical age. The *non-linearity* of $\tilde{A}_{ij}$ allows us to include (continuous) *age at arrival* in the main outcome equation. This is crucial to meet the exclusion restriction assumption, which maintains that the critical age has to affect the adaptation outcomes through language knowledge and not through other channels. Indeed, immigrants who arrive in the destination countries at earlier ages have both more chances to learn Italian and further time to fulfil their incorporation into the hosting society.

Graphical support for our excluded variables is reported in Figure CUT10, where we plot the average reported language deficiency by age at arrival, a linear trend fitting the age bins and 95% confidence interval. The graphs show that although there is not a statistically significant discontinuity in language deficiency at age 10, yet there is a slope change before vs. after age 10, consistent with the critical age hypothesis. In particular, before age 11 the linear trend is almost flat, which is consistent with ages 0-10 being almost indistinguishable in terms of language deficiency (indeed they are codified as zero in $\tilde{A}_{ij}$).

[7] The main difference with these papers is that they only use as the excluded instrument the interaction term, while we rely on the additional variable $\tilde{A}_{ij}$ as an exclusion restriction, still controlling in the outcome equation for age at arrival, exploiting the non-linearity in age of language proficiency posited by the critical period hypothesis.

Figure CUT10.

Language deficiencies and age at arrival (age 10 cut-off)



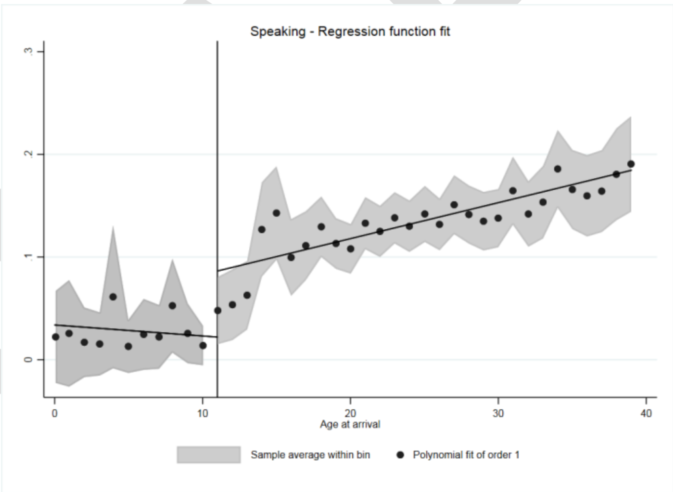
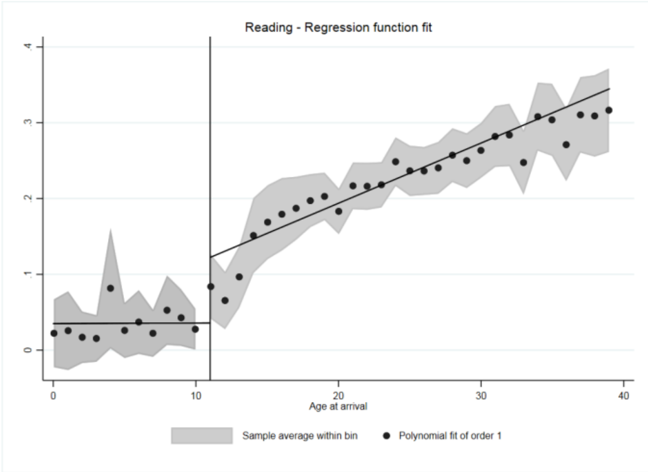
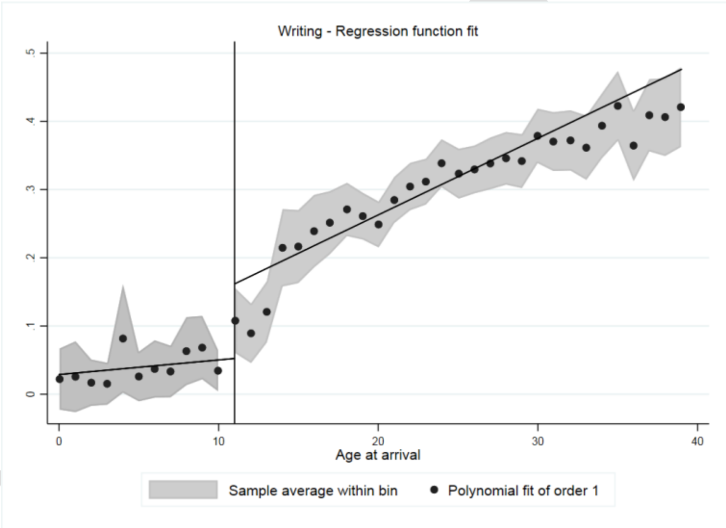


Figure CUT10 – continued





Note. The graphs show the average language difficulty by age bin and linear trend fit with the 95% confidence interval obtained using the STATA command `rdplot` (with a triangular kernel and sampling weights). For the sake of clarity, the graph reports only age at arrivals not greater than 40.

Table F1 reports some tests for the strength of the excluded variables in the language skill equation for each combination of language skill and outcome. Unlike for the IV-2SLS estimator,[8] there is not a clear rule of thumb to assess instrument weakness in a non-linear setting. Yet, the Chi2 joint tests for the two excluded variables in Table F1 show their relevance, with no sign of tenuous identification. The excluded variables are not only statistically but also economically meaningful. The marginal effects in Table D1 show that a one-unit increase in $\tilde{A}_{ij}$ decreases the

[8] Unlike with linear models and two-stage least squares, we cannot use the rule of thumb of an F-statistic exceeding 10 as an indication of the absence of a weak instrument problem (Stock and Yogo, 2005).

probability of language deficiencies by 7-8 percentage points, depending on specific linguistic skill considered.

4.2. Determinants of language deficiencies

In this section, we briefly comment on the main variables correlated with linguistic deficiencies. After controlling for non-linear age at arrival, age captures the length of stay in Italy. For this reason, not surprisingly, it is negatively associated with the probability of developing language deficiencies irrespective of the type of skill considered. Yet, its effect is larger on communication skills (about -9 percentage points for understanding and speaking) than on more complex skills (about -5 and -3 percentage points for reading and writing, respectively), which are less likely to improve just because of a longer stay in the host country, and require more formal learning (e.g. taking Italian courses).

Language deficiencies do not exhibit a gender gap, but they display an education gradient. As for understanding, individuals with higher than lower secondary education are less likely to have language problems. The education premia are 29, 34 and 35 percentage points for individuals with vocational, upper secondary and post-secondary qualifications compared to primary educated immigrants. The education gradient emerges at lower education levels on speaking, with individuals with a lower secondary qualification being 26 percentage points to have speaking difficulties. Gradients are steeper for more formal skills. Individuals with post-secondary education, for instance, are 83 and 64 percentage points less likely to have reading and writing difficulties. These results point to the strict complementarity between language and other investments in human capital, and also partly capture unobserved individual ability.

Socio-economic background, proxied by the father's education is negatively associated with the probability of linguistic problems. Not surprisingly, knowledge of Italian at arrival is strongly negatively associated with linguistic deficiencies. As for pre-immigration variables, being married before arrival is associated with lower linguistic skills, with language penalties of 40, 36, 27 and 20 on understanding, speaking, reading and writing, respectively. This may be partly explained with the fact that immigrants that move with their partner, or that leave their partner alone have lower incentives to integrate in the host society. In the second case, for instance, they may perceive their migration as only temporary. Immigrants that completed their education abroad, conditional on the level of education completed, have lower linguistic skills. The effects are quite large and stand in the range 50-57 percentage points depending on the type of skill. On the other hand, working status before arrival is strongly negatively associated with language deficiency, with the larger effect on understanding (-35 percentage points) and the lowest on writing (-12 percentage points).

Table F1

Strength of the excluded variables in the linguistic deficiency equations

CMP Model - Second stage: linguistic skill equation	Labour market	Cultural identity dimension		
Outcomes	Working	Language commonly spoken at home	Language commonly spoken with friends	Language spoken to talk about important issues
Linguistic skill	**Understanding**			
Instruments				
Age at arrival - critical period of acquisition	0.126***	0.126***	0.127***	0.127***
	(0.017)	(0.018)	(0.018)	(0.018)
Interaction between age at arrival and Italian language spoken during childhood	-0.043***	-0.048***	-0.048***	-0.048***
	(0.014)	(0.017)	(0.016)	(0.017)
Test for weak instruments $\tilde{A}_{ij}$ Z_{ij}				
Chi-Squared	108.72	85.92	87.68	88.02
Prob > chi2	0	0	0	0
Linguistic skill	**Speaking**			
Instruments				
Age at arrival - critical period of acquisition	0.122***	0.120***	0.122***	0.122***
	(0.020)	(0.022)	(0.022)	(0.022)
Interaction between age at arrival and Italian language spoken during childhood	-0.047***	-0.049**	-0.050**	-0.050**
	(0.017)	(0.020)	(0.020)	(0.020)
Test for weak instruments $\tilde{A}_{ij}$ Z_{ij}				
Chi-Squared	107.07	78.36	80.68	81.97
Prob > chi2	0	0	0	0
Linguistic skill	**Reading**			
Instruments				
Age at arrival - critical period of acquisition	0.117***	0.119***	0.119***	0.119***
	(0.010)	(0.012)	(0.011)	(0.011)
Interaction between age at arrival and Italian language spoken during childhood	-0.040***	-0.044***	-0.042***	-0.043***
	(0.009)	(0.011)	(0.011)	(0.011)
Test for weak instruments $\tilde{A}_{ij}$ Z_{ij}				
Chi-Squared	173.63	172.71	201.26	181.92
Prob > chi2	0	0	0	0
Linguistic skill	**Writing**			
Instruments				
Age at arrival - critical period of acquisition	0.089***	0.089***	0.091***	0.089***
	(0.015)	(0.015)	(0.013)	(0.015)
Interaction between age at arrival and Italian language spoken during childhood	-0.020	-0.020	-0.021	-0.020
	(0.016)	(0.016)	(0.015)	(0.016)
Test for weak instruments $\tilde{A}_{ij}$ Z_{ij}				
Chi-Squared	213.39	209.51	240.99	223.44
Prob > chi2	0	0	0	0

Note. This table reports the estimated coefficient for the excluded variables in the language skill equations, along with tests and p-values for the null hypothesis $H_0: \tilde{A} = 0 \ and \ \tilde{A} * It = 0$.

Table D1

Determinants of linguistic deficiencies

		Understanding	Speaking	Reading	Writing
		Marginal effects	Marginal effects	Marginal effects	Marginal effects
Linguistic skill					
Demographic patterns					
Age		-0.090***	-0.085***	-0.052***	-0.027**
	Standard errors	(0.017)	(0.019)	(0.013)	(0.013)
Age2		0.000*	0.000*	-0.000	-0.000*
	Standard errors	(0.000)	(0.000)	(0.000)	(0.000)
Sex: female		0.052	0.073	-0.020	-0.076
	Standard errors	(0.086)	(0.094)	(0.063)	(0.056)
Lower primary		-0.083	-0.257**	-0.339***	-0.164**
	Standard errors	(0.091)	(0.104)	(0.076)	(0.067)
Vocational		-0.337***	-0.528***	-0.511***	-0.324***
	Standard errors	(0.097)	(0.096)	(0.075)	(0.098)
Upper secondary		-0.292***	-0.463***	-0.623***	-0.462***
	Standard errors	(0.074)	(0.088)	(0.076)	(0.077)
Post secondary		-0.347***	-0.599***	-0.834***	-0.639***
	Standard errors	(0.090)	(0.098)	(0.090)	(0.084)
Pre-migration exposure patterns					
Italian language spoken during childhood		0.325	0.073	0.060	0.108
	Standard errors	(0.257)	(0.295)	(0.273)	(0.155)
Age at arrival -critical period of acquisition		0.080***	0.073***	0.076***	0.070***
		(0.009)	(0.008)	(0.007)	(0.005)
	Father's education				
Primary		0.060	0.070	0.124*	0.081**
	Standard errors	(0.078)	(0.074)	(0.064)	(0.041)
Lower primary		-0.229***	-0.187***	-0.164***	-0.141***
	Standard errors	(0.067)	(0.062)	(0.051)	(0.041)
Vocational		-0.371***	-0.294**	-0.278***	-0.344***
	Standard errors	(0.108)	(0.117)	(0.098)	(0.066)
Upper secondary		-0.172**	-0.121	-0.184**	-0.197***
	Standard errors	(0.085)	(0.083)	(0.087)	(0.073)
Post secondary		-0.050	-0.003	-0.128	-0.132
	Standard errors	(0.128)	(0.125)	(0.133)	(0.090)
Knowledge of Italian		-0.577***	-0.648***	-0.488***	-0.410***
	Standard errors	(0.082)	(0.088)	(0.053)	(0.054)
Marriage before migration		0.402***	0.360***	0.274***	0.203***
	Standard errors	(0.059)	(0.075)	(0.062)	(0.065)
Education before migration		0.506***	0.569***	0.500***	0.541***
	Standard errors	(0.130)	(0.132)	(0.135)	(0.095)
Working experience		-0.349***	-0.309***	-0.187***	-0.124***
	Standard errors	(0.058)	(0.059)	(0.045)	(0.045)
	Country of birth				
Francophone countries		0.158	0.291	0.397**	0.257
	Standard errors	(0.188)	(0.187)	(0.183)	(0.165)
Arabic countries		0.757***	0.419**	0.928***	0.603***
	Standard errors	(0.187)	(0.203)	(0.158)	(0.143)
Anglophone Asian countries		0.680***	0.671***	0.635***	0.607***
	Standard errors	(0.187)	(0.165)	(0.164)	(0.145)
Hispanic countries		-0.503***	-0.414***	-0.403*	0.180
	Standard errors	(0.091)	(0.105)	(0.216)	(0.114)
Italo-phone countries		0.010	0.064	0.091	0.034
	Standard errors	(0.187)	(0.169)	(0.137)	(0.107)
	Mother tongue				
French		-0.013	-0.119	0.037	-0.065
	Standard errors	(0.122)	(0.131)	(0.128)	(0.116)
Spanish		0.062	-0.047	0.003	-0.274**
	Standard errors	(0.140)	(0.135)	(0.214)	(0.113)
Portuguese		-1.531***	-1.134***	-0.585***	-0.480***
	Standard errors	(0.189)	(0.152)	(0.131)	(0.109)
English		0.532***	0.458***	0.479***	0.541***
	Standard errors	(0.162)	(0.139)	(0.124)	(0.107)
Arabic		0.052	-0.043	-0.245	-0.145
	Standard errors	(0.134)	(0.151)	(0.151)	(0.145)
Chinese		1.253***	1.199***	1.229***	0.966***
	Standard errors	(0.179)	(0.153)	(0.134)	(0.118)
Arrival and post-migration exposure patterns					
	Italian macro regions of residence				
North_East		-0.070	-0.026	0.011	0.151***
	Standard errors	(0.110)	(0.090)	(0.068)	(0.056)
Centre		-0.133*	-0.113	0.075	0.133**
	Standard errors	(0.080)	(0.078)	(0.056)	(0.055)
South and islands		-0.186***	-0.031	0.242***	0.319***
	Standard errors	(0.066)	(0.074)	(0.082)	(0.068)

Note. This table reports marginal effects of a probit model for the "determinants" of linguistic deficiencies.

5. Effects of language skills on adaptation outcomes

The section discusses results from the two-equation systems exploring to what extent deficiency in different types of language skills influences immigrants' adaptation outcomes, when the potential endogeneity of such skills is addressed.

For the sake of brevity, we present marginal effects of the demographic and linguistic patterns by model; marginal effects on the completed list of controls are provided in the annex.

5.1 Communication skills

Deficiency in communication skills leads to worse labour market outcomes: the probability to be employed for immigrants with difficulties in understanding (speaking) Italian decreases by 49 (42) percentage points.

Yet, when looking at non-labor market adaptation outcomes, the negative impact is partly reduced: poor understanding or poor speaking of Italian reduce the probability to commonly use Italian to talk with family members by 27 and 32 percentage points, respectively, and with friends by 29 and 30 percentage points, respectively. Estimated effects are also negative, but statistically non-significant, looking at the probability of using Italian for speaking about important issues with friends.

Regarding gender unbalance, women have a lower probability (-19 percentage points) to be successfully integrated in the labor market than men. By contrast, examining the cultural adaptation outcomes, the gender gap is reversed: women have a higher propensity to speak Italian at home and with friends than men. These effects may hide a male-driven decision related to intermarriage (some women, living with an Italian speaking partner, may be induced to adopt Italian as the language spoken at home) or be driven by child-caring as women spend more time with young children, which may already speak Italian.[9] Women may also have a denser network of relationships with native citizens (i.e. with the mothers of their children's friends) and more opportunities to speak Italian. Evidence favoring this last interpretation could be the female premium in the probability to talk in Italian about important issues.

Age-effects are significantly positive (but decreasing at older ages) on both the labor market outcomes and the use of Italian at home and with friends. Conditional on age at arrival, these effects capture the immigrants' length of stay in the host country, which not surprisingly has positive effects both on language proficiency and adaptation outcomes.

Examining the impacts of education, upper-secondary and post-secondary educational qualifications are generally associated with a higher probability to be linguistically

[9] However, scholars have also reported evidence that increasing investments in children's language skills may impact negatively on their parents' investment (Kuziemko, 2014).

integrated, albeit statistical significance changes depending on the type of skill considered. Yet, vocational education is more effective on labor market adaptation (5-7 percentage points premium compared to the impacts of primary education). This is consistent with the preference of immigrants for vocational schools observed in the Italy (Barban and White, 2011). Immigrants' educational achievement is positively and significantly associated with the probability of speaking in Italian about important issues with friends, with an advantage of tertiary educated immigrants compared to immigrants with primary education. Thus, achieving higher education seems to be beneficial in terms of exiting from "linguistic and social enclaves".

Father's level of education (reported in the Annex) is associated with a higher probability of speaking Italian at home and with friends, while surprisingly father's vocational qualifications are negatively associated with the probability of being employed.

Immigrants with knowledge of Italian before immigration are more likely to talk in Italian about important issues (+5 percentage points). This finding should be interpreted more as a country-of-origin's effect than a language-related implication: immigrants from countries where Italian is an official language and immigrants from Francophone African countries have lower likelihood to be employed than immigrants from Anglophone Asian countries, Arabic and Hispanic countries. As for the effect of mother tongue, the probability to speak Italian at home decreases by 18 percentage points among English-native speakers compared to immigrants of Italian mother tongue – the reference group (i.e. generally second generation immigrants), whereas their probability to speak Italian with friends falls by 27-28 percentage points.

Chinese native speakers are more likely to have a job (21-22 percentage points) than those who report Italian as mother tongue, unlike those who report Arabic, Spanish and Portuguese as their mother tongues, which generally suffer employment gaps (e.g. around 10-12 percentage points for Portuguese and Spanish speaking immigrants). Owing to the language distance between Italian and Chinese, the positive effect could be explained by labour market enclaves. Chinese niches have been developed in some labor market sectors (i.e. garment manufactures, restaurants or food workshops) and Italian regions, where Chinese entrepreneurs prefer to work with Chinese workers than with Italian ones (Ceccagno, 2015). Similarly, Chinese immigrants have the lowest probability to be linguistically assimilated: their probability to speak Italian at home is 39 percentage points lower whilst the probability to speak Italian with friends declines by 55 percentage points compared to the reference group (Italian mother tongue, i.e. second generation immigrants).

Investigating regional effects in adaptation pathways, immigrants residing in Centre Italy are more likely to be employed, while immigrants living in the South and islands are more likely to speak Italian at home and with friends; yet, the lack in the survey of the detailed residential location does not allow us to check whether immigrants live in ethnic enclaves or metropolitan areas, where the likelihood to be employed in the informal sector and speak their mother tongue may be higher.

Table U

The effect of understanding skills and demographic variables

		Labour market	Cultural identity dimension		
	Outcomes	Working	Language commonly spoken at home	Language commonly spoken with friends	Language spoken to talk about important issues
Variables		Marginal effects	Marginal effects	Marginal effects	Marginal effects
Linguistic skill					
Understanding		-0.485***	-0.268***	-0.289***	-0.036
	Standard errors	(0.024)	(0.078)	(0.087)	(0.083)
Demographic patterns					
Age		0.056***	0.026***	0.007	-0.003
	Standard errors	(0.004)	(0.005)	(0.006)	(0.005)
Age2		-0.001***	-0.000***	0.000	0.000
	Standard errors	(0.000)	(0.000)	(0.000)	(0.000)
Sex: female		-0.186***	0.178***	0.059***	0.037***
	Standard errors	(0.014)	(0.013)	(0.014)	(0.010)
Lower primary		0.010	0.044	0.012	0.060***
	Standard errors	(0.017)	(0.027)	(0.022)	(0.022)
Vocational		0.060***	0.027	0.020	0.067***
	Standard errors	(0.019)	(0.038)	(0.027)	(0.024)
Upper secondary		0.023	0.079**	0.060***	0.102***
	Standard errors	(0.023)	(0.037)	(0.021)	(0.024)
Post secondary		0.030	0.095**	0.095***	0.123***
	Standard errors	(0.029)	(0.042)	(0.031)	(0.026)

Table S

The effect of speaking skills and demographic variables

		Labour market	Cultural identity dimension		
	Outcomes	Working	Language commonly spoken at home	Language commonly spoken with friends	Language spoken to talk about important issues
Variables		Marginal effects	Marginal effects	Marginal effects	Marginal effects
Linguistic skill					
Speaking		-0.420***	-0.318***	-0.301***	-0.093
	Standard errors	(0.028)	(0.060)	(0.077)	(0.075)
Demographic patterns					
Age		0.058***	0.025***	0.006	-0.003
	Standard errors	(0.004)	(0.005)	(0.007)	(0.005)
Age2		-0.001***	-0.000***	0.000	0.000
	Standard errors	(0.000)	(0.000)	(0.000)	(0.000)
Sex: female		-0.188***	0.179***	0.060***	0.038***
	Standard errors	(0.014)	(0.013)	(0.014)	(0.010)
Lower primary		-0.004	0.031	-0.000	0.056***
	Standard errors	(0.018)	(0.027)	(0.021)	(0.021)
Vocational		0.047**	0.011	0.005	0.061***
	Standard errors	(0.019)	(0.039)	(0.026)	(0.023)
Upper secondary		0.010	0.065*	0.047**	0.096***
	Standard errors	(0.024)	(0.037)	(0.021)	(0.023)
Post secondary		0.015	0.078*	0.078**	0.117***
	Standard errors	(0.030)	(0.042)	(0.031)	(0.025)

Table

CMP model by outcomes Marginal effects: Understanding skills and linguistic patterns

		Labour market	Cultural identity dimension		
	Outcomes	Working	Language commonly spoken at home	Language commonly spoken with friends	Language spoken to talk about important issues
Variables		Marginal effects	Marginal effects	Marginal effects	Marginal effects
Linguistic skill					
Understanding		-0.485***	-0.268***	-0.289***	-0.036
	Standard errors	(0.024)	(0.078)	(0.087)	(0.083)
Pre-migration exposure patterns					
Italian language spoken during childhood		0.043	-0.039	-0.064	0.051**
	Mother tongue				
French		-0.032	-0.072	-0.064	-0.055**
	Standard errors	(0.032)	(0.061)	(0.063)	(0.027)
Spanish		-0.100**	0.108*	0.049	-0.013
	Standard errors	(0.045)	(0.062)	(0.095)	(0.055)
Portuguese		-0.118***	0.053	0.024	0.023
	Standard errors	(0.033)	(0.054)	(0.055)	(0.035)
English		-0.009	-0.183***	-0.275***	-0.040
	Standard errors	(0.032)	(0.051)	(0.054)	(0.028)
Arabic		-0.079**	-0.144**	-0.142**	-0.045
	Standard errors	(0.036)	(0.066)	(0.068)	(0.030)
Chinese		0.216***	-0.386***	-0.548***	-0.177***
	Standard errors	(0.031)	(0.049)	(0.057)	(0.025)
Other languages		-0.001	-0.117**	-0.202***	-0.059*
	Standard errors	(0.032)	(0.046)	(0.060)	(0.032)
Arrival and post-migration exposure patterns					
Italian macro regions of residence					
North_East		0.002	-0.017	0.008	0.017*
	Standard errors	(0.013)	(0.014)	(0.017)	(0.009)
Centre		0.023*	-0.011	-0.012	0.051***
	Standard errors	(0.014)	(0.011)	(0.014)	(0.009)
South and islands		0.003	0.041***	0.036***	-0.001
	Standard errors	(0.015)	(0.014)	(0.012)	(0.008)

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

Table

CMP model by outcomes Marginal effects: Speaking skills and linguistic patterns

		Labour market	Cultural identity dimension		
	Outcomes	Working	Language commonly spoken at home	Language commonly spoken with friends	Language spoken to talk about important issues
Variables		Marginal effects	Marginal effects	Marginal effects	Marginal effects
Linguistic skill					
Speaking		-0.420***	-0.318***	-0.301***	-0.093
	Standard errors	(0.028)	(0.060)	(0.077)	(0.075)
Pre-migration exposure patterns					
Italian language spoken during childhood		0.041	-0.040	-0.065	0.051**
	Mother tongue				
French		-0.033	-0.075	-0.066	-0.057**
	Standard errors	(0.033)	(0.060)	(0.065)	(0.028)
Spanish		-0.096**	0.104*	0.047	-0.016
	Standard errors	(0.045)	(0.062)	(0.095)	(0.055)
Portuguese		-0.111***	0.046	0.022	0.017
	Standard errors	(0.034)	(0.053)	(0.056)	(0.036)
English		-0.008	-0.182***	-0.272***	-0.039
	Standard errors	(0.033)	(0.052)	(0.055)	(0.028)
Arabic		-0.084**	-0.147**	-0.144**	-0.048
	Standard errors	(0.038)	(0.065)	(0.069)	(0.032)
Chinese		0.209***	-0.368***	-0.536***	-0.164***
	Standard errors	(0.033)	(0.050)	(0.058)	(0.025)
Other languages		0.007	-0.119***	-0.200***	-0.061*
	Standard errors	(0.033)	(0.046)	(0.061)	(0.032)
Arrival and post-migration exposure patterns					
Italian macro regions of residence					
North_East		0.004	-0.017	0.008	0.017*
	Standard errors	(0.012)	(0.014)	(0.017)	(0.009)
Centre		0.024**	-0.011	-0.013	0.051***
	Standard errors	(0.012)	(0.011)	(0.015)	(0.009)
South and islands		0.012	0.044***	0.041***	-0.001
	Standard errors	(0.016)	(0.014)	(0.012)	(0.009)

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

5.2 Reading and writing abilities

Poor proficiency in reading Italian reduces the probability to find a job by about 34 percentage points, while the effect of deficiencies in writing is smaller (about -28 percentage points). This finding is consistent with the propensity of immigrants to be mainly employed in manual and low-skilled jobs (D'Amuri and Peri, 2014), where complex cognitive skills are generally less relevant for employability than communication skills.

Difficulties in reading and writing Italian reduce the probability to speak Italian at home (about -20 percentage points and –17 percentage points, respectively), with no significant effect on the use of Italian with friends and to talk about important issues.

Table R

The effect of reading skills and demographic variables

		Labour market	Cultural identity dimension		
	Outcomes	Working	Language commonly spoken at home	Language commonly spoken with friends	Language spoken to talk about important issues
Variables		Marginal effects	Marginal effects	Marginal effects	Marginal effects
Linguistic skill					
Reading		-0.341***	-0.201**	-0.099	-0.043
	Standard errors	(0.037)	(0.078)	(0.118)	(0.068)
Demographic patterns					
Age		0.060***	0.027***	0.008	-0.003
	Standard errors	(0.004)	(0.004)	(0.006)	(0.005)
Age2		-0.001***	-0.000***	0.000	0.000
	Standard errors	(0.000)	(0.000)	(0.000)	(0.000)
Sex: female		-0.196***	0.176***	0.055***	0.036***
	Standard errors	(0.014)	(0.014)	(0.014)	(0.010)
Lower primary		-0.012	0.030	0.010	0.056**
	Standard errors	(0.018)	(0.030)	(0.019)	(0.023)
Vocational		0.042**	0.014	0.023	0.063**
	Standard errors	(0.019)	(0.040)	(0.027)	(0.026)
Upper secondary		-0.005	0.061	0.062**	0.097***
	Standard errors	(0.026)	(0.042)	(0.024)	(0.027)
Post secondary		-0.005	0.072	0.094***	0.117***
	Standard errors	(0.032)	(0.046)	(0.030)	(0.029)

Table W

The effect of writing skills and demographic variables

		Labour market	Cultural identity dimension		
	Outcomes	Working	Language commonly spoken at home	Language commonly spoken with friends	Language spoken to talk about important issues
Variables		Marginal effects	Marginal effects	Marginal effects	Marginal effects
Linguistic skill					
Writing		-0.277***	-0.169**	-0.022	-0.059
	Standard errors	(0.073)	(0.086)	(0.187)	(0.081)
Demographic patterns					
Age		0.062***	0.028***	0.008	-0.003
	Standard errors	(0.004)	(0.004)	(0.006)	(0.004)
Age2		-0.001***	-0.000***	0.000	0.000
	Standard errors	(0.000)	(0.000)	(0.000)	(0.000)
Sex: female		-0.203***	0.173***	0.054***	0.035***
	Standard errors	(0.015)	(0.015)	(0.014)	(0.010)
Lower primary		0.007	0.038	0.019	0.057***
	Standard errors	(0.021)	(0.028)	(0.022)	(0.022)
Vocational		0.064***	0.022	0.036	0.062**
	Standard errors	(0.025)	(0.038)	(0.033)	(0.025)
Upper secondary		0.014	0.067*	0.074**	0.095***
	Standard errors	(0.032)	(0.040)	(0.031)	(0.025)
Post secondary		0.015	0.076*	0.109***	0.115***
	Standard errors	(0.038)	(0.045)	(0.041)	(0.028)

The effects of the control variables are generally consistent with those reported in the previous section.

Table 11

CMP model by outcomes Marginal effects: Reading skills and linguistic patterns

Linguistic skill					
Reading		-0.341***	-0.201**	-0.099	-0.043
	Standard errors	(0.037)	(0.078)	(0.118)	(0.068)
Pre-migration exposure patterns					
Italian language spoken during childhood		0.046	-0.039	-0.068	0.052**
	Standard errors	(0.032)	(0.045)	(0.058)	(0.022)
	Mother tongue				
French		-0.026	-0.068	-0.056	-0.055**
	Standard errors	(0.036)	(0.061)	(0.068)	(0.027)
Spanish		-0.098**	0.107*	0.051	-0.015
	Standard errors	(0.049)	(0.063)	(0.096)	(0.056)
Portuguese		-0.113***	0.055	0.046	0.020
	Standard errors	(0.035)	(0.054)	(0.059)	(0.036)
English		-0.007	-0.178***	-0.284***	-0.040
	Standard errors	(0.035)	(0.053)	(0.061)	(0.029)
Arabic		-0.102**	-0.155**	-0.143*	-0.049
	Standard errors	(0.042)	(0.066)	(0.074)	(0.033)
Chinese		0.204***	-0.378***	-0.581***	-0.175***
	Standard errors	(0.037)	(0.055)	(0.072)	(0.027)
Other languages		0.006	-0.116**	-0.197***	-0.061*
	Standard errors	(0.034)	(0.047)	(0.066)	(0.032)
Arrival and post-migration exposure patterns					
Italian macro regions of residence					
North_East		0.009	-0.015	0.011	0.017**
	Standard errors	(0.012)	(0.014)	(0.017)	(0.009)
Centre		0.036***	-0.004	-0.006	0.052***
	Standard errors	(0.012)	(0.011)	(0.015)	(0.009)
South and islands		0.036**	0.057***	0.052***	0.002
	Standard errors	(0.017)	(0.016)	(0.015)	(0.009)

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

Table 12

CMP model by outcomes Marginal effects: Writing skills and linguistic patterns

	Labour market	Cultural identity dimension		
Outcomes	Working	Language commonly spoken at home	Language commonly spoken with friends	Language spoken to talk about important issues
Variables	Marginal effects	Marginal effects	Marginal effects	Marginal effects
Linguistic skill				
Writing	-0.277***	-0.169**	-0.022	-0.059
Standard errors	(0.073)	(0.086)	(0.187)	(0.081)
Pre-migration exposure patterns				
Italian language spoken during childhood	0.049	-0.039	-0.072	0.052**
Mother tongue				
French	-0.031	-0.075	-0.064	-0.060**
Standard errors	(0.035)	(0.061)	(0.071)	(0.029)
Spanish	-0.108**	0.096	0.047	-0.022
Standard errors	(0.045)	(0.063)	(0.094)	(0.058)
Portuguese	-0.111***	0.053	0.048	0.013
Standard errors	(0.033)	(0.057)	(0.053)	(0.039)
English	-0.001	-0.177***	-0.297***	-0.039
Standard errors	(0.039)	(0.052)	(0.080)	(0.027)
Arabic	-0.091**	-0.153**	-0.142**	-0.053
Standard errors	(0.040)	(0.066)	(0.072)	(0.033)
Chinese	0.172***	-0.401***	-0.608***	-0.178***
Standard errors	(0.040)	(0.049)	(0.090)	(0.026)
Other languages	0.010	-0.118**	-0.201***	-0.065**
Standard errors	(0.033)	(0.048)	(0.068)	(0.032)
Arrival and post-migration exposure patterns				
Italian macro regions of residence				
North_East	0.018	-0.008	0.013	0.019**
Standard errors	(0.012)	(0.014)	(0.018)	(0.010)
Centre	0.042***	-0.001	-0.006	0.053***
Standard errors	(0.014)	(0.012)	(0.015)	(0.010)
South and islands	0.043***	0.060***	0.048**	0.005
Standard errors	(0.015)	(0.017)	(0.023)	(0.010)

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

6. Gender differences

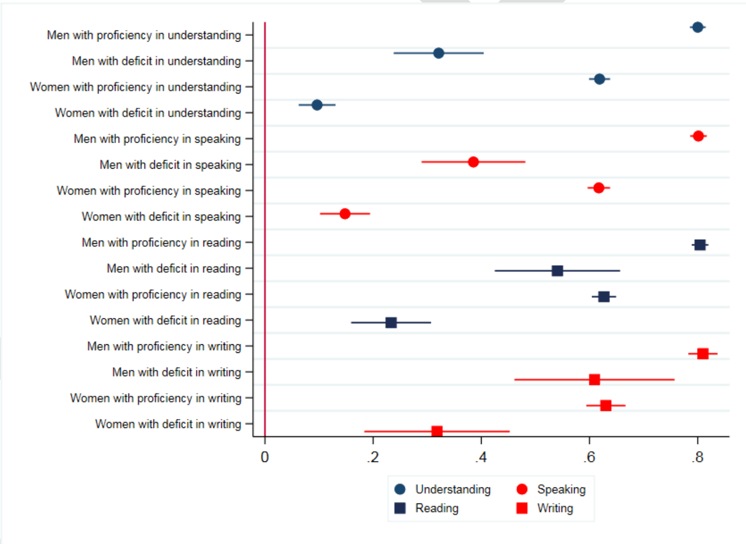
The labour market impact of linguistic proficiency crucially depends on the sectors and jobs in which immigrants typically find employment. The latter in turn differs across genders. In Italy, for instance, female immigrants, especially of some ethnicities, are typically concentrated in the caring sector (Barone and Mocetti, 2011).

For this reason, in this section we explore gender heterogeneity in the effect of language proficiency on labor market and social adaptation of immigrants. Past papers have uncovered gender differences for other countries. Yao and van Ours (2015), for instance, find a negative effect of language deficiencies on wages for women but not for men in the Netherlands, but do not find employment effects for neither gender.

Figures F1L-F1I report the predicted probabilities with 95% confidence intervals of the different outcomes by type of linguistic proficiency. Starting with employment outcomes in Figure F1L, not surprisingly men always have an employment premium compared to women. Among the different types of skills, deficiencies in understanding and speaking entail larger employment penalties (48 and 42 percent points, respectively) than reading and writing (26 and 20 percentage points, respectively) for men. Similar gaps emerge for women, with employment penalties of 52 and 47 percentage points for understanding and speaking, and 39 and 31 percentage points for reading and writing, respectively. Comparing between genders, the linguistic employment gap is larger for women especially for reading and writing skills. One possible explanation is that immigrant women are less likely to work in immigrant enclaves (e.g. in jobs and firms where all or the majority of co-workers are immigrants), and more likely to be in contact with natives (e.g. private care, trade), for which possession of more formal skills such as reading and writing Italian may give an advantage in the labor market. To provide some empirical support to this speculation, we exploit two survey questions that ask individuals about the nationality of their co-workers and if Italian is the language most spoken at work. In the survey, 88% of men and 95% of women aged 15-64 declare that Italian is the mostly spoken language at work, similarly 2.5% of women and 9% of men declare that all or most of their co-workers share their same nationality. All in all, these descriptive statistics suggest that "immigrant working enclaves" are more prevalent for men than for women, and the latter are likely to be more intensively exposed to the Italian language at work.

Figure F1L

Labour market outcome: predicted probability by gender and linguistic skill



Moving now the discussion to the linguistic adaptation outcomes, Figure F1H reports the predicted probabilities of speaking Italian at home. The general picture that emerges is that women are more likely to speak Italian at home than men, and that for them this outcome is more strongly affected by language proficiency. For instance, proficiency in understanding is associated with a 17 percentage points increase in the probability of speaking Italian at home (compared with those without such proficiency) for men, while for women the probability premium is more than 10 percentage points higher, at 29 percentage points. Similar patterns are also observed for the other types of linguistic skill, with linguistic proficiency premia always higher for women. Quite interestingly, contrary to what happens for the labor market outcomes, the largest gender differences emerge for communication skills.

In short, while for women formal linguistic skills tend to give higher returns in the labor market than for men, communication skills are more important for the cultural adaptation (as measured by using the destination language at home) of female immigrants than for their male counterparts. Two possible explanations for the use of Italian at home being more sensitive to language proficiency for women than for men could be the presence of children at home and intermarriage. As for the first, since women are often the primary responsible of childcare, and children are likely to be scholarized in Italy, women are also more likely to communicate in Italian with their children at home. Second, use of Italian may be related to inter-marriage. Indeed, immigrants with a native partner are more likely to use Italian with him/her or a vehicular language (e.g. English) than their own language compared to those with a non-native partner. However, both the number of children and inter-marriage are not included in the models since they may be affected by severe endogeneity and reverse causality problems.[10]

Figure F1H

Italian as language spoken at home. Predicted probability by gender and linguistic skill

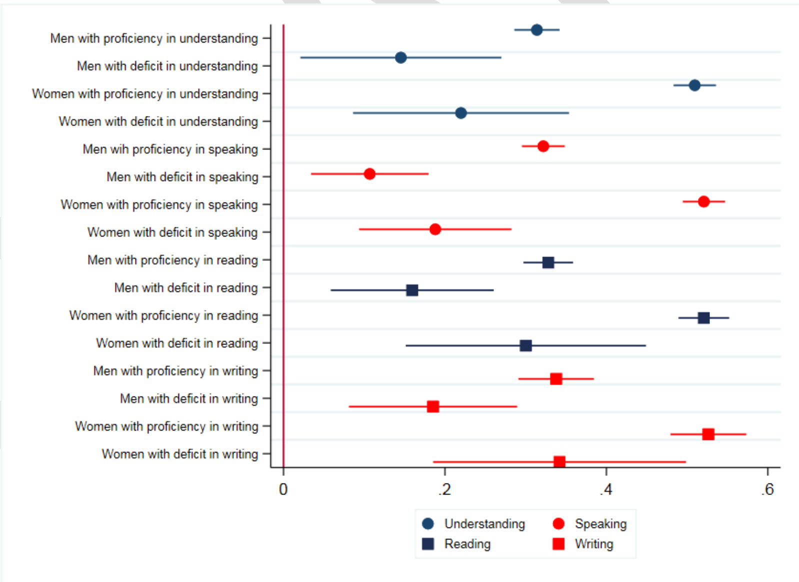
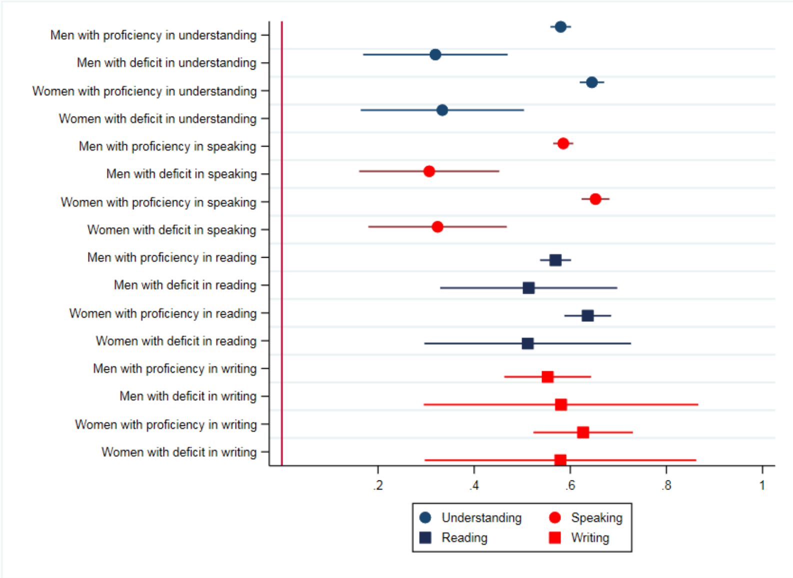


Figure F1F reports the predicted probabilities of speaking Italian with friends. Proficiency in the destination language is generally associated with a greater probability of using Italian with friends. Understanding and speaking skills appear to be more relevant for this specific outcome, especially for women.

[10] One the one hand, immigrants with a better language proficiency are more likely to find a native partner. One the other hand, intermarriage is likely to improve language proficiency of the non-native speaker. The same happens for the presence of children in the household, since fertility may be affected by immigrant adaption.

Figure F1F

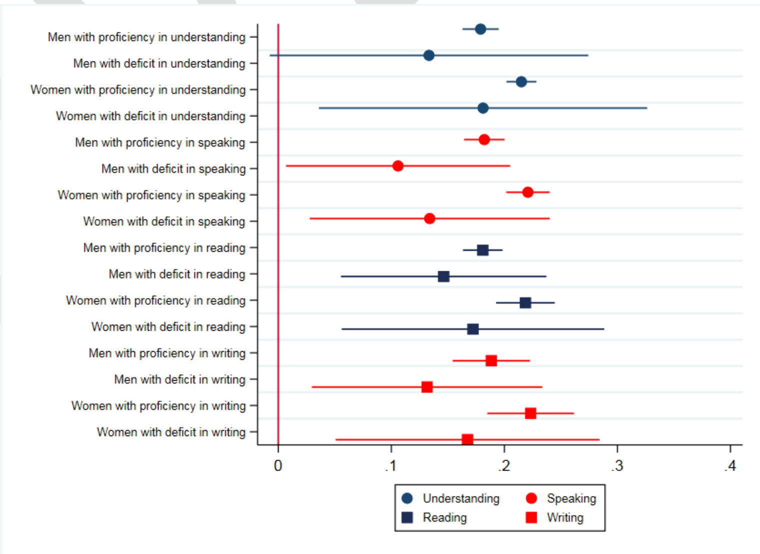
Italian as language spoken with friends. Predicted probability by gender and linguistic skill



Finally, Figure F1I plots the probabilities of speaking in Italian with friends about important things. This is the adaptation outcome that turns out to be least affected by language proficiency, with gender differences that are generally negligible.

Figure F1I

Italian as language to talk about important issues. Predicted probability by gender and linguistic skill



Heterogenous effects by gender and linguistic group

Annex reports estimates by gender and linguistic group. Due to the high number of point estimates in tables and for the sake of brevity, we do not comment here on all results, but highlight some interesting patterns.

The estimates show quite remarkable differences in the male employment premia related to understanding Italian between Spanish-speaking (about 60 percentage points) and other linguistic groups, such as the Chinese-speaking (about 33 percentage points) or the Arabic-speaking (about 29 percentage points) immigrants, for instance. The corresponding female employment premia are much more similar across linguistic groups (53 percentage points for the Spanish-speaking, 45 percentage points for the Chinese-speaking and 43 percentage points for the Arabic-speaking group). These probabilities entail female-male gaps of approximately -8, 12 and 15 percentage points for Spanish-, Chinese- and Arabic-speaking countries. The results point to higher language employment premia for immigrants that are relatively less likely to work in more ethnically concentrated jobs, that is who are less likely to share the same nationality and language of their co-workers. Indeed, using the survey question on the nationality of co-workers, in the age group 15-64, 26% of Chinese subjects declare that all or most co-workers share their same nationality, compared with 3% or Arabic- or Spanish-speaking countries. Similarly, using the question on the language usually spoken at work, while only 51% of Chinese interviewees declare that it is Italian, the corresponding figures for Arabic- and Spanish-speaking subjects are 94% and 97%, respectively.[11]

Worth noting are also the female-male gap in the probability premia of speaking Italian at home associated with a good understanding of Italian. Such gap stands at 46 percentage points for Spanish-speaking immigrants, 29 percentage points for Arabic-speaking immigrants, and a very low 6 percentage points for Chinese-speaking immigrants, always in favor of women. These estimates highlight that good labor market adaptation does not always go hand in hand with linguistic adaptation (for instance for Chinese-speaking immigrants), and that language of origin-gender gaps vary substantially across different outcomes (labor market vs. linguistic outcomes).

7. Robustness: Identification based on compulsory schooling laws

In Section 5 the model identification is based on the critical age hypothesis, considering age 11 as the source of regime change for an individual's language learning skills. However, educational systems usually provide another potential source of identification stemming from institutional features, namely compulsory schooling laws (CLS). The underlying idea is that individuals that arrive in Italy before the end of compulsory education must necessarily attend some schooling in the host country. Through exposition to formal learning and socialization with natives at school, those students

[11] As shown in Bratti et al. (2019) using administrative data on the population of all Italian manufacturing firms, the percentage of the working force whose nationality coincides with the nationality of the entrepreneur is 89.3% for Chinese workers, 32.7% for Egyptian workers and 4.8% for Moroccan workers, suggesting very different levels of same-ethnicity concentration at the firm level. Data are only reported for the ten most numerous groups by country of origin and are not available for Spanish-speaking immigrants.

who arrive before compulsory schooling age are therefore also more likely to achieve some language proficiency. For the birth cohorts that are included in our estimation sample, the typical compulsory schooling age was 14 (introduced in 1923 by the Gentile reform but that started to be enforced with the reform of lower secondary schooling in 1962-1963).[12]

Thus, in this section we report the results of a model identified through alternative exclusion restrictions based on the age cut-off 14. In particular, we estimate a variant of the system (1)-(2) where the exclusion restrictions are provided by the interactions between a dummy for age at arrival before 14 (compulsory schooling) and its interactions with age at arrival and childhood knowledge of Italian (both double and triple interactions). Compared to our previous models, age at arrival is now included linearly (instead of including $\tilde{A}_{ij}$) in the language equations, and we exploit the non-linearity in the age cut-off dummy.

This identification strategy hinges on the assumption of exogeneity of age at arrival with respect to the compulsory schooling age cut-off: individuals (and their parents) may care about the age at which they (their children) arrive in the destination country, but they should not have age 14 (of their children) as a crucial reference point for their migration decisions. A cautionary note is however in order, age 14 in some origin countries might be the age at which a given school cycle ends (typically primary or lower secondary) or may coincide with the CSL in their origin country, and for this reason it might affect an individual's schooling attainment. This potential issue is tackled in two ways. First, both equations of the system (1)-(2) include father's education because highly educated fathers may care more about their children's finishing a school cycle and leaving when their children have just ended a cycle and obtained the corresponding qualification. Second, we include as a control the highest educational qualification achieved by the individual. The latter also helps to address the potential criticism that arriving before age 14 some individuals are forced to attend some schooling in Italy, and they may end up with more education, compared with those arriving later. This is indeed the argument that is usually made in studies that use CSL as instrumental variables to estimate the causal effect of education on various outcomes (see, for instance, Acemoglu and Agrist 2000, Oreopoulos 2006, Clark and Royer, 2013, Atella and Kopinska 2014).

Figure CL provides graphical evidence of the relevance of compulsory schooling age. The graphs show the relationship existing between different types of language deficiencies and age at arrival. They clearly show a significant discontinuity at age 14, which roughly corresponds to an increase of about 10 percent points in the likelihood of reporting language deficiencies. The estimates of the language deficiency equations are omitted for the sake of space but are available upon request from the corresponding

[12] There were some short-lived attempts to raise the compulsory schooling age at 16 (Berlinguer reform), which however were removed by later reforms (Moratti reform).

author. They show both statistically and economically significant effects of age 14 on language proficiency.

Table CL1 reports the coefficients of the different language skills on the four individual outcomes. Understanding, speaking and reading deficiencies produce an important negative employment gap, of about -46, -37 and -26 percentage points, respectively. The effect of writing is instead negative but small and statistically insignificant. As for the probability of speaking Italian at home, the magnitudes of the effects are quite close across types of skills, ranging from -33 percentage points for speaking skills and -23 percentage points for reading. Communication skills are more important than more formal skills on the likelihood of using Italian with friends, with negative premia of 36 and 37 percentage points for understanding and speaking, respectively, and negative premia of formal skills that are about 15 percentage points lower. Few significant effects are instead found on the probability of speaking of important things in Italian with friends. Speaking and writing deficiencies reduce this outcome by about 14 percentage points.

All in all, using this second identification strategy based on CLS with estimates based on the critical age, the effects are qualitatively consistent, and when there are precisely estimated, they also are of similar magnitude.

Table CL.

Effect of linguistic deficiencies on labour market and cultural outcomes using CSL for identification

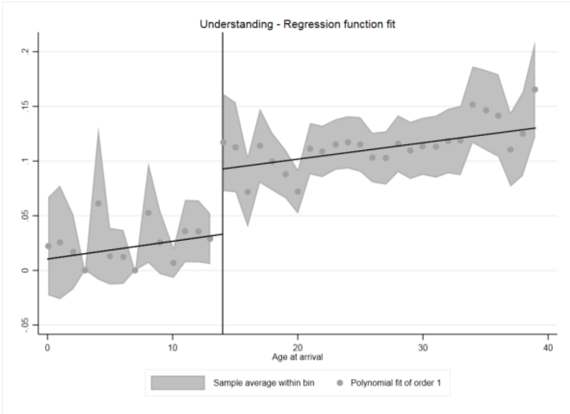
	Labour market	**Cultural identity dimension**		
Outcomes	Working	Language commonly spoken at home	Language commonly spoken with friends	Language spoken to talk about important issues
Variables	Marginal effects	Marginal effects	Marginal effects	Marginal effects
Linguistic deficiency:				
Understanding	-0.456***	-0.284***	-0.360***	-0.087
	(0.035)	(0.093)	(0.066)	(0.077)
Speaking	-0.373***	-0.328***	-0.374***	-0.137**
	(0.045)	(0.070)	(0.062)	(0.070)
Reading	-0.256**	-0.225***	-0.220***	-0.085
	(0.108)	(0.087)	(0.070)	(0.062)
Writing	-0.025	-0.217**	-0.250***	-0.141**
	(0.166)	(0.086)	(0.060)	(0.068)

*, **, *** statistically significant at the 10%, 5% and 1% level, respectively.

Note. The table only reports marginal effects of linguistic deficiency on the labour market and cultural identity outcomes computed from the joint estimation of the outcome and the language skill equations. The exclusion restrictions are a dummy for age at arrival before 14 (compulsory schooling) and its interactions with age at arrival and childhood knowledge of Italian (both double and triple interactions). The models include the regressors listed in Section 5.

Figure CL.

Language deficiencies and age at arrival (age 14 cut-off)



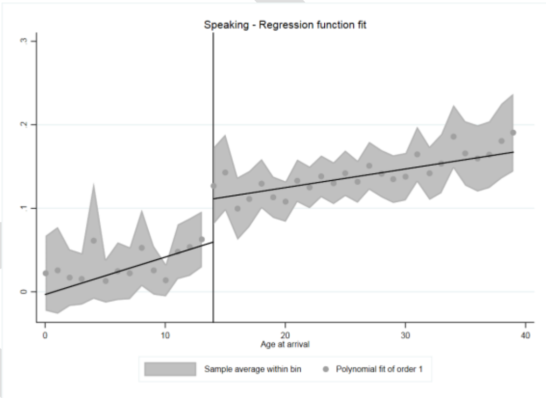
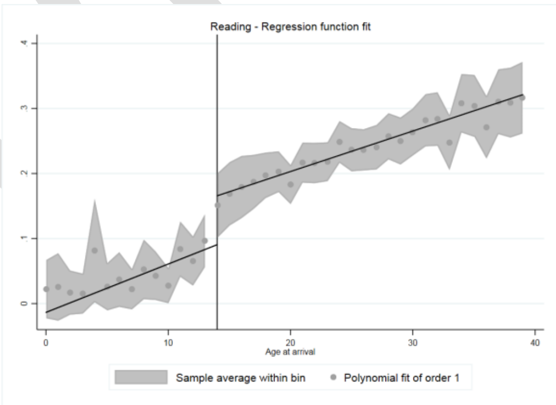
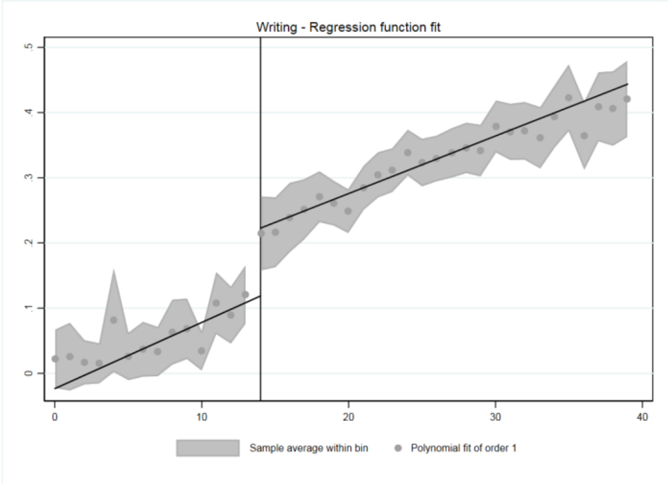


Figure - continued





Note. The graphs show the average language difficulty by age bin and linear trend fit with the 95% confidence interval obtained using the STATA command `rdplot` (with a triangular kernel and sampling weights). For the sake of clarity, the graph reports only age at arrivals not greater than 40.

8. Conclusions

The paper examines the impacts of language deficiency on immigrants' integration process using a simultaneous equation system to deal with endogeneity of linguistic skills on integration outcomes. Previous studies have focused on proficiency in English mainly for immigrants from English-speaking countries of origin assessing an index of language ability based only on speaking capability (Guven and Islam, 2010) or merging linguistic skills. We separately model language ability to capture differences between communication skills (understanding, speaking) and other cognitive abilities (reading, and writing).

We find that poor proficiency in Italian affect a successful integration of immigrants living in Italy, but effects due to deficiency in communication skills differ in magnitude from effects due to difficulties in other cognitive abilities.

Examining the labour market outcomes, the probability to find a job decreases by 48 percentage points among immigrants with difficulties in understanding and by 42 percentage points among immigrants with difficulties in speaking. Effects are weaker when looking at reading and writing difficulties.

Cultural adaptation outcomes are influenced by deficiency in Italian language. As expected, immigrants that report difficulties in speaking Italian have the lowest probability to use Italian in their private sphere of interactions, with different impacts when accounting for the topic of talking.

These results are in line with former empirical analyses showing how proficiency in destination language increases the probability of immigrants to be incorporated into destination societies. Considering immigration as a phase of individual cycle-life, children perform higher adaptation and learning language capabilities than adults; therefore, experiencing immigration at younger ages can be less distressing in terms of future incorporation into Italian society than immigration at older ages.

Although effects are mediated by the exposition of destination language before emigration, female-gender gap results from the models assessing impacts of language deficiency on the labour market outcomes: women are less likely to be employed. Nevertheless, looking at cultural dimensions, female immigrants are more likely to speak Italian at home and with friends.

Clustering immigrants by mother tongue allows us to measure origin identity effects and assess the power of Italian as vehicle of the Italian culture. English, Arabic and Chinese native speakers are more likely to keep their mother tongue for interacting with relatives and friends. Specifically for Chinese immigrants, language barriers versus Italian language, that are not obstacles for their access to Italian labour market, may represent a facilitate pathway of their cultural segregation.

Findings of the analysis suggest that linguistic barriers to immigrants' incorporation into Italian society could be broken down by targeted programs defined by mother tongue and demographic patterns of immigrants.

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ANNEX

Files will be provided with the final version of the paper