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MARRIAGE, FERTILITY, AND CULTURAL INTEGRATION IN ITALY

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ABSTRACT

We study the cultural integration of immigrants, estimating a structural model of marital matching along ethnic dimensions, exploring in detail the role of fertility, and possibly divorce in the integration process. We exploit rich administrative demographic data on the universe of marriages formed in Italy, as well as birth and separation records from 1995 to 2012. We estimate strong preferences of ethnic minorities' towards socialization of children to their own identity, identifying marital selection and fertility choices as fundamental socialization mechanisms. The estimated cultural intolerance of Italians towards immigrant minorities is also substantial. Turning to long-run simulations, we find that cultural intolerances, as well as fertility and homogamy rates, slow-down the cultural integration of some immigrant ethnic minorities, especially Latin America, East Asia and Sub-Saharan Africa. Nonetheless, 75% of immigrants integrate into the majoritarian culture over the period of a generation. Interestingly, we show by counterfactual analysis that a lower cultural intolerance of Italians towards minorities would lead to slower cultural integration by allowing immigrants a more widespread use of their own language rather than Italian in heterogamous marriages. Finally, we quantitatively assess the effects of large future immigration inflows.

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1 Introduction

The recent surge in migration flows to Western countries represents one of the most contentious political and socio-economic phenomenon of the last decades. Voters' attitudes towards immigration reveal large support for restrictive immigration policies. This support appears to be motivated in large part by the perceived cultural externalities immigration imposes on natives in the integration process, since sizeable negative labor market effects of immigration on natives are far from well-documented (Bisin and Zanella, 2017).[1] Indeed, the empirical evidence documents slow rates of convergence and strong persistence in cultural traits on the part of minorities (Algan et al., 2012; Fernández, 2011).

But cultural convergence and integration are equilibrium phenomena, the result of a demand of integration on the part of immigrants and a supply, in the form of cultural acceptance, on the part of natives. In order to gauge a better understanding of these mechanisms, to distinguish the demand and supply components which contribute to the slow-down immigrants' economic and cultural integration, this paper takes a structural approach to study the intergenerational process of cultural transmission, focusing on the role of the family. The family has in fact, arguably, a pivotal function in this process as the primary place where values, attitudes and beliefs are transmitted from parents to children. More specifically, we investigate marital matching along the cultural-ethnic identity of the spouses, and the implications of marital sorting on consequent intra-household decisions regarding fertility, and cultural transmission.

To this end, we study a structural model of family formation and intra-household decision making in a context where ethnic differences between spouses potentially matter both in terms of preferences and technologies for household production. The model is consistent with several stylized facts of marriage markets, e.g., the strong positive assortative mating along cultural-ethnic lines and the relative lack of stability of intermarriages. We estimate the model parameters using rich administrative data on the universe of marriages formed in Italy, as well as birth and separation records.

More in detail, we consider a transferable utility (TU) marriage matching model in a two-sided market without frictions. Spouses match along the cultural-ethnic dimension. The joint marital utility is the sum of a systematic and an idiosyncratic component. The id-

[1] A large empirical literature in economics has investigated the effects of immigration on natives labour market outcomes, without reaching a final consensus. Results are polarized. While some studies uncover negative and persistent wage effects (Borjas, 2003, 2014), others provide evidence in favour of positive long-term wage effects (Card, 2009; Ottaviano and Peri, 2012; Manacorda et al., 2012; Card and Peri, 2016) or even heterogeneous effects along the wage distribution (Dustmann et al., 2013).

iosyncratic component reflects individual unobserved heterogeneity (Choo and Siow, 2006). The systematic component depends on observable spouses' characteristics and is the result of a collective household decision problem embedded within this matching framework. Within marriage, parents choose fertility, investments in the cultural socialization of children, and possibly divorce. Parents care about socializing their children and are endowed with technologies to transmit their own cultural-ethnic traits to children (Bisin and Verdier, 2000, 2001). Socialization incentives and technologies vary, in particular, within homogamous and heterogamous marriages. Furthermore, the socialization behavior depends on the distribution of the population across ethnic groups. As a consequence, the model implies a systematic dependence of fertility, socialization, and divorce patterns across household ethnic characteristics.

Our empirical analysis exploits variability in cultural-ethnic identity across immigrants in the Italian marriage market. Indeed, Italy has recently experienced massive waves of ethnically heterogeneous immigration.[2] We obtained administrative individual-level data from ISTAT through its ADELE (*Laboratorio per l'Analisi dei Dati ELEmentari*) Laboratory. These data cover the universe of marriages formed in Italy from 1995 to 2012 and the universe of births and separations registered in Italy in the same time period. We then matched marriage records with birth and separation records to provide a dynamic representation of intra-household decisions, from the moment of marital formation to potential childbirth and dissolution decisions.

Descriptively, the data reveal strong positive assortative mating preferences along ethnic lines. Different behavioral patterns distinguish the majoritarian Italian group from the minority ethnic groups. Systematic differences also characterize homogamous and heterogamous household choices in terms of fertility, socialization, and divorce. For instance, homogamous minority households have a strong preference toward the transmission of their own language, hence the probability of speaking Italian at home is lower compared to those in heterogamous families.

We estimate the parameters of the structural model via a method of moments estimator, exploiting two sources of cross-sectional variability in outcomes, i.e., across (the ethnic composition of) marital matches and across geographical regions. The main parameters of interest in the model are the cultural intolerance parameters, that is, the (psychological) value a parent obtains when socializing a child to his/her own ethnic identity, relative to having a

[2] At the beginning of 2014, the number of foreign residents registered in Italy was more than 4.9 million, accounting for 8.1% of the total resident population. This is in comparison to 2013, when the same percentage was around 7.4% and as little as ten years earlier, in 2003, it was 2.6%. As a consequence, the percentage of interethnic marriages nearly tripled during the period of investigation from 1995 to 2012.

child with a specific different cultural-ethnic identity. Cultural intolerances represent a measure of the strength of the cultural transmission effort of a specific ethnic group and hence of the strength of its resistance to cultural integration. We estimate cultural intolerance parameters that are positive, asymmetric and highly heterogeneous across cultural-ethnic groups. In particular, ethnic minority parents display strong preferences towards socialization of children, as measured by language transmission, particularly so for parents from North Africa-Middle East, whose estimated cultural intolerance is nearly seven times as high as the one of Europe-EU15. On the other hand, we also estimate the highest cultural intolerance of the Italian majority towards immigrants originating from Sub-Saharan Africa and North Africa-Middle East (four times as high as the one towards immigrants from Europe-EU15).

We investigate the evolution of the distribution of the population by cultural traits in the long-run, by simulating our model of marital matching and intra-household choices over successive generations. Despite cultural intolerance estimates highlight strong preferences of immigrants for maintaining their cultural identity, all cultural-ethnic minorities are simulated to converge to the Italian majority along the language dimension. Furthermore, 75% of immigrants integrate into the majoritarian culture over the period of a generation; that is, 75% of the second generation immigrants speaks Italian at home with their children. However, the pace of convergence is heterogeneous across cultural-ethnic groups. On the one hand, we find that the Europe-EU15 and Other Europe minorities converge almost completely to the majoritarian culture in a single generation. A similar pattern is also displayed by the North Africa-Middle-East minority. On the other hand, a significantly slower convergence rate is achieved by the Latin America minority which even restrain their integration process towards the native culture in the first generation and after four generations only 68% of immigrants culturally integrate along the language dimension. A slower convergence rate also characterizes the East Asia and Sub-Saharan Africa minorities.

The patterns of cultural integration of Europe-EU15 and Other Europe minorities are the result of their relatively low cultural intolerance preferences. In a similar way, the East Asia and Sub-Saharan Africa minorities' slower integration is due in part to their higher intolerance parameters. But intolerance parameters are not the only determinants of the dynamics of integration of different cultural-ethnic groups. For instance, while North Africa-Middle East, Sub-Saharan Africa, and East Asia show relatively comparable cultural intolerance preferences, they display significant differences in the dynamics of integration. Indeed, a strong estimated selection into homogamous marriages for Sub-Saharan Africa migrants allows them to sustain their cultural heterogeneity by accessing superior direct socialization technologies. On the other hand, estimated fertility rates are particularly high for East Asia minorities and this is a fundamental factor behind this minority's integration pattern.

Finally, the relative success of the Latin America in securing their cultural distinctiveness over time is due in large part to the fact that they turn out to be uniquely able to socialize children also in heterogamous marriages with natives.

The relative speed of the cultural integration of immigrants is also in relevant part due to the cultural intolerance of Italians, the strength in their own cultural transmission preferences. The sign of this counterfactual effect is somewhat surprising. In principle, letting natives more (indeed fully) accepting of the cultural traits and beliefs of immigrants might make their cultural integration easier and hence faster, for instance by fostering heterogamous marriages. Actually, when we simulate our model by assuming an higher willingness of the majority to welcome cultural dissimilarities, the dynamics of integration of minorities towards Italian's culture is reduced by 6% over the period of a generation, and we observe a remarkably larger persistence in heterogeneity of cultural traits. In fact, the intuition is that an higher acceptance of the culture of minorities on the part of natives allows immigrants to better maintain their cultural traits by means of higher socialization rates when married with natives, with a consequential increase in their demand for intermarriages with natives, and higher fertility.

Finally, we study the effects of a rise in migration inflows on cultural heterogeneity in Italy, by performing two counterfactual simulation exercises, doubling the number of second generation minorities with different compositional assumption. The effects are varied. When the inflows are designed to keep population shares constant, we see a reduction in cultural convergence of 7 percentage points for third generation; that is, 86% of immigrants integrate into the majoritarian culture by the third generation, compared to the 93% of convergence at the baseline. More in detail, the rise in migration inflows has small effect on the cultural integration of Europe-EU15, Other Europe and North Africa-Middle East minorities, while it reduces integration of 20 and 6 percentage points, respectively, for Sub-Saharan Africa and East Asia minorities. When we modify the relative distribution of minorities, overweighting North Africa-Middle East, Sub-Saharan Africa and East Asia, we see a similar pattern: North Africa-Middle East immigrants reduce convergence of only a 6 percentage points by the third generation, while the response of East Asia and Sub-Saharan Africa minorities ranges from a 20 to a 50 points reduction in convergence, slowing down significantly the process of cultural integration.

The rest of the paper is organized as follows. Section 1.1, next, provides a discussion of the related literature. Section 2 outlines the theoretical framework, discussing the general setup, the timing of the model and choice components, and we discuss theoretical results. Section 3 describes the data used in the empirical analysis and interesting patterns. Section 4 presents the structural model, the estimation strategy, the identification of model parameters and a

discussion of the main assumptions of our empirical model. We present the estimation results in Section 5 and we study the dynamics of the distribution of cultural-ethnic traits in the population over successive generations in Section 6. We provide additional counterfactuals in Section 7 by studying the effects of an increase of incoming migration flows on cultural heterogeneity. Finally, Section 8 concludes.

1.1 Related Literature

This paper fits into the literature on family economics by studying a model of marital matching and intra-household decisions.[3] More specifically, we embed a collective household decision problem into a marital matching framework, as first in Chiappori et al. (2017). The context of the analysis is however different: Chiappori et al. (2017) studies returns to education, while we study cultural-ethnic socialization patterns. Other papers along similar methodological lines include (Chiappori et al., 2018; Gayle and Shephard, 2019; Galichon et al., 2019).[4]

This paper also fits into the recent literature on cultural transmission. Cultural-ethnic socialization patterns within the family are arguably the main mechanism to explain the intergenerational transmission of cultural norms and preferences.[5] In particular, we follow Bisin et al. (2004) in that we characterize the contribution of various intra-household decisions to the cultural transmission process. On the other hand, we focus on cultural-ethnic rather than religious traits, we center on immigrants, studying the dynamics of integration of cultural-ethnic minorities, and we formulate and estimate explicitly a marital matching problem in which we embed socialization choices.

Finally, this paper fits into the large literature on the cultural integration of immigrants. In this respect, (Gordon, 1964; Meng and Gregory, 2005; Constant and Zimmermann, 2008; Algan et al., 2012; Furtado and Trejo, 2013) focus on intermarriage, (Abramitzky et al., 2019; Clots-Figueras and Masella, 2013; Fouka, 2019) on socialization by means of children's first names and home language transmission, (Manning and Roy, 2010) on self-reported national

[3] See the early contributions by Gary Becker, (Becker, 1973, 1974; Becker et al., 1977; Becker, 1991).

[4] See Choo and Siow (2006); Choo (2015); Chiappori et al. (2009, 2012); Dupuy and Galichon (2014); Galichon and Salanié (2015); Ahn (2018) for the more recent contributions to the study of marital matching problems and Chiappori and Salanié (2016) for a comprehensive survey; and see also Lundberg and Pollak (1993); Chiappori (1988, 1992); Chiappori et al. (2002); Blundell et al. (2007); Del Boca et al. (2014); Voena (2015) for advances in the study of spouses interactions in marriage.

[5] See Bisin and Verdier (2000, 2001) for theoretical models of socialization. See Fernández et al. (2004); Nunn and Wantchekon (2011); Voigtländer and Voth (2012); Alesina et al. (2013); Grosjean (2014); Guiso et al. (2016) for some of the many empirical studies documenting the persistence of cultural traits. Finally, see Bisin and Verdier (2011) for a survey of the theoretical and empirical literature on the subject.

identity.[6] Differently from this paper, these studies adopt mostly a non-structural approach.

2 Theoretical Framework

We consider a large marriage market, with a population of m men and f women, heterogeneous in terms of their cultural-ethnic identity. Each man and each woman is identified by a cultural-ethnic trait. For simplicity, in this section, we present the theoretical model for dichotomous cultural traits; say n for natives and i for immigrants.[7] The marriage market is frictionless. Individuals match in the marriage market anticipating the utility of their future choices as a household. The household choices we consider include fertility, divorce, and socialization of children in terms of cultural-ethnic traits. Spouses interact cooperatively within marriage and as a consequence intra-household decisions are Pareto efficient; following a divorce, however, they choose non-cooperatively their socialization efforts. Utility is transferable (TU) across spouses. Transfers are endogenously determined as equilibrium outcomes, depending on the quality of the specific match but also on the set of available opportunities in the marriage market. Total marital utility is the sum of two components: i) a systematic component related to the fertility, divorce, and socialization in the household; and ii) an idiosyncratic component, capturing residual idiosyncratic returns from marriage, observed by the individuals prior to marriage.

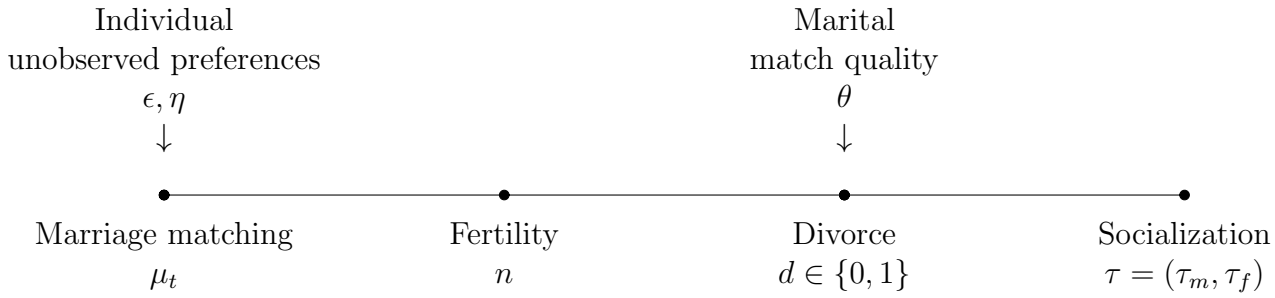
Each individual has a preference over the cultural-ethnic identity of his/her children and has an available socialization technology. In the empirical application, we will proxy cultural socialization by language transmission. Family types are heterogeneous, as spouses might or might not share the same cultural traits. Let the notation $\{h, j\}$ denote a household type where the male has cultural-ethnic identity h and the female j with $h, j \in \{n, i\}$; let $\{h, .\}$ denote the household type composed of an unmarried male with trait h and let $\{., h\}$ be the type composed of an unmarried female with trait h. Let T denote the set of possible types of household, along the cultural-ethnic identity.[8] We use $t \in T$ to index all types of household, including those composed of unmarried individuals. We use $hj \in T$ to index married household types.

[6] With regards to economic rather than cultural integration, specifically, the wage and employment gap between native and immigrants, see, e.g., Borjas (2014), the review of this book by Card and Peri (2016), and Constant and Zimmermann (2013) for surveys of empirical findings.

[7] The empirical exercise, and the theoretical model presented in the Appendix, allow for multiple cultural-ethnic traits of immigrants.

[8] Formally, this is the set of permutations with repetition. With K different traits, the set has $(K+1)^2-1$ elements; hence 8 in the dichotomous trait case, in this section.

Figure 1: Timing of the Model



Timing. The timing of the marriage model is illustrated in Figure 1. Let ϵ_h and η_h denote the individual idiosyncratic preference shocks for men and women, respectively, with identity h; a vector, each element of which represents the idiosyncratic component of utility associated to a possible type of spouse the individual might be matched with (including none, if he/she stayed single).[9] The total expected utility of a household of type hj between man m with identity h and female f of identity j (resp. $h.$) is then $U_{hj} + \epsilon_{hj} + \eta_{jh}$ (resp. $U_{h.} + \epsilon_{h.}$). In the first stage individuals observe their idiosyncratic shocks and match along cultural-ethnic identity traits in a frictionless marriage market with TU, anticipating their marital utility $U_t + \epsilon_t + \eta_t$ for all different potential matches. We normalize $U_{h.} = U_{.h} = 0$, for all $h = n, i$. Let μ_t denote the fraction of households of type t formed in the population.

After households are formed in the marriage market, in the second stage, the spouses in the household choose, cooperatively, fertility in the marriage, that is, the number of children, n (abusing notation). In the third stage, a match quality shock θ_{hj} is realized, which is observed by the spouses. Depending to the realization of the shock, the spouses cooperatively decide whether they remain married or to divorce: $d = 1$ indicates the choice of divorcing and $d = 0$ the choice of continuing in marriage. Finally, children are socialized, either as a cooperative decision by both parents in the household or as a non-cooperative decision of the mother in case the household is separated in divorce.[10]

Matching. Let q^h define the fraction of individuals with trait h in the population, m^h males

[9] We assume that individual idiosyncratic preference shocks are additive separable in preferences and depend on observable characteristics only. Despite this we still allow for sorting on unobservable dimensions, this separability assumption excludes complementarity between unobserved spouses' characteristics (Chiappori and Salanié, 2016).

[10] The fact that socialization efforts are chosen conditional on divorce is merely a simplification, but it does not affect the main results. In fact, what we need is that at least part of the socialization process takes place after divorce or, said differently, that socialization is completed only conditional on marital status.

and $f^h = q^h - m^h$ females. The optimal stable assignment is the solution of the following welfare maximization problem, subject to the feasibility constraints (Shapley and Shubik, 1971)[11]:

$$\begin{aligned} &\max_{(\mu_t \geq 0)_{t \in T}} \quad \sum_{t \in T} \mu_t \left(U_t + \epsilon_t + \eta_t \right) \\ &s.t. \\ &\sum_j \mu_{hj} + \mu_{h.} = m_h \quad \forall h = n, i, \\ &\sum_h \mu_{hj} + \mu_{.j} = f_j \quad \forall j = n, i \end{aligned} \tag{1}$$

We turn now to construct the expected systematic utility component U_{hj} for each household type $hj \in T$. U_{hj} is the indirect utility of the household future choices of fertility, divorce, and socialization. We make a series of simplifying assumptions. First of all, the marital utility is proportional to fertility n and the utility per child is composed of a constant direct utility δ and the utility from socialization u_{hj}. Investment in fertility entails a cost $c(n)$. Furthermore, the marital quality shock θ enters marital utility only if the household stays married (does not divorce), that is, it chooses $d = 0$:

$$U_{hj} = n \left(\delta + E \left(u_{hj} \right) \right) + \theta(1 - d) - c(n), \text{ with } E(\theta) = 0 \tag{2}$$

We proceed backwards, from socialization to fertility.

Socialization. We start from the socialization problem, given (n, θ_{hj}, d). In fact, under the preference structure we imposed, the socialization choice is independent of fertility n and it depends on θ_{hj} only through d.

Let V_j^h denote the utility a parent with trait j obtains if the child is socialized to trait h, for all h, j. Each parent's preference over the cultural-ethnic identity of his/her children is biased towards his/her own trait:

$$V_h^h > V_h^j, \text{ for all } h, j \in \{n, i\}.$$

With regards to the socialization technology, we introduce several simplification assumptions. First of all, within a family all children identify to the same trait.[12] Secondly, homogamous native households socialize their children with probability 1; that is, children of

[11] Under our assumptions, the two-sided matching problem reduces to a series of one-sided discrete choice problems (Galichon and Salanié, 2015; Chiappori et al., 2017).

[12] In particular, we abstract from differences in socialization preferences regarding the gender and/or the birth order of children and from socialization externalities driven by spillover effects across siblings.

native parents speak the native language. Thirdly, in a household of type hj the socialization effort of the father, τ_m, has the objective and the effect of increasing the probability that the children identify with his trait, h; similarly, the socialization effort of the mother, τ_f, has the objective and the effect of increasing the probability that the children identify with her trait, j. Parents in heterogamous households, such that $h \neq j$, face conflicting incentives in the socialization of children, while parents in homogamous households, with $h = j$, benefit from coordinate incentives.

Let $P^h_{hj}(\tau, d)$ denote the probability that a child in a family of type hj is socialized with the father's trait $h = n, i$, when the socialization effort is $\tau = (\tau_m, \tau_f)$ and the divorce choice is d. Assuming that the mother is given custody of children in divorce[13], we posit socialization technologies, extending Bisin and Verdier (2000), as follows:

$$\begin{array}{ll} P^n_{nn}(\tau,0) = P^n_{nn}(\tau,1) = 1 & \\ P^i_{ii}(\tau,0) = \tau_m + \tau_f + (1-\tau_m-\tau_f)q^i, & P^n_{ii}(\tau,0) = (1-\tau_m-\tau_f)(1-q^i) \\ P^i_{in}(\tau,0) = \tau_m + (1-\tau_m-\tau_f)q^i, & P^n_{in}(\tau,0) = \tau_f + (1-\tau_m-\tau_f)(1-q^i) \\ P^i_{ni}(\tau,0) = \tau_f + (1-\tau_m-\tau_f)q^i, & P^n_{ni}(\tau,0) = \tau_m + (1-\tau_m-\tau_f)(1-q^i) \end{array} \tag{3}$$

Socialization probabilities under divorce $P^h_{hj}(\tau, 1)$ are equivalent to those reported in (3), after imposing $\tau_m = 0$. The total marital utility from the socialization process, net of socialization costs $c(\tau)$ is

$$\begin{aligned} u_{hj}(\tau, d) &= P^h_{hj}(\tau, d)\left(V^h_h + V^h_j\right) + \left(1 - P^h_{hj}(\tau, d)\right)\left(V^j_h + V^j_j\right) - c(\tau) \\ &= V^j_h + V^j_j + P^h_{hj}(\tau, d)\left(\Delta V^j_h - \Delta V^h_j\right) - c(\tau). \end{aligned}$$

where $\Delta V^j_h = V^h_h - V^j_h$ and $\Delta V^h_j = V^j_j - V^h_j$ represent the *cultural intolerance* of cultural-ethnic group h and j, respectively. Socialization effort τ is then the solution to

$$\max_{\tau \geq 0} \; u_{hj}(\tau, d). \tag{4}$$

Let the solution be denoted $\tau_{hj}(d)$. Notice that it depends only on ΔV^j_h, ΔV^h_j rather than

[13] We introduce an asymmetry between spouses in the probability of child custody assignment upon dissolution, independently from the ethnic-groups h, j. We calculate that in 88% of separation and divorce proceedings in Italy, the mother is given *effective* custody of children. We uncover some significant differences in custody assignment conditional on mother and father migrant status, but we abstract from incorporating them in the model for the sake of simplicity. Specifically, foreign mothers married with a native husband are less likely to obtain their child's custody by 1.4 (3.4) p.p. compared to native mothers, upon separation (divorce). On the contrary, native mothers are more likely to obtain their children custody by 5.1 (6.9) p.p. following a separation (divorce) if married with a foreign husband.

on the utility levels V_j^h (which do not affect the maximization problem in (4)).

Divorce. After observing the realization of the marriage quality shock θ_{hj}, the spouses optimally choose whether to dissolve the marriage (divorce) or not, rationally anticipating their total utility from the socialization process. Given n, a type hj household divorces, choosing $d = 1$, if

$$n\left(u_{hj}(\tau_{hj}(1),1)\right) > n\left(u_{hj}(\tau_{hj}(0),0)\right) + \theta_{hj}.$$

Fertility. Given $F(\theta_{hj})$ the cumulative distribution of θ_{hj}, the probability of divorce of a type hj household with n children is

$$\pi_{hj}\left(n\right) = F\left(nu_{hj}(\tau(1),1) - nu_{hj}(\tau(0),0)\right).$$

The quantity-quality trade-off that characterizes endogenous fertility choices (Becker, 1960) is captured in the model as the optimal number of children is determined by the expected socialization quality per child, interacted with the effect of fertility itself on dissolution, and the marginal cost of raising them:

$$\max_n \; n\left(\delta + \pi_{hj}\left(n\right)u_{hj}(\tau(1),1) + (1-\pi_{hj}\left(n\right))u_{hj}(\tau(0),0)\right) - c(n) \tag{5}$$

2.1 Results

We describe here informally the most important implication of the marriage model in the previous section, for a culturally heterogeneous society, with $q^i \in (0, 1/2)$.

Socialization. Parents make costly investments in order to socialize their children, both in homogamous and heterogamous families. Socialization investments in homogamous families benefit from coordinated incentives. Conversely, a positive socialization investment in heterogamous families hinges on cultural intolerance asymmetries. In addition, homogamous families, when married, hold a more efficient socialization technology, compared to heterogamous ones. If they divorce, the socialization technology is the same independently of the type of household. As a consequence,

In homogamous minority households ii, when the parents stay married, both parents' socialize the children. If, instead, the household divorces, only the mother

has custody and socializes the children, by assumption, and the investment in socialization is lower. In heterogamous households ni and in, when the parents stay married, only the parent with higher cultural intolerance has a strictly positive socialization effort. If, instead, the household divorces, in this case as well, only the mother socializes the children. Heterogamous households, contrary to homogamous household, invest more in socialization when divorced than when married.

For all household types, married or divorced, the probability of successful socialization to the trait desired by the parents (or parent) doing the investment is greater than the rate associated to random matching.[14] We turn now to study comparative statics relationships.

In homogamous minority households, whether parents divorce or stay married, both parents' socialization efforts are monotonically increasing in cultural intolerance and decreasing in the size of their cultural group, q^i. In heterogamous households, the socializing parent effort is monotonically increasing in his/her own cultural intolerance; if parents stay married, the socializing parent's effort is also decreasing in his/her spouse's cultural intolerance. It is also the case that the minority i socializes more than the majority n, ceteris paribus.[15]

Divorce. Consider an household with positive fertility, $n > 0$. As the systematic gains from marriage derive from socialization and divorce leads to a generally less efficient socialization technology,

All types of household $hj \in T$ stay married if their marriage quality shock is positive, $\theta_{hj} \geq 0$; they divorce only if the quality shock is negative and large enough (in absolute value).

On the other hand, in heterogamous households, mothers have an advantage in socialization after divorce, and therefore,

The divorce probability of heterogamous families is higher compared to homogamous minority families, for the same realization of the stability shock, θ_{hj}, if the mother has higher cultural intolerance. If instead the father has higher cultural intolerance, the divorce probability of heterogamous families is higher compared

[14] It is equal for heterogeneous household with equal intolerances, as in this specific case parents do not socialize children.

[15] This is a property called *cultural substitution* in Bisin and Verdier (2001).

to homogamous families if and only if the father belongs to the cultural-ethnic minority i.

Divorce choices for heterogamous families might be interpreted as a strategic deviation from marriage for mothers who have a preference to socialize children and expect to have a higher probability of child custody attainment.[16]

Furthermore, we can show that,

The divorce probabilities, for both homogamous and heterogamous families, are decreasing in the number of children.

More generally, our model displays a quantity-quality trade-off in fertility, since quality is effectively represented by the associated efficiency of socialization. This implies a negative relationship between the probability of divorce of a family and the number of children in that family.

Fertility. The fertility rates for all types of households are strictly positive. The main result is that,

The fertility rate in homogamous families is larger than the fertility rate in heterogamous families.

Matching. Complementarity between spouses' cultural traits implies that,

The marriage distribution along cultural-ethnic lines displays positive assortative mating.

3 Descriptive Evidence

In this section, we first present the data we use in the estimation. In terms of cultural-ethnic traits, we distinguish between Italians, as the majoritarian group, and migrant minorities, aggregated by country of origin. We obtain $K = 7$ cultural-ethnic groups: $n =$ Italian; $i =$ European (EU15 countries), Other European, North African and Middle-Eastern, Sub-Saharan African, East Asian and Latin American. This classification reflects both the prevalence of each ethnic-group in Italy and the relative cultural distance of countries with respect to

[16]This perspective is pointed out by Dohmen et al. (2012). Indeed, they make the point that children are more strongly socialized by a divorced mother rather than in heterogamous families, while there is no significant difference in socialization compared to homogamous families.

Italy.[17] We adopt the standard classification that divides Italy in 20 distinct administrative regions and we consider the region of residence of spouses at the moment of marriage.[18]

3.1 Data

We take advantage of original administrative individual-level data, which covers the universe of marriages formed in Italy from 1995 to 2012, and the universe of births and separations registered in Italy during the same period. Data were made available by ISTAT through its ADELE Laboratory.[19] We constructed a unique dataset, by matching marriage records with birth and separation records through time-invariant observable characteristics of spouses, which are available in both registries. Specifically, the union of the exact date of marriage and exact date and place of birth of both spouses provides an exact one-to-one matching for 98.5% of the universe of marriages. The dynamic structure of data has two main advantages. First, it allows us to follow households over time, having a full dynamic representation of intra-household decisions, from the moment of marital formation to potential childbirth and decisions over marital dissolution. Secondly, it allows us to rule out household sample-selection driven by divorce choices.

The final sample consists of more than 4 million marriages, that cover 92.6% of the universe of marriages celebrated in Italy from 1995 to 2012.[20] From this data, we recover i) the bivariate distribution of marriages, by cultural-ethnic group of spouses and by region;

[17] The classification of immigrants' countries of origin by cultural-ethnic group is reported in Table B.1. Figure B.1 shows the distribution of the migrant population resident in Italy by country of origin. Figure B.2 shows the correspondence between our ethnic-group classification and the cultural distance of countries with respect to Italy, proxied by genetic (Spolaore and Wacziarg, 2009) and ethnolinguistic (Lewis et al., 2009) distance. Overall, we document the presence of some geographical clusters in cultural dissimilarity by continent. In particular, our classification parallels the heterogeneity in genetic distance within Africa, between the Arabic countries in the North and Sub-Saharan countries, as well as the within Asia divide between Middle-East countries and East Asia countries.

[18] Interregional migration choices are not taken into account, in line with the theoretical model. See Section 4.4 for a discussion.

[19] Requests for accessing the data for research purposes should be addressed to ISTAT through an open application procedure. Authorized researchers can access and use the data from work stations located in secure rooms within the ISTAT offices. The output of analysis is made available upon inspection by ADELE officers in compliance with the laws on the protection of statistical confidentiality and of personal data. For further information, see https://www.istat.it/it/informazioni-e-servizi/per-i-ricercatori/laboratorio-adele. A synthetic description of data sources and variables of interest is provided in Table B.2, while a comprehensive discussion of available data and sample construction is reported in Appendix A.

[20] We restrict our attention to legal marriages, while cohabitations are not included in our sample. Despite that the cohabitation rate increased in the last decade, implicitly, we interpret the differential between legal marriage and cohabitation choices, in light of the fact that marriages involve an additional degree of commitment, which is especially salient for investments over the long term such as the socialization of children (Lundberg and Pollak, 1993; Chiappori et al., 2017).

ii) fertility rates, by cultural-ethnic group of spouses and by region; and iii) the separation rates, by cultural-ethnic group of spouses and by region.

Descriptively, the 87.3% of marital unions are homogamous Italian marriages, while the remaining percentage refers to marriages that involve at least one foreign spouse. The aggregate bivariate distribution of marriages by ethnic group of spouses is presented in Table B.3. First marriages account for the 88.3% of the total sample. The comparison of two marital distributions for first and second or further marriages suggests that remarriage rates are not systematically different across spousal ethnic groups. In the sample the fertility rate corresponds to 69.6% with an average of 1.54 children per family. Of all marriages, the 7% end up in separation in the first years of the marital union.

We complement these data with individual Italian Census data, for 2001 and 2011, to obtain the distribution of unmatched men and women, by cultural-ethnic group and region.[21] The distribution of single male and female adult individuals is reported in Table B.4. We derive the population distribution by cultural ethnic group and region for the time period 1995-2012 from municipality records on the movements of the foreign resident population. Population shares by ethnic group and region are calculated thanks to administrative data on the total resident population at the regional level. The maps in Figure B.3, display the geographical variability in the ethnic groups' distribution across markets.

Finally, we proxy the cultural-ethnic transmission with language socialization, relying on the observation that the ethnic identity and spoken language are relevant culturally related specific attributes and both allow the direct transmission of cultural characteristics across generations; see (Dustmann, 1997; Ginsburgh and Weber, 2011; Clots-Figueras and Masella, 2013; Fouka, 2019).[22] We recover socialization probabilities by cultural-ethnic group of spouses and by region from the *Condition and Social Integration of Foreign Nationals* Survey (2011-2012). The survey is targeted to foreign residents in Italy and it is intended to provide a comprehensive representation of the socio-cultural as well as economic integration

[21] We select only adult unmatched men and women (of more than 18 years of age). We classify an individual as unmatched in case she/he is never married, legally separated, divorced or widowed. To account for the possibility that unmatched individuals might marry in the future, we follow Chiappori et al. (2017) and restrict the set of unmatched individuals to unmatched men and women after their marriageable age, defined as the 90th percentile of the age at first marriage distribution for men and women, respectively. In our data, unmatched rates increase quite symmetrically for all ethnic groups, from 2001 to 2011, the overall Spearman rank correlation test is as high as 0.88, and equal to 0.57 and 0.98 for available adult men and adult women, in turn, suggesting that the ethnic-group rank order remains stable over the period, especially for women.

[22] We interpret the Italian linguistic socialization as a form of parental investment in integration, which might be motivated by cultural as well as socio-economic opportunities. Even though we cannot disentangle the two dimensions, this does not hinder our identification, which exploits both differences in socialization across groups jointly with marital and intra-household moments.

of foreign residents, by collecting essential information on their living conditions, behaviours, attitudes and opinions. For our analysis, we construct our socialization measure, by considering children and young adults of less than 25 years old, living with their parents at the time of the interview. The final sample consists of 8,007 individuals belonging to about 5,000 families, 86.7% of these families have married parents while the remaining are either separated or divorced. We measure language socialization by the language spoken within the family: an individual is socialized to the Italian language if he/she declares to speak Italian within the family;[23] otherwise we assume he is socialized to his mother language, defined as idiom acquired during the preschool period of childhood.

3.2 Stylized Patterns

We provide here a brief descriptive analysis of the stylized patterns in the data.

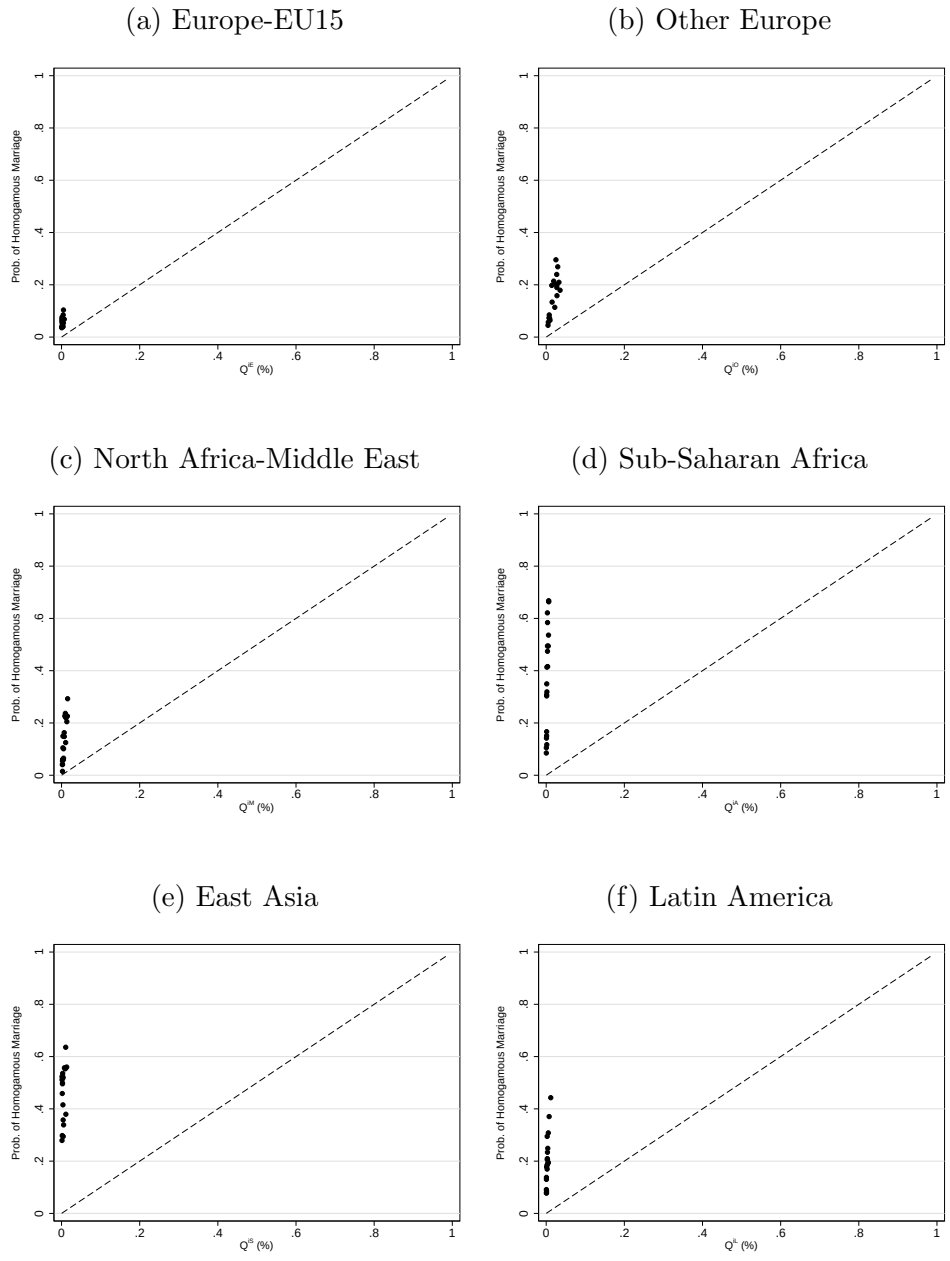
Marriage. Several contributions in the sociological and economic literature provide evidence in favor of positive assortative mating along cultural lines in terms of ethnic, racial and linguistic identity (Fu and Heaton, 2008; Fryer, 2007; Schwartz, 2013).[24] This evidence pertains mainly to the US. Our data confirms it for the Italian marriage market. By reporting the observed homogamy rates for ethnic minorities across markets, Figure 2 documents strong assortativeness in marriage for all cultural-ethnic groups. Interestingly, however, we observe heterogeneous degrees of assortativeness across groups; e.g., particularly high for Sub-Saharan Africa and East Asia minorities.

Fertility. Differential fertility rates across homogamous and heterogamous families, for all cultural-ethnic groups, are documented in Table 1. Homogamous Italian households tend to be more fertile than homogamous immigrant minorities (1.56 children on average; greater than all groups except Sub-Saharan African, 1.59 children on average). Interestingly, the probability of having at least one child in a homogeneous Italian family is of 73.5%, higher

[23] Language socialization allows us to study the degree of cultural convergence of migrants into the host socio-economic environment. Indeed, several studies uncover a positive association between the proficiency in the destination language and migrant socio-economic integration, favoring the educational achievement of lag-behind children during compulsory schooling (Dustmann et al., 2010), and fostering employment and earning opportunities (Dustmann and Fabbri, 2003). Table B.11 and B.12 shows that our measure of Italian linguistic socialization, by capturing the assimilation effort of migrant cultural-ethnic groups, is positively associated with various proxies of socio-cultural and linguistic integration.

[24] Schwartz (2013), in particular, underlines the parallel between ethnic and linguistic homogamy, where both ethnicity and spoken language are relevant culturally specific attributes.

Figure 2: Probability of Homogamous Marriage by Ethnic Group of Minorities



Notes: This figure shows the sample probability that a member of a specific cultural-ethnic minority marries homogeneously, over the correspondent population share by region of residence (average over the time period). E: Europe-EU15; O: Other Europe; M: North Africa and Middle-East; A: Sub-Saharan Africa; S: East Asia; L: Latin America. Source: Marriage records from vital statistics (1995-2012), Italy.

that the equivalent probability in any homogamous immigrant group (including Sub-Saharan African, 53%). Moreover, we observe a significant differential in fertility rates between homogamous and heterogamous families, both at the extensive and intensive margin, with the

Table 1: Fertility Rates by Ethnic Group of Spouses

	Panel a. Extensive Margin Prob. of Having Children			Panel b. Intensive Margin Number of Children		
	Homogamous	Heterogamous	Heterogamous Italians excluded	Homogamous	Heterogamous	Heterogamous Italians excluded
	n_{hh}	n_{hj}	$n_{hj}, h, j \neq n$	n_{hh}	n_{hj}	$n_{hj}, h, j \neq n$
Italian	0.735	0.418	-	1.561	1.390	-
Europe-EU15	0.420	0.578	0.359	1.465	1.490	1.385
Other Europe	0.494	0.401	0.381	1.293	1.365	1.342
North Africa-Middle East	0.541	0.303	0.350	1.462	1.297	1.313
Sub-Saharan Africa	0.534	0.352	0.247	1.592	1.369	1.346
East Asia	0.682	0.308	0.282	1.516	1.302	1.298
Latin America	0.322	0.344	0.359	1.241	1.308	1.295

Notes: This table reports fertility rates by ethnic group of spouses, both in terms of the probability of having children (panel a) and in terms of the average number of children (panel b). Columns 1 and 4 report estimates for homogamous families, Columns 2 and 5 report estimates for heterogamous families, Columns 3 and 6 report estimates excluding mixed marriages with natives. Marriage and Birth records (1995-2012), Italy.

homogamous displaying higher childbirth investments. For instance, the probability of having a child in a heterogamous family with at least one Italian spouse is of 41.8%, compared to the 73.5% of homogamous Italian households. Observed asymmetries in fertility rates across family types suggest that cultural differences between spouses lower the investment in marital-specific capital.

Separation. In line with previous literature, we observe a positive differential in marital instability of heterogamous marriages as compared to culturally homogeneous unions (Becker et al., 1977; Kalmijn et al., 2005; Bratter and King, 2008; Zhang and Van Hook, 2009). Table 2 shows that the probability of marital dissolution for homogamous Italian couples is equal to 6.4%, while in mixed families with at least one Italian spouse it increases to 7.5%. Larger differences across families are uncovered from the pairwise comparison of separation rates across the remaining ethnic groups, i.e. the gap for the European group is of 2.4%, 4.1% for Other European, 7.1% for North Africa-Middle East, 6.6% for Sub-Saharan Africa, 5.4% for East Asia and 4.2% for Latin America. Moreover, by looking at ethnic group variability across homogamous unions, Table 2 reports evidence that the separation rate of Italian families, as the majoritarian group, is higher with respect to those of homogamous minorities.[25]

Socialization. We report language socialization rates by cultural-ethnic group in Table 3, for homogamous and heterogamous families, in turn. Italian linguistic socialization rates are quite low in Italy, in particular for homogamous unions of spouses belonging to minorities.

[25]Separation rates are quite low in Italy and especially so for homogamous marriages, compared to other Western countries (Stevenson and Wolfers, 2007).[26]

But across group variability is high, as well as it is the variability across household type: e.g., the probability that an East Asian parent speaks Italian with his child is equal to 20% in a homogamous marriage, whereas it increases to 92% in a heterogamous marriage. Table B.9 presents Italian language socialization frequencies by spousal ethnic group and marital status. Socialization in divorced homogamous households is higher than in married homogamous households. For example, the probability that a child speaks Italian is equal to 36.4% in a European homogamous married family and it increases to 43.6% for the same family under divorce. On the other hand, for comparable European heterogamous families, the probability that a child speaks Italian is equal to 79.5% and 92.2%, respectively, in case of divorce or not.

Table 2: Separation Rates by Ethnic Group of Spouses

	Separation Rates		
	Homogamous	Heterogamous	Heterogamous Italians excluded
	π_{hh}	π_{hj}	$\pi_{hj}, h, j \neq n$
Italian	0.064	0.075	-
Europe-EU15	0.024	0.048	0.058
Other Europe	0.030	0.071	0.057
North Africa-Middle East	0.045	0.116	0.070
Sub-Saharan Africa	0.026	0.092	0.066
East Asia	0.013	0.067	0.054
Latin America	0.050	0.092	0.076

Notes: This table reports the separation rates by ethnic group of spouses Column 1 reports estimates for homogamous families, Column 2 reports estimates for heterogamous families, and Column 3 reports estimates excluding mixed marriages with natives. Source: Marriage and Separation records (1995-2012), Italy.

4 Estimation: Methodology

We estimate the parameters of the model by observing the marital matching patterns, as well as the fertility, separation and socialization frequencies. To take the model to data we need to extend the theoretical model presented in Section (2) to allow for K cultural traits in the society. Furthermore, we consider R geographical regions as the unit of reference for marital and intra-household decisions. Specifically, we consider a multi-market framework where marriage markets are disjoint but agents share common preference parameters across markets.

In the following Section, we specify the structural model, by introducing the relevant assumptions and the functional form parametrization. Then, we describe our parameters of

Table 3: Italian Socialization Probabilities by Spouses Ethnic Group

	Italian Socialization Frequencies		
	Homogamous	Heterogamous	Heterogamous Italians excluded
	P^n_{hh}	P^n_{hj}	$P^n_{hj}, h, j \neq n$
Italian	1	0.915	-
Europe-EU15	0.424	0.867	0.641
Other Europe	0.395	0.925	0.803
North Africa-Middle East	0.267	0.884	0.706
Sub-Saharan Africa	0.377	0.891	0.727
East Asia	0.196	0.816	0.692
Latin America	0.469	0.904	0.926

Notes: This table shows Italian socialization frequencies by ethnic group of spouses. The outcome variable corresponds to the probability that a child speaks Italian as main language at home. Column 1 reports estimates for homogamous families, Columns 2 reports estimates for heterogamous families, and Columns 3 reports estimates excluding mixed marriages with natives. Source: Condition and Social Integration of Foreign Nationals Survey (2011-2012), Italy.

interest, we introduce an appropriate estimation procedure and discuss parameters identification.

4.1 The Structural Model

We extend the model to allow for multiple cultural-ethnic traits ($K = 7$), associated with Italians, denoted n, and to 6 distinct immigrants groups $i \in \{i_E, i_O, i_M, i_A, i_S, i_L\}$. The subscripts identify minority groups, i.e. E: Europe-EU15; O: Other Europe; M: North Africa-Middle East; A: Sub-Saharan Africa; S: East Asia; L: Latin America. To this end, we assume that in households ii, in and ni children only might be socialized to the trait i or to n; while in a heterogamous household with both immigrants parents, the children can be socialized either to one of the parents' traits or to n.[27] The remaining socialization probabilities are constrained to be zero.

Also, we allow the specification of socialization and fertility cost to capture systematic differences between homogamous and heterogamous households, indexed by $s \in \{het, hom\}$,

[27]Specifically, in a generic heterogamous marriage of type hj with $h \neq j$ and $h, j \in \{i_E, i_O, i_M, i_A, i_S, i_L\}$, in divorce status $d = 0$, the probabilities of socialization to the Italian language P^n_{hj}, to the father language P^h_{hj} and to the mother language P^j_{hj} are respectively:

$$\begin{aligned} P^n_{hj}(\tau, 0) &= (1 - \tau_m - \tau_f)(1 - q^h - q^j), \\ P^h_{hj}(\tau, 0) &= \tau_m + (1 - \tau_m - \tau_f)q^h, \\ P^j_{hj}(\tau, 0) &= \tau_f + (1 - \tau_m - \tau_f)q^j. \end{aligned} \tag{6}$$

respectively:

$$C(\tau) = \sigma_{\tau_s} \left\{ \lambda_{\tau_s} \frac{1}{2} \tau^2 + (1 - \lambda_{\tau_s}) e^{\frac{\tau}{1-\tau}} - 1 \right\} \tag{7}$$

and

$$C(n) = \sigma_{n_s} \left\{ \lambda_{n_s} (n)^{\xi_s} + (1 - \lambda_{n_s}) e^{n^{\xi_s}} - 1 \right\}, \quad \xi_s > 1, \tag{8}$$

where the parameter ξ_s captures the dependence of fertility costs on childbearing decisions.[28]

For flexibility in the estimation, we allow the distribution of θ_{hj} to have a mean that depends on the household type hj. More specifically, we assume that θ_{hj} follows a generalized logistic distribution with location a_{hj} and scale parameter b.

We introduce an outside option for singlehood ω_{h_s}, for all h ethnic groups, separately for homogamous and heterogamous families, $s \in \{het, hom\}$.

Following Choo and Siow (2006), we assume that ϵ_t, η_t are independent and identically distributed random variables with a type I extreme-value distribution (Gumbel). Under separability and distributional assumptions, the matching model presented in (1) in its welfare maximization form translates into the multinomial logit model (McFadden, 1974). The total expected utility of a household of type hj net of the outside options of singlehood, $\tilde{U}_{hj} = U_{hj} - \omega_{h_s} - \omega_{j_s}$, is identified as follows:

$$\tilde{U}_{hj} = \ln \frac{(\mu_{hj})^2}{\mu_{h.} \cdot \mu_{.j}}. \tag{9}$$

Finally, we model the role played by the society within the transmission process, relaxing the initial assumption of unbiased horizontal socialization frequencies. We explicitly introduce a positive segregation bias, ρ, allowing each minority to face a segregated socialization pool composed of a fraction Q^i of individuals of group i; where

$$Q^i = \rho q^i \quad \forall i \in \{i_E, i_O, i_M, i_A, i_S, i_L\} \tag{10}$$

and the horizontal socialization of the majority group is rescaled to represent its complement.

4.2 Parameters and Procedure

The main parameters of interest are the cultural relative intolerance parameters: $\Delta V_h^j = V_h^h - V_h^j$, for all cultural-ethnic groups h, j. In the estimation, we impose V_h^h to be constant

[28] The parametrization of socialization and fertility cost functions guarantee that they are increasing and convex functions in the parents socialization efforts and childbearing choices, respectively, and that they satisfy regularity Inada conditions for interior solutions; see the Appendix for details.

across groups, for all h ($V_h^h = V$); that is, we assume that the value for a parent in sharing the same cultural trait of his/her own child is constant across groups, while relative differences in transmission are allowed to vary across groups. For identification purposes, we normalize $V = 100$, so we are left with $K(K-1) = 42$ cultural intolerance parameters to estimate. The other parameters to be estimated are: socialization and fertility cost function parameters, $\sigma_{\tau_s}, \lambda_{\tau_s}$ and $\sigma_{n_s}, \lambda_{n_s}$; dependence of fertility costs on childbearing decisions, $\xi_s > 1$; direct value of fertility (independently from cultural transmission), δ; index of segregation ρ; outside option of being single ω_{h_s}, for all h and s. Furthermore, with regards to the distribution of θ_{hj}, we normalize $b = 1$ and we set a_{hj} to match the dissolution probability of couples without children in the data for all hj; i.e. $a_{hj} : F(0; a_{hj}, b) = \hat{\pi}_{hj}(0)$.[29] This assumption allows us to capture systematic differences in separation rates across ethnic groups for households without children, aggregate evidence is reported in Table B.7.

Let $\boldsymbol{\beta}$ denote the vector of parameters. The structural model provides us with the theoretical moments in reduced form, $(\widetilde{\boldsymbol{\Pi}}(\boldsymbol{\beta}))$ as function of structural parameters $\boldsymbol{\beta}$, for given exogenous population distribution q^h, for all ethnic groups h, a vector whose elements are index by the region $r \in R$. We switch from now on, without loss of generality, to this vector notation to avoid explicit use of the index r. The moments are represented more specifically by mappings from $\boldsymbol{\beta}$ into $\tilde{U}_{hj}$, n_{hj}, π_{hj}, for all hj, and $P_{hj}^k(d)$ for all hj and k, and for marital status d.

The empirical moments are:

$$\widehat{\boldsymbol{\Pi}} = \{\hat{U}_{hj}, \hat{n}_{hj}, \hat{\pi}_{hj}, \hat{P}_{hj}^k\}, \quad \forall h, j, k.$$

In particular, we compute the marital surplus $\hat{U}_{hj}$ thanks to the identification equation of the marital matching function in (9), where $\hat{\mu}_{hj}$ is obtained from the bivariate distribution of marriages, cumulated over the period 1995-2012; while $\hat{\mu}_{h.}$ and $\hat{\mu}_{.j}$ are taken from the population vectors by ethnic group, gender and marital status of individual Italian Census data in 2001 and 2011. We compute fertility rates $\hat{n}_{hj}$ as the average number of children in households of type hj, including zeros. We evaluate separation rates $\hat{\pi}_{hj}$ as the fraction of marriages of type hj ending in separation during the period of analysis, conditional on having children. Finally, we construct socialization frequencies, $\hat{P}_{hj}^k$ as the fraction of households of type hj in which children speak a given language k at home.[30] Given normalization

[29] Because of data limitations, we estimate non-parametrically the probability of dissolution of couples without children, $\hat{\pi}_{hj}(0)$, as the linear combination of a family-specific component, to capture heterogeneity in divorce rate across matches, and a regional specific component, to capture heterogeneity across marriage markets.

[30] Because within each family socialization frequencies sum up to one, we exclude from the estimation

restrictions, we end up with a total of 68 parameters to match 2,416 moments.[31]

We estimate model parameters via a method of moments estimator, by matching the vector of theoretical moments implied by the model, $(\widetilde{\mathbf{\Pi}}(\boldsymbol{\beta}))$ for a specified choice of parameters $\boldsymbol{\beta}$, with their empirical counterparts observed in the data $(\widehat{\mathbf{\Pi}})$. The method of moments estimator $\hat{\boldsymbol{\beta}}$ minimizes the criterion function $Q_N(\boldsymbol{\beta})$, such as:

$$\hat{\boldsymbol{\beta}} = arg\min_{\boldsymbol{\beta}} [\widehat{\mathbf{\Pi}} - \widetilde{\mathbf{\Pi}}(\boldsymbol{\beta})]^{\intercal} \boldsymbol{W}_N [\widehat{\mathbf{\Pi}} - \widetilde{\mathbf{\Pi}}(\boldsymbol{\beta})], \tag{11}$$

given $\boldsymbol{W}_N$ a weighting matrix, being N the sample size.[32]

We solve the optimization problem in (11) via the Differential Evolution (DE) algorithm. The DE is a global optimization algorithm, first introduced by Storn and Price (1997). It is designed for non-convex and non-linear programming problems with potentially multiple local optima. Compared to alternative local optimization methods, its remarkable performance on continuous numerical minimization problems has been extensively explored, Price et al. (2006).[33]

4.3 Identification

Parameters identification hinges on the two sources of cross-sectional variation. First, we exploit variation across cultural-ethnic groups and family types. Second, we exploit exogenous variation in the ethnic composition of the population across regions. With respect to the the literature, e.g., Choo and Siow (2006), this geographical variation provides us with the needed additional identification power, under the assumption that each region corresponds to a separate –but local– marriage market.[34] In this perspective, our identification strategy

redundant moments. See Appendix A for a comprehensive description of empirical moments computation.

[31] In the estimation, we exploit 628 moments for gains to marriage and fertility rate, 623 moments for separation rate and 537 moments for socialization frequencies. The distribution of such moments by family type is the following: 592 for homogeneous families, 980 for heterogamous families with one Italian spouse and the remaining 844 for intermarriages among immigrants. Notice that for limited data availability, in the estimation we exclude socialization moments for divorced families.

[32] Given the uneven distribution of marriages in our sample, the weighting matrix is constructed by balancing sample size considerations and representation. Hence, we assign the same weight to Italian homogamous marriages and to the rest of marriages; in turn, the rest of the marriages are weighted by their relative representation in the data.

[33] As with other evolutionary algorithms, DE solves optimization problems by evolving a population of candidate solutions and by using floating-point encoding and arithmetic operations in mutation of population members. We refer to Storn and Price (1997) and Price et al. (2006) for more details.

[34] To give a sense of how stringent is our assumption, we calculate that in more than 92.7% of marriages, wife and husband share the same region of resident at the moment of marriage. Notice that, this assumption does not rule out the possibility of interregional migration per se, but it does rule out that migration choices are driven by marriage reasons.

is related to Chiappori et al. (2017) that exploits variation across cohorts in the returns to human capital investment on the US marriage market.

More specifically, in our estimation procedure, identification hinges on the following restrictions. First of all, cultural intolerance parameters ΔV_h^j are specific to the household type hj, but are assumed to be constant across region $r \in R$. Similarly, socialization and fertility cost parameters $(\sigma_{\tau_s}, \lambda_{\tau_s}, \sigma_{n_s}, \lambda_{n_s}, \xi_s, \delta)$ are assumed to be independent across ethnic-groups h and region $r \in R$. The same for segregation ρ. Moreover, the random variable θ_{hj} has the same distribution across households of different type hj.

4.4 Discussion

In this section we discuss some of the main assumptions of our empirical model.

The geographical unit of reference for marital and intra-household choices coincides with the region. This assumption is motivated by computational reasons, since we have data at higher level of disaggregation, at the province level. Assuming that the region is the relevant unit of reference for individual behaviour is potentially problematic if a higher level of disaggregation would reveal different patterns of segregation of minorities across geographical units, potentially affecting our estimates. The validation we discuss in Section 5 sheds a light in this direction. Our estimates, based on regional moments, are able to predict the distribution of marriages by type by province, implied by the distribution of the population at the province level. Furthermore, a large body of empirical evidence shows that, in fact, immigrant minorities tend to segregate in small but homogeneous neighbourhoods (Borjas, 1995; Edin et al., 2003), which act as a restricted pool of reference for marital and intra-household choices. By taking the region as the unit of our analysis, we implicitly treat these cultural-ethnic enclaves as minorities with respect to the regional population of reference and as a consequence we predict high investment into the socialization of children to their own cultural values, which in turn translate into a high level of cultural intolerance. Conversely, by taking the neighbourhood as the unit of our analysis, the same cultural-ethnic enclaves now appear to be a majority, with obvious consequences in terms of low predicted investment into the cultural socialization of children and low cultural intolerance preferences. As a matter of fact and in line with Bisin et al. (2004), this conclusion does not contradict our identification strategy, by assuming that residential segregation itself acts as a costly mechanism of cultural socialization.

The distribution of the population across regions is exogenous. In other words, we abstain from modeling endogenous moving and/or residential location decisions. Endogenous moving or location decisions might be problematic for our estimates, if these decisions were motivated in part by marriage and socialization as well as by unobserved heterogeneity. For example, suppose those minorities that are particularly attached to their cultural identity and thus more willing to invest in the socialization of their children select to locate/move to more segregated areas, if so we should expect to see a positive correlation between vertical and horizontal socialization, other things equal. We investigate this relationship by plotting the probability of direct socialization in homogamous families over the correspondent population share by regions, as reported in Figure B.4. The evidence is consistent with direct cultural transmission within the family substituting horizontal socialization, i.e., if anything, minorities in more segregated regions display lower socialization rates to the language of parents.

Marital matching is along cultural-ethnic lines only. In particular, we do not take into account sorting along other, in principle, important and observable dimensions, like age and education. We capture the multidimensionality of the marital selection process in a reduced form way through the outside options. For instance, the outside option to singlehood act as residual in the model, capturing differential sorting in both observable and unobservable relevant attributes across cultural-ethnic groups and between homogamous and heterogamous families. In this respect, Adda et al. (2019) develop and estimate a multidimensional equilibrium model of marriage and separation on Italian data. Their model explicitly allows for trade-offs between cultural distance, legal status, and other socio-economic spousal characteristics. Results suggest that preferences for cultural similarity within the couple are way more important than age and education in explaining marital selection of cultural minorities in Italy.

Cultural-ethnic groups aggregate several and potentially heterogeneous countries of origin in six minority groups. While considering each country of origin as a single cultural group is impossible, two aspects of our classification need to be discussed. First, migrants' cultural belonging is identified by nationality in years 1995 to 1997 and not by country of birth, because of data limitation. This potentially leads to underestimate migrants, because of naturalization. Our estimates are robust to the exclusion of these initial years, when we estimate the model on the universe of marriages formed from 1998 to 2012. Second, the group Other Europe includes Eastern European countries which became EU members after the enlargements in 2004 and 2007. In this respect, Adda et al. (2019) provide evidence

Table 4: Fit of the Model

	a. Homogamous Families									
	Italian Soc		Father Soc		Separation		Fertility		Marital Gain	
	Data	Model	Data	Model	Data	Model	Data	Model	Data	Model
Italian	1.00	1.00	1.00	1.00	0.06	0.05	1.10	1.08	-0.54	-0.54
EU15	0.47	0.52	0.53	0.48	0.03	0.00	0.69	0.95	-4.95	-4.95
Other EU	0.39	0.43	0.61	0.57	0.02	0.01	0.63	0.85	-3.00	-3.01
North Africa-Middle East	0.33	0.38	0.67	0.62	0.05	0.04	0.80	0.66	-3.47	-3.46
Sub-Sah. Africa	0.40	0.41	0.60	0.59	0.02	0.00	0.83	0.75	-0.29	-0.29
East Asia	0.19	0.43	0.81	0.57	0.01	0.00	1.10	0.83	-0.43	-0.44
Latin America	0.51	0.44	0.49	0.56	0.03	0.01	0.40	0.85	-1.61	-1.59
	b. Heterogamous Families									
	Italian Soc		Father Soc		Separation		Fertility		Marital Gain	
	Data	Model	Data	Model	Data	Model	Data	Model	Data	Model
Italian	0.95	0.94	0.67	0.67	0.05	0.03	0.62	0.53	-4.05	-4.10
EU15	0.92	0.97	0.59	0.52	0.04	0.02	0.88	0.59	-4.36	-4.36
Other EU	0.97	0.95	0.73	0.73	0.04	0.02	0.59	0.52	-3.50	-3.61
North Africa-Middle East	0.93	0.86	0.42	0.40	0.07	0.06	0.39	0.37	-6.23	-6.02
Sub-Sah. Africa	0.96	0.97	0.65	0.65	0.07	0.03	0.48	0.45	-6.65	-6.96
East Asia	0.60	0.97	0.34	0.82	0.05	0.01	0.40	0.50	-6.35	-5.92
Latin America	0.98	0.77	0.67	0.66	0.06	0.04	0.45	0.53	-4.36	-4.54

Notes: This table shows the fit of the model by ethnic group of spouses, separately for homogamous (panel a) and heterogamous (panel b) families.

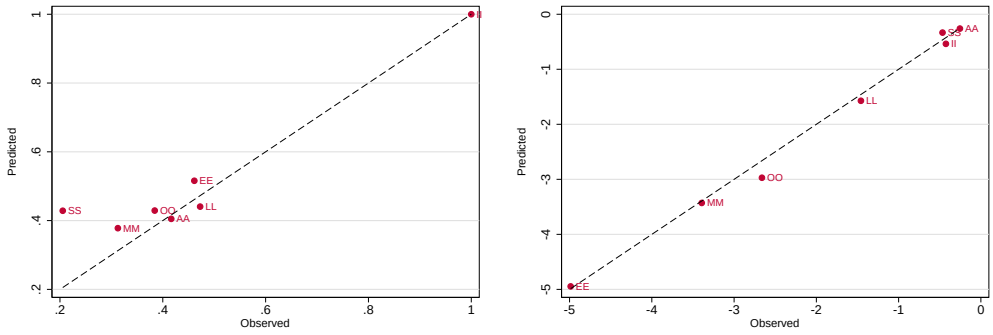
that the successive enlargements of the EU changed profoundly the composition of mixed marriages in the Italian marriage market, by altering the incentives of some migrants to marry natives. Our results, therefore, need to be interpreted as average estimates over the entire period of analysis.

5 Estimation: Results

We start describing the fit of the model and its validation. The model fits the data very well with an overall correlation between predicted and observed moments equal to 0.90. Table 4 compares the average observed and predicted moments, for homogamous and heterogamous families, respectively. Overall, we match well the socialization frequencies, the separation rates and the gains to marriage for both homogamous and heterogamous families. Figure 3 displays the average fit for Italian socialization probabilities and gains to marriage for homogamous families. Similarly, the model fits well the fertility rates for heterogamous families and for some homogamous families, but less so for some others. Moreover, the model is able to capture the geographical variability across markets, Figure B.5 displays the

Figure 3: Fit of the Model in Homogamous Families - Socialization Frequency and Gains to Marriage

(a) Italian Socialization (b) Gains to Marriage



Notes: This figure shows the average fit of the model by household type for homogamous families, considering Italian socialization probabilities (panel a) and gains to marriage (panel b). I: Italians; E: Europe-EU15; O: Other Europe; M: North Africa and Middle-East; A: Sub-Saharan Africa; S: East Asia; L: Latin America.

relationship between predicted and observed gains to marriage for homogamous families of ethnic group minorities over the corresponding population share by region of residence.

In addition, we validate our estimates by predicting the socialization frequencies of divorced couples and comparing them with observed socialization frequencies observed in our survey data. The model matches these external moments very well, the correlation between the observed and predicted Italian socialization probabilities is equal to 0.68 and it is even higher for mother socialization probabilities. Figure B.6 displays the fit for Italian socialization and mother socialization frequencies by family type, in turn. As a final test, we validate our estimates by using them to predict the distribution of marriages by type by province implied by the distribution of the population at the *province* level, i.e. a thinner level of geographical disaggregation. Figure B.7 displays the relationship between the out-of-sample predicted and observed distribution of marriages by type. The model performs quite well in capturing the geographical variability in outcomes across provinces.

Table 5 presents the estimation results. From the estimates on cultural intolerance parameters, we discuss three classes of results. First, cultural intolerance parameters are strictly greater than zero, suggesting that parents of each cultural-ethnic group have strong preferences for speaking their own mother language at home with children. Second, intolerance parameters are highly heterogeneous across cultural-ethnic groups, i.e. some groups are much more resilient in their cultural identity compared to others. In particular, Figure 4 reports as a graph the cultural intolerance of minorities versus natives (Panel a); estimates reveal that immigrants from North Africa-Middle East countries have very strong preferences for maintaining their cultural identity, with estimates that are nearly seven times as high as the

Table 5: Structural Model Parameters

Cultural Intolerance Parameters							
j:	Italian	EU15	EU Other	Middle East	Africa	Asia	Latin America
ΔV^{Ij}, Italian		22.13	53.25	68.23	79.13	58.72	18.32
ΔV^{Ej}, Europe-EU15	10.01		52.60	4.77	6.69	18.54	0.33
ΔV^{Oj}, Other Europe	39.97	0.05		52.32	51.63	10.42	23.02
ΔV^{Mj}, North Africa-Middle East	65.35	7.00	47.98		29.85	32.12	52.25
ΔV^{Aj}, Sub-Saharan Africa	55.03	28.37	55.42	20.37		81.22	24.50
ΔV^{Sj}, East Asia	40.40	0.30	87.08	42.70	15.29		93.13
ΔV^{Lj}, Latin America	38.60	13.69	20.77	58.99	46.96	29.13	
Outside Option of Singlehood Parameters							
Outside option for homogamous, ω_i	44.47	33.34	25.75	15.49	17.81	21.82	23.11
Outside option for heterogamous, ω_i	16.61	19.87	8.70	4.37	6.32	11.95	11.65
Cost Function Parameters							
Socialization Cost Parameters	σ_τ hom	10.434	Fertility Cost Parameters		σ_n hom	65.486	
	λ_τ hom	0.499			λ_n hom	0.003	
	σ_τ het	23.645			ϵ hom	1.021	
	λ_τ het	0.497			σ_n het	99.562	
Extra Marital Gain per Child	δ	0.713			λ_n het	0.025	
Segregation Parameter	ρ	1.805			ϵ het	1.281	

Notes: This table shows structural parameter estimates.

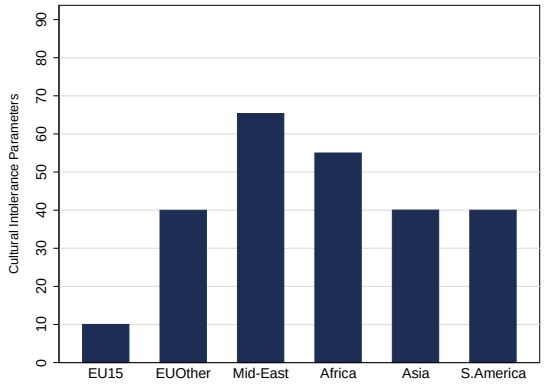
one of Europe-EU15, followed by Sub-Saharan Africa and East Asia migrants' minorities. The highest estimates reported on Panel b. of Figure 4, instead, capture the cultural intolerance of Italian natives towards Sub-Saharan Africa, North Africa-Middle East and East Asia minorities in order. Third, the matrix of intolerance parameters is not symmetric, i.e. the intolerance of group h versus group j does not parallel the intolerance of group j versus group h. We uncover considerable asymmetries in preferences across ethnic minorities and of Italians towards different ethnic groups, which potentially imply significantly different patterns in the dynamics of integration across minorities in Italy.[35]

The outside option parameters of remaining single are highly heterogeneous both across families (homogamous vs heterogamous) and across cultural-ethnic groups, with homogamous Italian natives showing the highest outside option parameter and the heterogamous North Africa-Middle East group showing the smallest ones. Figure B.9 displays ω_{h_r} parameters. Even thought our model is not dynamic, we might interpret the estimated outside option as a reservation utility, hence the larger the estimated outside option the large the utility the individual might get from a future marriage.

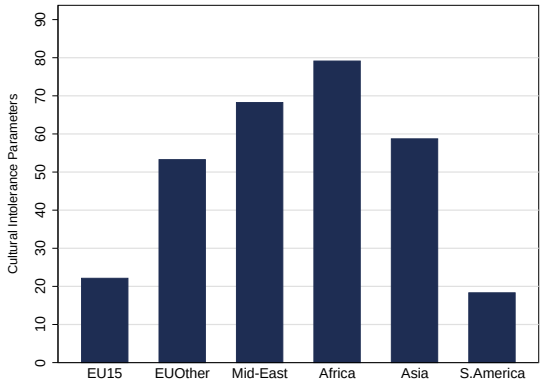
[35]Similarly to Adda et al. (2019), we investigate the relationship between our estimated measure of cultural intolerance and different measures of cultural distance, well recognized in the literature (Spolaore and Wacziarg, 2016). Figure B.8 displays systematically a positive correlation between our cultural intolerance estimates and cultural distance along genetics (Panel a), language (Panel b), religion (Panel c), and values from WVS (Panel d).

Figure 4: Cultural Intolerance Parameters

(a) Migrants vs Natives



(b) Natives vs Migrants



Notes: This figure reports parameter estimates for the cultural intolerance of migrants versus natives ΔV_i^n (panel a) and natives versus migrants ΔV_n^i (panel b) for all cultural-ethnic minorities $i \in \{i_E, i_O, i_M, i_A, i_S, i_L\}$, with E: Europe-EU15; O: Other Europe; M: North Africa-Middle East; A: Sub-Saharan Africa; S: East Asia; L: Latin America.

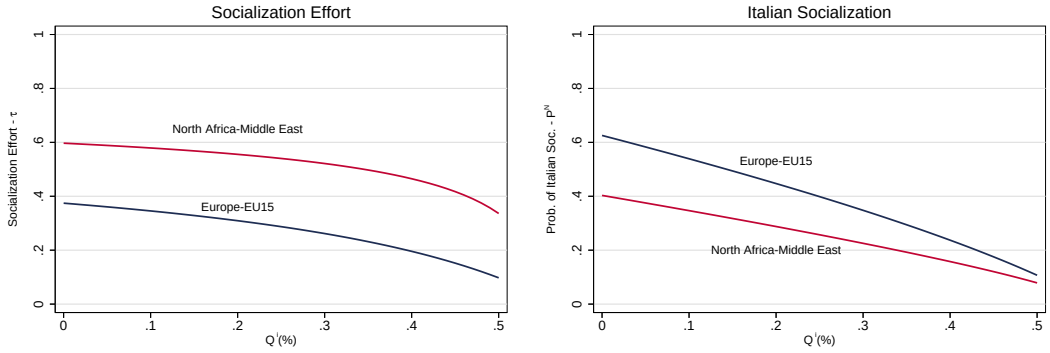
We estimate a significant difference in socialization costs across families, i.e. σ_τ of heterogamous families is twice as high as the one estimated for homogamous families, while the estimates of λ_τ (i.e. the weight associated to the degree of convexity of the cost function) are comparable for homogamous and heterogamous couples. This difference in socialization costs reinforces the differences in incentives of spousal investment in socialization between homogamous and heterogamous. For instance, the direct socialization probabilities of homogamous families when fully minority ($q^i = 0$) are positive: τ is estimated between 0.38 (Europe-EU15) and 0.60 (North Africa-Middle East). This difference implies that North Africa-Middle East parents have 50% higher probability of socializing children to their own culture, compared to Europe-EU15 parents in homogamous families. Thus, the probability of Italian socialization, P^n in homogamous families ranges between 40 (North Africa-Middle East) to 64 (Europe-EU15) percent at maximum and lowers as q^i increases, for all minorities i. Figure 5 (panel a.) displays the cultural substitution pattern between vertical and horizontal socialization for the two groups of North Africa-Middle East and Europe-EU15 homogamous families, which are at the two extremes of the spectrum. On the other hand, the direct socialization probabilities of heterogamous families when fully minority ($q^i = 0, q^j = 0$) are positive: τ^i, τ^j are estimated between 0 and 0.46. The probability of Italian socialization in heterogamous families ranges between 48 to 100 percent. Figure 5 (panel b.) displays the cultural substitution pattern between vertical and horizontal socialization for the two groups of North Africa-Middle East and Europe-EU15 heterogamous families.

Additionally, we estimate a positive difference in fertility costs between homogamous and

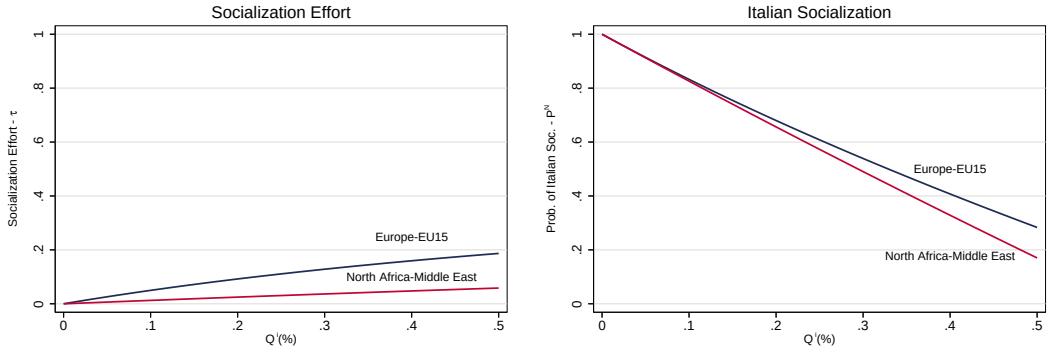
heterogamous families, i.e. σ_n of heterogamous families is greater than one third compared to the same cost parameter for homogamous families. Moreover, the dependence of fertility costs on childbearing decisions, ξ, is equal to one for homogamous families, while it increases by 30% in mixed ones. Overall, estimates suggest that fertility investments are much more costly whenever spouses belongs to different cultural-ethnic groups. Irrespective of cultural socialization quality, we estimate a direct value of fertility of 0.71. Finally, we estimate a segregation index, ρ, of 1.80, which suggests that the contribution of the society at large in the socialization process of minorities is twice as much as its actual representation in the population.

Figure 5: Estimates of Minorities Socialization Effort and Italian Socialization

(a) Homogamous Families



(b) Heterogamous families



Notes: This figure reports estimates of socialization effort and the Italian socialization probability of Europe-EU15 and North Africa-Middle East minorities over the potential population share by region. Panel (a) reports estimates for homogamous families. Panel (b) reports estimates for heterogamous marriages with Italians.

6 Long-Run Integration Patterns

In this section, we simulate the dynamics of the distribution of cultural-ethnic traits in the population induced by our structural estimates of marital matching, fertility, divorce, and socialization. While the exercise rests on the strong assumption that parameters are invariant over time, these simulation highlight the implication of our estimated model with respect to the prospective pattern of cultural-ethnic integration of different minorities in Italy. It is important to note that the notion of integration we are necessarily bound to adopt, given our data, refers to the practice of speaking Italian at home; that is, we say that a minority is integrated when its descendants speak Italian at home.

We proceed as follows. The time unit in the simulations is a generation, i.e., a time interval of about 25-30 years. We fix the initial condition, generation $t = 0$, to coincide with the distribution of the population by region and ethnic group in our data. More precisely, we can interpret our data as representing a cross section of the Italian population in 2012, by region and ethnic group, the demographic characteristics of which we observe as they form and evolve over time since 1995. Let this distribution be denoted p_t; and let p_{irt} represent the measure of the population of ethnic group i in region r at time t. The structural model we have estimated induces a map from p_t into p_{t+1}. Indeed, the estimated model maps any distribution p_t into a vector of demographic characteristics of the population, in terms of marital matching, fertility, divorce, and socialization, by ethnic group and region. The mapped fertility and socialization, by region and ethnic group, induce in turn a distribution of the population p_{t+1} of the children of the population at time t, p_t.[36] We continue recursively to induce $p_{t+2}, p_{t+3}, \ldots$. [37]

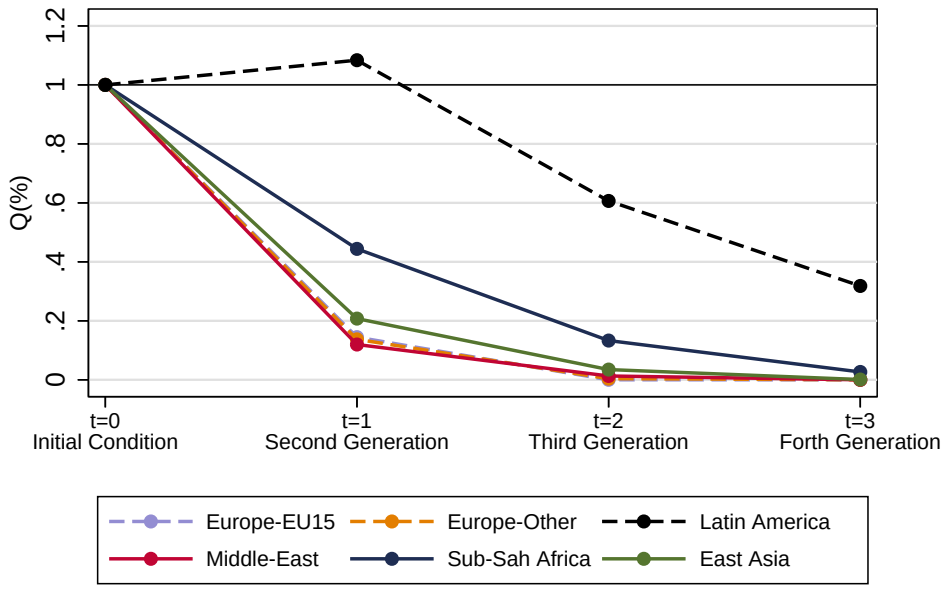
The simulated long-run dynamics of the fraction of the population with cultural-ethnic trait i for all $i \in \{i_E, i_O, i_M, i_A, i_S, i_L\}$ are reported in Figure 6, normalized so that $q_t^i = 1$ in $t = 0$ for comparability.[38] Despite cultural intolerance estimates highlight strong preferences of immigrants for maintaining their cultural identity, all cultural-ethnic minorities are simulated to converge to the Italian majority along the language dimension. Furthermore,

[36] Reproduction is asexual in the model, hence we consider future generations populated by men and women of equal proportion. Note also that the individuals in the population composing the distribution p_t are distributed across the age dimension. We disregard this in the estimates, and hence also in the simulation, but we can interpret the distribution p_{t+1} as representing the same distribution across age.

[37] At each step, we compute the marital matching equilibrium in the marriage market, represented by equation (9) subject to feasibility constraints in (1). This amounts to solving a system of $2K$ quadratic equations in as many unknowns, with K the number of cultural traits in the population, for each of the R regions. To this end, we take advantage of an iterative projection fitting procedure (IPFP) designed to find projections on intersecting sets of constraints, by projecting iteratively on each constraint (Galichon and Salanié, 2015; Dupuy and Galichon, 2014).

[38] See Figure B.10 for non-normalized long-run dynamics of cultural traits.

Figure 6: Long-run Dynamics of Cultural Traits (index=1 in $t = 0$)



Notes: This figure shows the long-run dynamics of the distribution of cultural traits in the population for minority groups, over successive generations.

75% of immigrants integrate into the majoritarian culture over the period of a generation; that is, 75% of the immigrants' population at $t = 1$ speaks Italian at home with their children. However, the pace of convergence is heterogeneous across cultural-ethnic groups. On the one hand, we find that the Europe-EU15 and Other Europe minorities converge almost completely (reduce about 87% of the gap) to the majoritarian culture in a single generation. A similar pattern is also displayed by the North Africa-Middle-East minority. On the other hand, a significantly slower convergence rate is achieved by the Latin America minority which even restrain their integration process towards the native culture in the first generation and after four generations only 68% of immigrants culturally integrate along the language dimension. A slower convergence rate also characterizes the East Asia and Sub-Saharan Africa minorities, who integrate by only 80% and 55% along the language dimension in one generation. By looking at third generations, overall 93% of immigrants converge towards Italian culture in about 50-60 years. Said differently, 93% of the immigrants' population at $t = 2$ speaks Italian at home.

The patterns of cultural integration of Europe-EU15 and Other Europe minorities are the result of their relatively low cultural intolerance preferences. In a similar way, the East

Asia and Sub-Saharan Africa minorities' slower integration is due in part to their higher intolerance parameters. But intolerance parameters are not the only determinants of the dynamics of integration of different cultural-ethnic groups. Homogamous marriage rates, fertility rates, and other demographic characteristics in fact turn out to have sizable independent effects on cultural integration in the simulations.[39] This is clearly illustrated by the fact that, while North Africa-Middle East, Sub-Saharan Africa, and East Asia show relatively comparable cultural intolerance preferences, they display significant differences in the dynamics of integration. Indeed, a strong estimated selection into homogamous marriages for Sub-Saharan Africa migrants allows them to sustain their cultural heterogeneity by accessing superior direct socialization technologies; see Figure B.11 for evidence on the evolution of the homogamous marriage (panel a.) and intermarriage (panel b.) rates over successive generations. Details about homogamous marriage rates across groups are reported in Figure B.12. On the other hand, estimated fertility rates are particularly high for East Asia minorities and this is a fundamental factor behind this minority's integration pattern. Finally, the relative success of the Latin America in securing their cultural distinctiveness over time is due in large part to the fact that they turn out to be uniquely able to socialize children also in heterogamous marriages with natives.

6.1 Counterfactual Cultural Intolerance Parameters

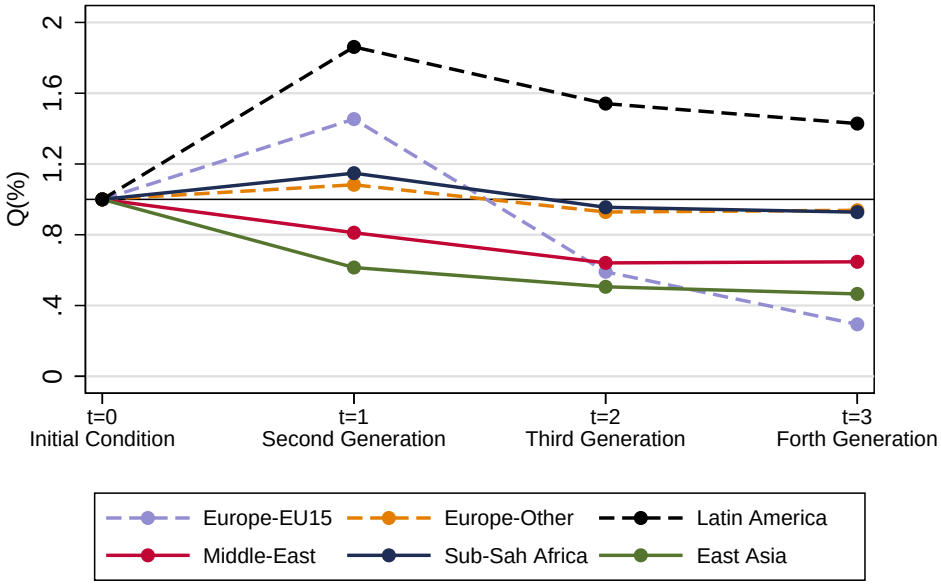
In this section we study more in detail the mechanisms that promote the cultural integration of immigrants. In particular, we analyze the role of the cultural intolerance parameters, studying the dynamics of the distribution of cultural-ethnic traits in the population under several extreme counterfactual values of ΔV_n^i.

We consider, first, the case in which $\Delta V_n^i = 0$ for all $i \in \{i_E, i_O, i_M, i_A, i_S, i_L\}$; that is, we assume full tolerance of Italians towards all minorities. Results, displayed in Figure 7, are striking. In principle, letting natives more (indeed fully) accepting of the cultural traits and beliefs of immigrants might make their cultural integration easier and hence faster, for instance by fostering heterogamous marriages. On the contrary, in fact, this counterfactual experiment induces on average a reduction in the dynamics of integration of minorities towards Italian's culture by 6% over the period of a generation. Also, in the long-run, the heterogeneity of the cultural traits of immigrants shows a remarkable persistence.

The intuition for this result is illustrated by decomposing the effects of complete tolerance of Italians. The ability of minorities to maintain their cultural traits, in the absence of

[39] With respect to fertility, this is the case even though predicted fertility rates for all groups are below reproduction level, which potentially has implications on marriage market competition as well.

Figure 7: Long-run Dynamics of Cultural Traits with Italians Fully Tolerant, $\Delta V_n^i = 0$ (index=1 in $t = 0$)



Notes: This figure shows the long-run dynamics of the distribution of cultural traits in the population for minority groups, over successive generations assuming the case of complete tolerance of Italian majority towards minorities.

cultural intolerance on the part of Italians, is due to three different mechanisms. Figure B.15 and Figure B.16 provide evidence on these mechanisms. First, in line with above predictions, we observe a huge increase in demand for intermarriages with natives and in parallel a lower demand for homogamous marriages previously motivated by a parental socialization premium. Second, we document a sizable increase in fertility rate in intermarriages with natives, because the expected socialization quality of children is higher. Third, the parental socialization conflict is now muted within heterogamous couple and socialization to the majoritarian culture is driven only by society at large. This implies a reduction in Italian socialization in intermarriages compared to the baseline and in parallel an increase in foreign language socialization.

Finally, we notice that the positive but slow integration of some minorities is counterbalanced by lack of convergence of other groups. Specifically, we find that at $t = 3$, Europe-EU15, East Asia and North Africa-Middle East forth generations culturally converge towards the majoritarian culture by about 70%, 54% and 35%, respectively. Instead, Other Europe and Sub-Saharan Africa forth generations remains largely distinct from the

Table 6: Counterfactuals on Cultural Intolerance Parameters

Simulations	Overall convergence in a generation period	Convergence by ethnic minority in a generation period
Baseline (at parameter estimates)	75%	Europe-EU15 86%; Other Europe 86%; North Africa-Middle East 88%; Sub-Saharan Africa 55%; East Asia 80%; Latin America -8%
Full Italian tolerance ($\Delta V_n^i = 0$)	-6%	Europe-EU15 -45%; Other Europe -8%; North Africa-Middle East 18%; Sub-Saharan Africa -14%; East Asia 38%; Latin America -86%
Full minorities' tolerance ($\Delta V_i^n = 0$)	93%	Europe-EU15 94%; Other Europe 89%; North Africa-Middle East 96%; Sub-Saharan Africa 97%; East Asia 97%; Latin America 95%
Full Italian intolerance ($\Delta V_n^i = 100$)	80%	Europe-EU15 85%; Other Europe 85%; North Africa-Middle East 87%; Sub-Saharan Africa 55%; East Asia 78%; Latin America 50%

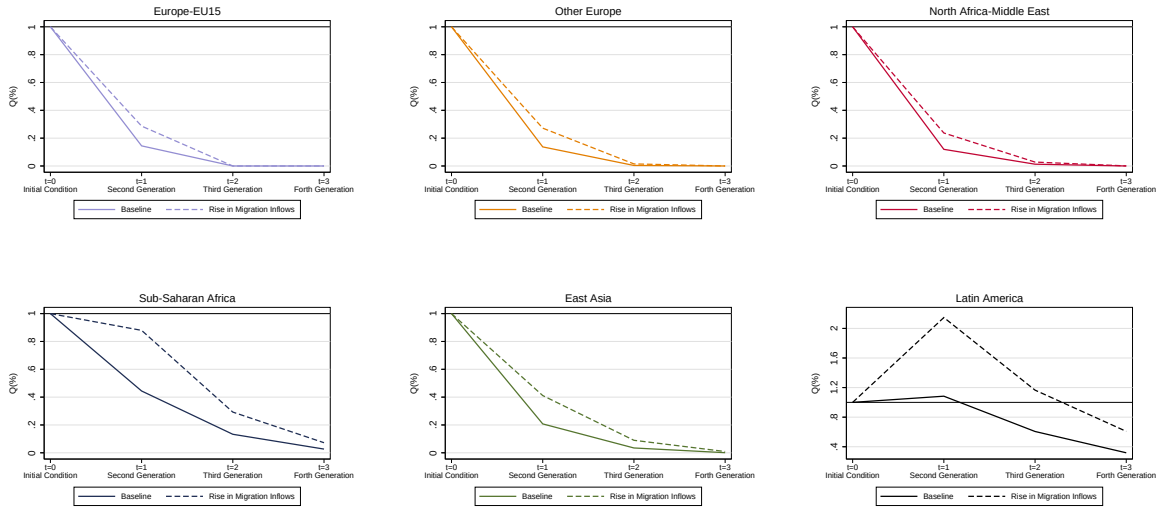
Notes: This table reports the convergence results from simulations of counterfactuals by changing cultural intolerance parameters.

majoritarian cultural values showing a very limited convergence of only about 7%. Once again, the Latin America minority appears to be an outlier, the cultural distinction of Latin American forth generations with respect to the native culture increases by 30%.

We consider next the case in which minorities do not have any taste for maintaining their own identity, $\Delta V_i^n = 0$ for all $i \in \{i_E, i_O, i_M, i_A, i_S, i_L\}$. In this case, the direct investment in socialization of minority parents is muted and socialization to foreign language occurs as a residual from socialization of the society at large. Thus, the cultural integration of minorities towards Italian is on average of 93% over the period of a generation. In this particular case, any heterogeneity in cultural convergence across ethnic groups is washed out and in the long-run, all minorities fully integrate into the socio-cultural fabric of the host country. Table 6 reports the results in comparison with previous counterfactual scenarios, while Figure B.17 graphically show the patterns of convergence along cultural lines over the long-term.

Finally, we investigate the case in which Italians are fully intolerant culturally towards all minorities, $\Delta V_n^i = 100$ for all $i \in \{i_E, i_O, i_M, i_A, i_S, i_L\}$. In this case, the dynamics of convergence of ethnic minorities follow the results in the baseline, with 80% of immigrants who integrate into the majoritarian culture over the period of a generation. The most significant difference in integration is attributable to Latin America minority, who fails to maintain its cultural identity and assimilate to Italian culture by 50% in $t = 1$. Figure B.18 reports the results over successive generations.

Figure 8: Long-run Dynamics with Proportional Increase in Migration Inflows



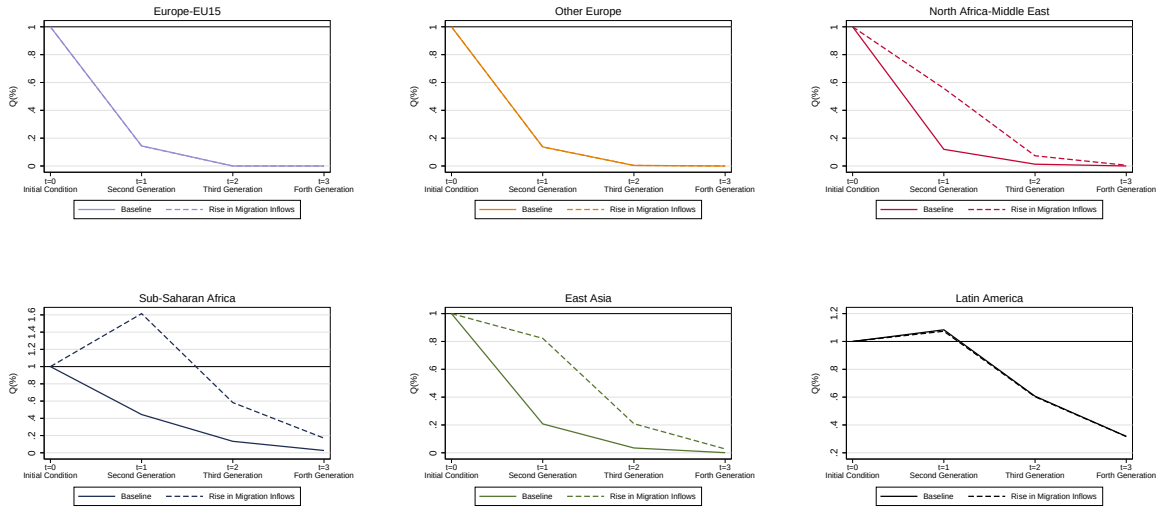
Notes: This figure shows the long-run dynamics of the distribution of cultural traits in the population for minority groups, over successive generations, normalized so that $q_t^i = 1$ in $t = 0$. The solid line represents the dynamics at the baseline, while the dash line represents the dynamics after doubling the share of second generation minorities, proportionally for all minority groups. Figure B.13 reports the non-normalized long-run dynamics and highlights the exogenous rise in inflows for all second generation minorities (black arrows).

7 Counterfactual Migration Flows

In the last few years, Italy has been characterized by a significant increase of incoming migration flows, especially originating from Sub-Saharan Africa and Middle-East countries. In this section we study the effects of such a rise in migration inflows on cultural heterogeneity in Italy, by performing two counterfactual simulation exercises. In both cases, we exogenously increase the number of second generation minorities and we study the long-term effects of this increase on cultural convergence. But in the first exercise we double the share of second generation minorities *proportionally for all minority cultural-ethnic groups*; while in the second exercise we still double the overall share of second generation migrants by *assigning one third of the increase exclusively to North Africa-Middle East, Sub-Saharan Africa and East Asia minorities.*

Keeping invariant the share of each group, Figure 8 compares the dynamics of the distribution of cultural-ethnic traits in the population at the baseline (solid line) with the distribution resulting from the rise in migration flows (dashed line). Population shares are normalized so that $q_t^i = 1$ in $t = 0$. Overall, doubling the shares of second generation minorities (at $t = 1$) leads to a reduction in cultural convergence of 7 percentage points for third generations; that is, 86% of immigrants integrate into the majoritarian culture by $t = 3$,

Figure 9: Long-run Dynamics with Compositional Increase in Migration Inflows



Notes: This figure shows the long-run dynamics of the distribution of cultural traits in the population for minority groups, over successive generations, normalized so that $q_t^i = 1$ in $t = 0$. The solid line represents the dynamics at the baseline, while the dash line represents the dynamics after raising the share of second generation North Africa-Middle East, Sub-Saharan Africa and East Asia minorities. Figure B.14 reports the non-normalized long-run dynamics and highlights the exogenous rise in inflows for North Africa-Middle East, Sub-Saharan Africa and East Asia second generations minorities (black arrows).

compared to the 93% of convergence at the baseline. More in detail, the rise in migration inflows has no effect on the cultural integration of Europe-EU15, Other Europe and North Africa-Middle East minorities already in the third generation. On the contrary, the incoming waves of Sub-Saharan Africa and East Asia immigrants produce an effect in delaying their full cultural convergence to host country cultural practices. In particular, we simulate a 20 and 6 percentage points reduction in convergence of Sub-Saharan Africa and East Asia minorities, respectively, compared to baseline.

We observe qualitatively similar results (even though stronger in magnitude) in the second exercise, when we modify the relative distribution of minorities, overweighting North Africa-Middle East, Sub-Saharan Africa and East Asia. The implications on the distribution of cultural-ethnic traits resulting from this immigrants' inflow are graphically represented in Figure 9. For a comparable increase in migration flows, the three groups highlight significant differences in their patterns of integration, with Sub-Saharan Africa and East Asia minorities accentuating dramatically their successful transmission of cultural values.[40] In particular, the cultural integration response of North Africa-Middle East immigrants to the exogenous rise in inflows is reduced of only a 6 percentage points, while the response of East Asia

[40]See Figure B.13 and B.14 for non-normalized long-run dynamics of cultural traits for both exercises.

and Sub-Saharan Africa minorities to a comparable variation ranges from 20 to 50 points, slowing down significantly the process of cultural integration.

8 Conclusions

Recent migration flows into Europe are possibly having relevant economic consequences in terms of their effects on the labor market of the receiving countries. They most certainly are changing the political landscape in Europe, inducing a sizable and drastic shift of the electorate towards populist anti-immigration movements and parties. Arguably, a substantial motivation behind this shift in voting sentiments is a reaction of natives against the cultural beliefs and traits of immigrants and their perceived slow integration.

In this paper we study cultural integration as an equilibrium phenomenon, the result of a demand of integration on the part of immigrants and a supply, in the form of cultural acceptance on the part of natives. This structural approach allows us in particular to perform several counterfactual exercises illustrating the long-run implications of our analysis in terms of cultural convergence and integration. We find that, despite cultural intolerance estimates highlight strong preferences of immigrants for maintaining their cultural identity, all cultural-ethnic minorities are simulated to converge to the Italian majority along the language dimension. Furthermore, 75% of immigrants integrate into the majoritarian culture over the period of a generation; that is, 75% of the second generation immigrants speaks Italian at home with their children. However, the pace of convergence is heterogeneous across cultural-ethnic groups. A significantly slower convergence rate is achieved by the Latin America minority which even restrain their integration process towards the native culture in the first generation and after four generations only 68% of immigrants culturally integrate along the language dimension. A slower convergence rate also characterizes the East Asia and Sub-Saharan Africa minorities. Doubling the number of second generation minorities, overweighting North Africa-Middle East, Sub-Saharan Africa and East Asia, we see that North Africa-Middle East immigrants reduce convergence of only a 6 percentage points, while the response of East Asia and Sub-Saharan Africa minorities ranges from a 20 to a 50 points reduction in convergence, slowing down significantly the process of cultural integration.

These kind of analyses and results have in principle fundamental implications for more thoughtful immigration policies in Europe, beyond well-meaning across-the-board integration policies as well as beyond restrictive closed-border (closed-ports) policies. In this respect, our result that an higher acceptance of the culture of minorities on the part of natives allows immigrants to better maintain their cultural traits by means of higher socialization rates

when married with natives, deserves careful attention. We shall purse the study of these implications in future work.

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A Data and Sample Construction

The empirical analysis uses rich administrative Italian data at the individual level, from 1995 to 2012. We obtained data from ISTAT trough its ADELE Laboratory. In what follows, we describe the data sources and the main information provided in each dataset.

A.1 Marriages, Fertility, Separation and Singles

Marriage. We exploit marriage records from municipal vital statistics registries to recover matching patterns by ethnic group of the spouses. Marriage records contain the universe of marriages celebrated each year in Italy from 1995 to 2012. They provide information on the main socio-demographic characteristics of the spouses. They are collected through the ISTAT model compiled by the Registrar of the City Civil State in which the marriage took place. For each marriage, the section dedicated to the wedding reports: the date of marriage, the type of ceremony (religious or civil), the municipality of the ceremony and the choice of the property regime by the spouses (community or separation property). The information provided for each spouse includes: date of birth, municipality of birth, municipality of residence at the time of marriage, the place of future residence of the spouses, the previous marital status, the education level, the employment status, and for migrant individuals the nationality and the country of origin. In order to account for out-migration selection of families, the sample is restricted to marriages where at least one spouse is resident in Italy at the time of the marriage.

Fertility. Fertility rates come from municipality births registries, which contain the universe of individual birth records of residents in the municipality of enrolment, for each year from 1990 to 2012. Individual birth records include socio-demographic variables of interest such as gender, date and province of birth, citizenship and parental information regarding their date of birth, citizenship and marital status.

Separation. Separation data come from the registries of civil court chancelleries and cover the universe of legal separations registered in Italy, covering the period 1995-2012. The statistical data collected allow us to analyse different aspects of the marital dissolution phenomenon. Information is provided regarding the judicial proceedings and any appeal for legal assistance; the marital union as the date and the type of ceremony; spousal socio-demographic characteristics as reported in marriage records; any children involved with date of birth and gender; the post-dissolution arrangements like alimony obligations, recipient

subject and annual amount of contribution for maintenance and the custody of children[41]. We focus on separation rates, which better represent marital dissolution decisions in the Italian context, for two main reasons. First, separation is the juridical act that launches the divorce proceedings. With Law 74/1987 and until 2015, a minimum period of 3 years of legal separation was required before eventually submitting a divorce request. Second, on average only 65% of separations are followed by a divorce, which implies that divorce choices significantly underestimate marital dissolution behaviours. In light of this, separations provide a more accurate representation of actual household dissolution choices.

Single Individuals. We derive the population vectors by ethnic group, gender and marital status from individual Italian Census data of 2001 and 2011. We select adult individuals, hence the age range we focus on is of more than 18 years old. Census data classify the marital status of an individual as: never married, at present married, separated *de facto*, legally separated, divorced or widowed. We consider an individual available in the case that she/he is never married, legally separated, divorced or widowed. We also discard institutional households, corresponding to correctional institutions, but also military and mental care facilities. We take into account potential measurement error concerns due to truncation of unmatched population vectors as described in Section (3).

A.2 Dataset Construction and Sample Selection

The empirical estimation is based on a unique dataset that links households information across different sources. We matched marriage, birth and separation records on the exact date of marriage and spouses' exact date and place of birth (Italian province for natives and country of origin for foreigners), which are reported in all registries. In the birth records matching, the combination of these characteristics allows for an exact one-to-one matching for 98.8% of marriages, while in the separation matching, we match exactly the 99.5% of marriages, and we discard the remaining fraction. Such low percentages suggest that marriages can be uniquely identified through the set of time-invariant characteristics listed above. The

[41] For the period under investigation, registries of civil court chancelleries constitute the unique source for separations and divorces data, while starting from December 2014 (in application of Law n. 162/2014) consensual separation and divorce proceedings can be submitted to the civic registrar. The time-period of our analysis rules out potential concerns in the selection of available data. Proceedings classified to end with conciliation, cancellation, or change of rite are registered, but post-dissolution information is not available for them. We drop them from the final sample because not representative of effective households' marital dissolution choices. Separation records that end up in conciliation are 2,149, those cancelled are 1,884 and those that changed rite are 1,772; hence they account of the 1.59% of the total number of separations.

final sample of marriages (4,151,551) corresponds to 92.58% of the universe of marriages celebrated in Italy during the time interval 1995-2012. In the final dataset the fertility rate corresponds to 69.56% with an average of 1.54 children per family. Of all marriages, 7% end up in separation in the first years of the marital union.

From this final sample, we recover the following empirical moments. The expected marital utility net of the outside options of singlehood $\hat{U}_{hj}$ for the household of type hj is identified from equation (9), exploiting the number of hj marriages formed in each region r, (μ_{hj}), and the number of unmatched men of type h and women of type j for each region r, $(\mu_{h.}, \mu_{.j})$.

Fertility rates $\hat{n}_{hj}$ for each household type hj and for all regions r are computed as follows:

$$\hat{n}_{hj} = \frac{1}{\mu_{hj}} \sum_{m=1}^{\mu_{hj}} N_{hj},$$

with N_{hj} the number of children born from within a hj household, for all region r.

Separations rates $\hat{\pi}_{hj}$ for each household type hj and for all regions r are computed as:

$$\hat{\pi}_{hj} = \frac{1}{\mu_{hj}} \sum_{b=1}^{\mu_{hj}} D_{hj},$$

where D_{hj} is a dummy equal to one if the hj marriage end up in separation during the investigation period.

A.3 Socialization Probabilities

Socialization data come from the *Condition and Social Integration of Foreign Nationals* Survey, conducted in 2011 and 2012 in all Italian regions on a sample of 9,600 families. The survey targeted foreign residents in Italy and it was conducted at the household level to provide socio-demographic information about all family members, for a total sample of 25,356 respondents. The aim of the survey was to collect relevant aspects of the socio-economic integration process of migrants in Italy, with a particular focus on linguistic integration. Different dimensions have been targeted such as: family composition, educational level, migratory path, employment status, discrimination and integration perception, living environment conditions, religious affiliation, social network formation and socio-political participation. The survey follows a pivotal survey conducted in 5 sampled regions on a sample of 250 families with at least one foreign member. The pivotal survey was particularly useful in the definition and evaluation of the questionnaire, which also requires the participation of sociologists and cultural mediators. The final questionnaire was translated in 10 different languages to overcome potential language barriers and to reduce attrition. The actual survey was conducted

through direct interviews supported by the CAPI (Computer Assisted Personal Interview) system to ease the development of the whole questionnaire[42]. In each selected household, all members were interviewed, both foreign-born and natives.

We exclude from our analysis, respondents who are single and families without children, at the time of the interview. For our analysis, we consider children and young adult of less than 25 years old, living with their parents at the time of the interview. The final sample consists of 8,007 individuals belonging to about 5,000 families, 86.7% of these families are married while the remaining are either separated or divorced.We consider the sample representative for the study of migrant linguistic integration by ethnic group in each region of residence. We construct our measure of socialization based on the language spoken at home. The survey also provides questions to evaluate the level of Italian language proficiency and we check individual self-declared responses on language spoken.

We measure language socialization by the language spoken within the family to capture both the family socialization dimension and the horizontal socialization dimension. We define the language socialization, by exploiting three pieces of info: (i) language spoken at home; (ii) mother tongue (main); (iii) mother tongue (secondary). Specifically, we consider that an individual is socialized in Italian language if he/she declares to speak Italian within the family. On the contrary, we impute the socialization to his/her mother language, defined as idiom acquired during the preschool period of childhood. Moreover, if a subject declares he/she was speaking another language when young, we assign equal weight to the socialization of the main and secondary mother tongue, to account for bilingualism [43]. For children of less than 6 years old, we impute the language spoken within the family.

We compute the vector of socialization frequencies $\hat{P}^k_{hj}(d)$ for all h, j and k, conditional on being married, $d = 0$, and for all regions r, as follow:

$$\hat{P}^k_{hj}(d=0) = \frac{1}{M_{hj}} \sum_{b=1}^{M_{hj}} S^k_{hj}.$$

with M_{hj} being the number of children and young adults of less than 25 years old belonging to the hj household, and speaking language S^k. Due to data limitations in the number of divorced households per type of family and region, we exploit in the estimation only socialization moments for married families.

[42]Examples of the questionnaire and invitation letter are available at *http://www.istat.it/it/archivio/10825*.

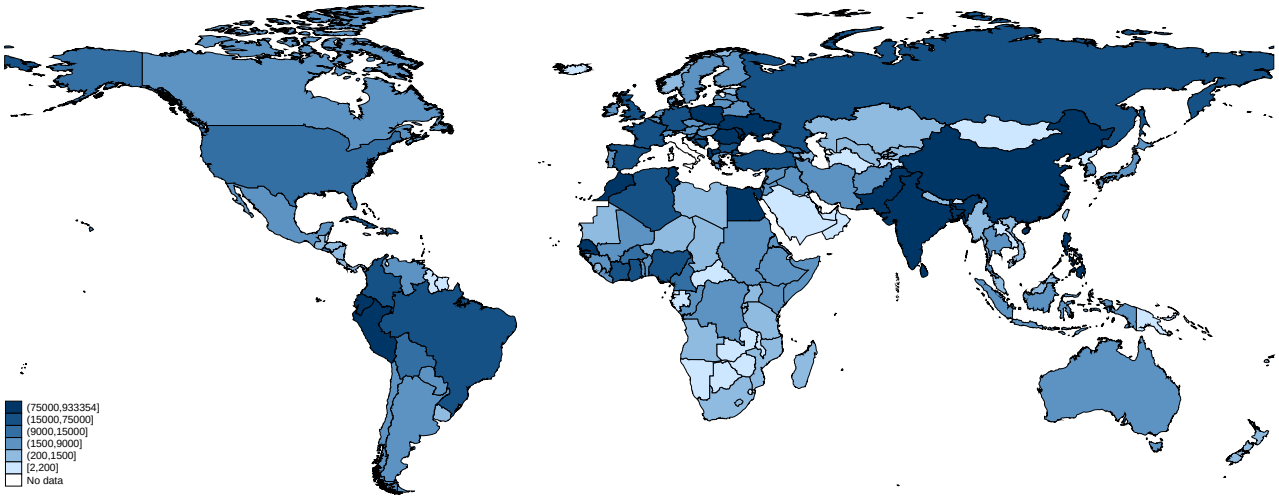
[43]The three questions are framed in the following way. Language spoken at home: *In Italy, in your family, do you speak more often Italian or another language?*. Mother tongue (main): *What language did you speak when you were young, before going to school?*. Mother tongue (secondary): *In addition to this, did you also speak another language when you were young and which one?*

A.4 Population Distribution

The population distribution by ethnic group for each province is derived from municipality records on the movements of the foreign resident population for the years 1995 to 2010. Ethnic group shares are calculated thanks to municipality data on the total resident population, aggregated at the regional level.

B Additional Figures and Tables

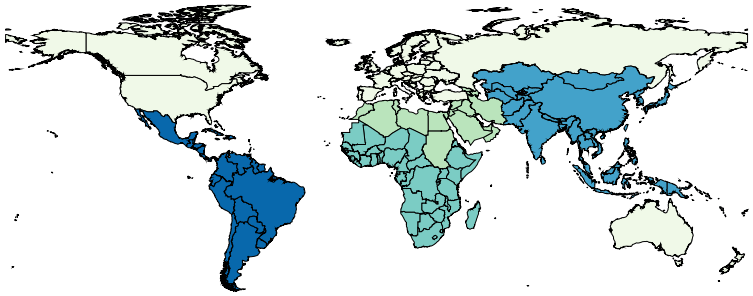
Figure B.1: Relevance of Migrant Population Resident in Italy in 2012



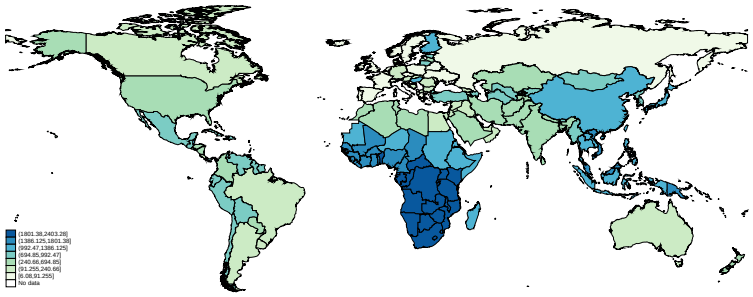
Notes: This figure shows the distribution of the migrant population resident in Italy in 2012 by country of origin. Source: Movements of the foreign resident population (2012), Italy.

Figure B.2: Ethnic-Group Classification and Cultural Distance Measures wrt Italy

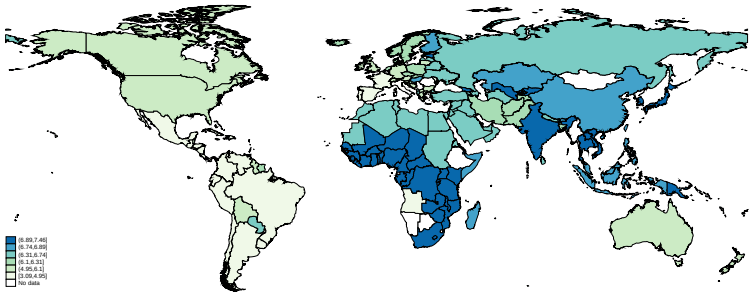
(a) Our Cultural-Ethnic Group Classification



(b) Genetic Distance Classification



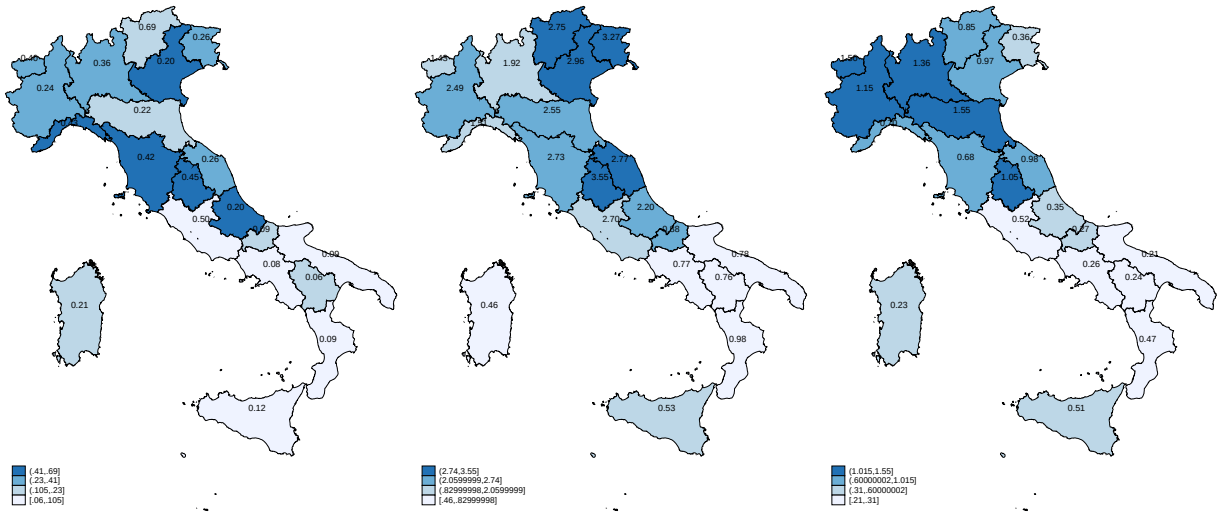
(c) Linguistic Distance Classification



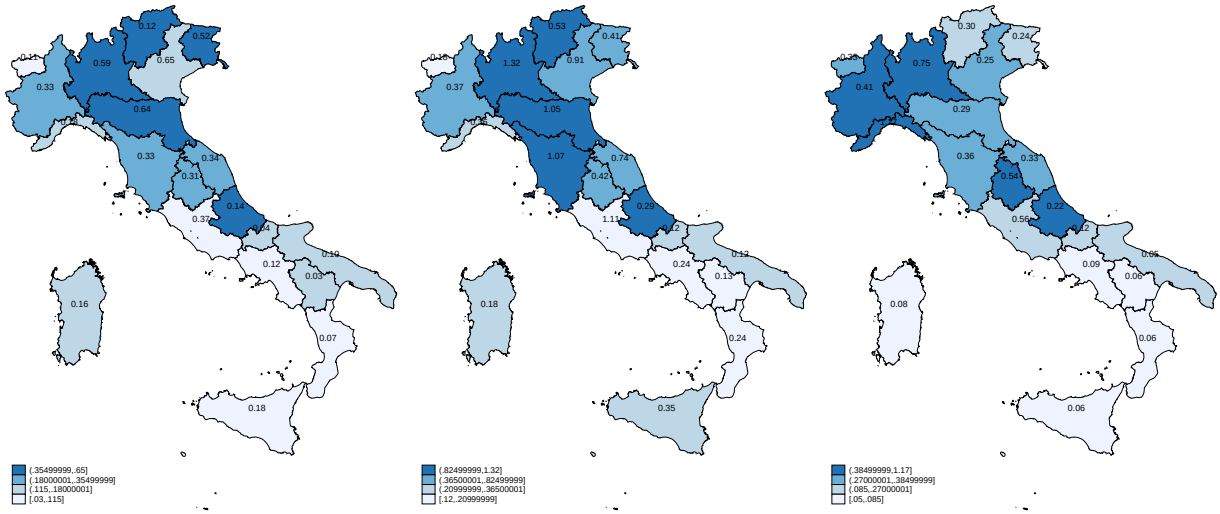
Notes: This figure shows our ethnic-group classification (panel a) as well as country cultural distance towards Italy as proxied by genetic distance (panel b) and ethnolinguistic distance (panel c). Data are available thanks to Spolaore and Wacziarg (2016). Genetic distance measures the probability that two alleles selected at random in two populations will be different: the higher the genetic distance between two populations, the longer they have been apart from each other, the greater would be the difference in culture. Ethnolinguistic distance is based on the language tree classification, which groups languages into families based on perceived similarities between them. Hence, the lower the number of common nodes between two languages, the greater the distance between them.

Figure B.3: Migrants' Distribution across Regions

(a) Europe - EU15 (b) Other Europe (c) North Africa-Middle East



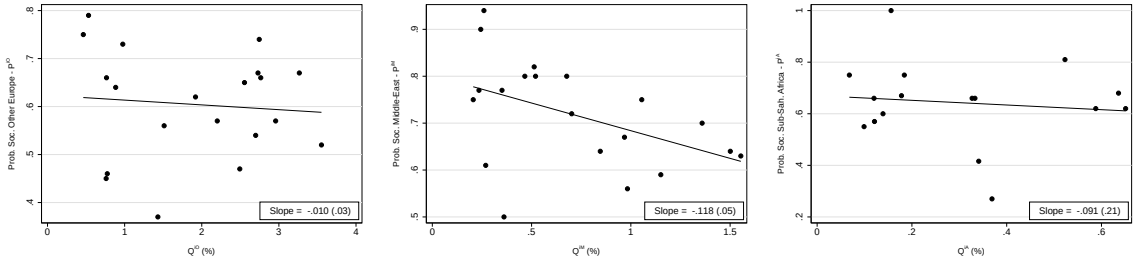
(d) Sub-Saharan Africa (e) East Asia (f) Latin America



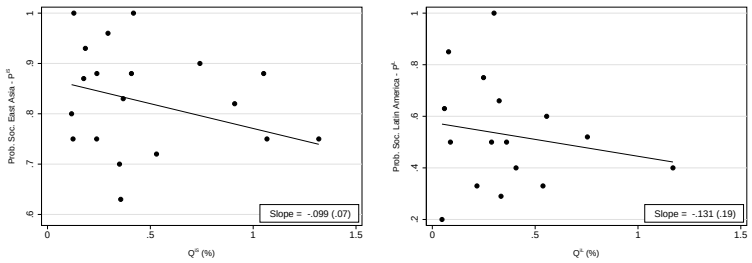
Notes: This figure shows the distribution of migrant population across regions computed as the share of migrant population over the total resident population by region and ethnic group. The ethnic group classification is defined in Table B.1. The color classification corresponds to the quartiles of the population distribution. Source: Movements of the foreign resident population (1995-2010), Italy.

Figure B.4: Minorities Socialization Probabilities and Horizontal Socialization

(a) Other Europe (b) North Africa-Middle East (c) Sub-Saharan Africa



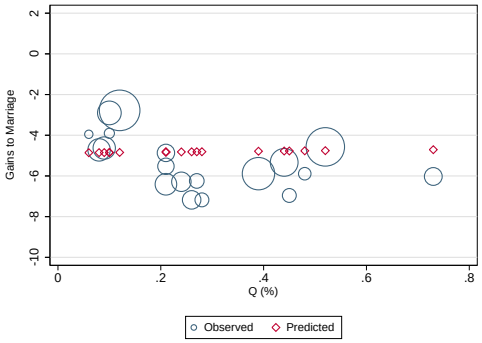
(d) East Asia (e) Latin America



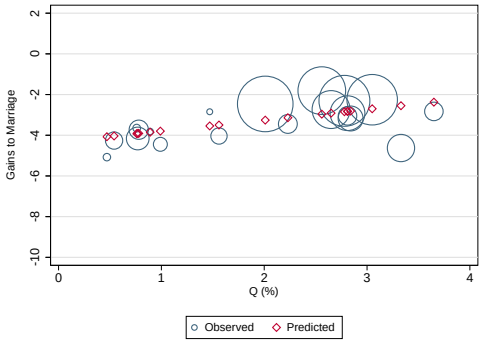
Notes: This figure shows the average socialization probability of each minority group, over the correspondent population share by region of residence (average over the time period). Source: Condition and Social Integration of Foreign Nationals Survey (2011-2012), Italy.

Figure B.5: Fitting of the Model - Gains to Marriage for Homogamous Families

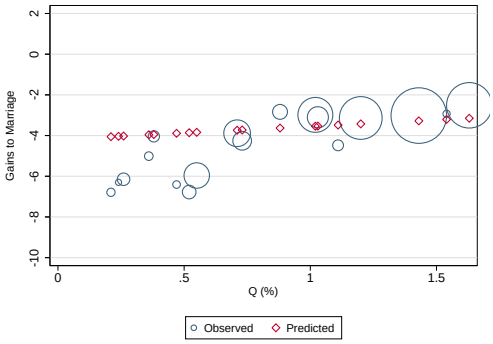
(a) Europe-EU15



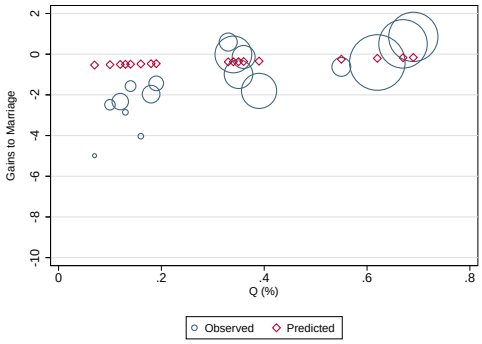
(b) Other Europe



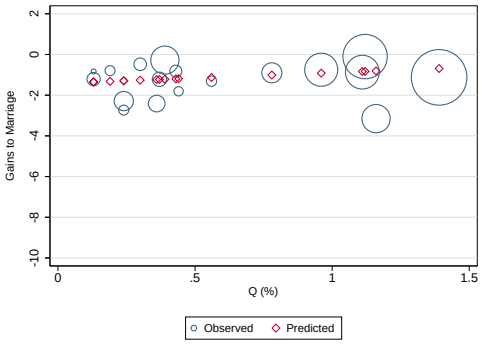
(c) North Africa-Middle East



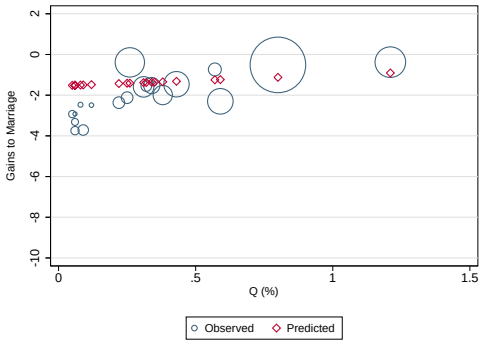
(d) Sub-Saharan Africa



(e) East Asia



(f) Latin America

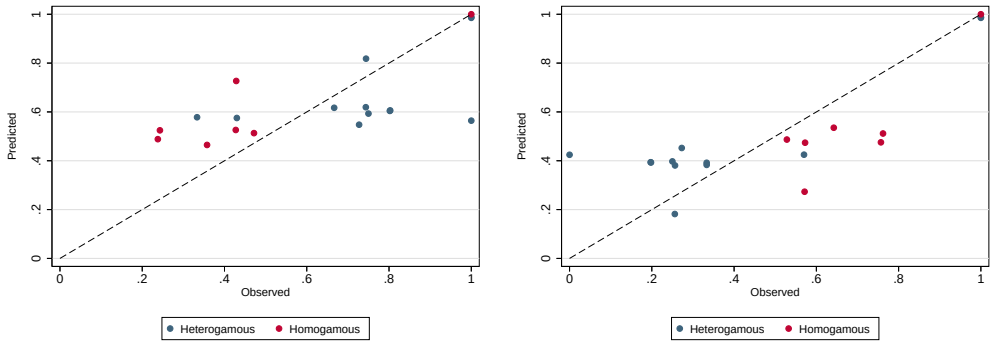


Notes: This figure shows predicted and observed gains to marriage for homogamous families of ethnic group minorities over the correspondent population share by region of residence (average over the time period). Observed moments are weighted by number of marriages per region. E: Europe-EU15; O: Other Europe; M: North Africa and Middle-East; A: Sub-Saharan Africa; S: East Asia; L: Latin America.

Figure B.6: Model Validation on Out of Sample Socialization Frequencies for Divorced Couples

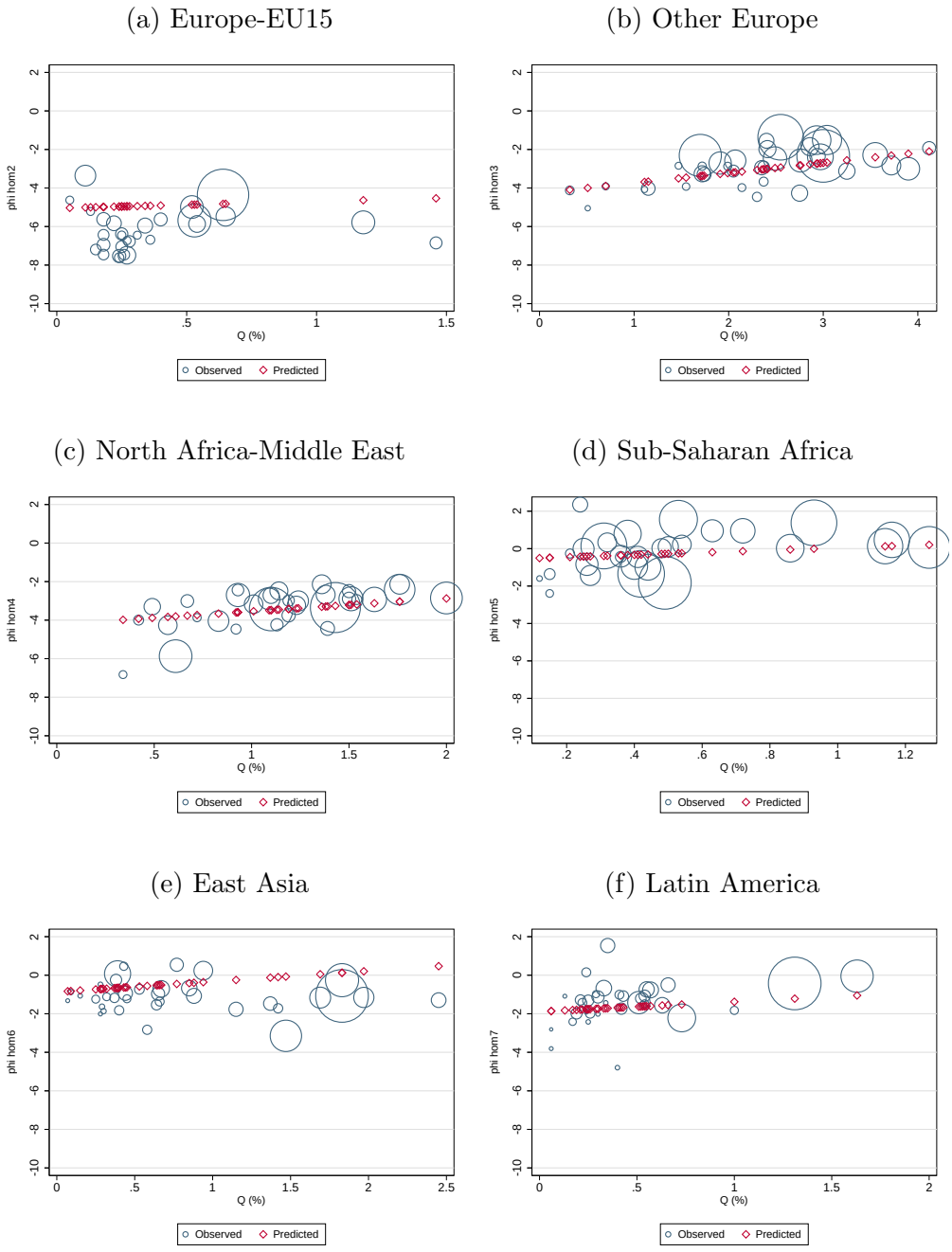
(a) Italian Socialization

(b) Mother Socialization



Notes: This figure shows the relationship between the observed and predicted Italian and mother socialization frequencies by family type for the sample of marriages ending in divorce.

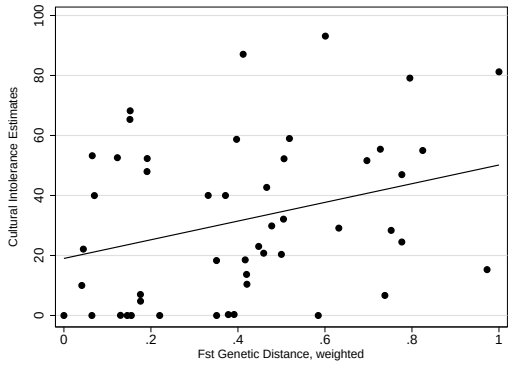
Figure B.7: Out of Sample Fit of the Model with Province Data - Gains to Marriage for Homogeneous Families



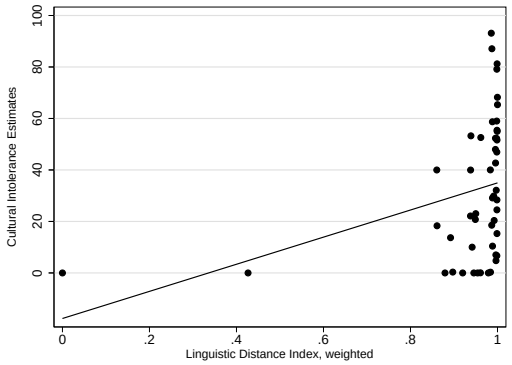
Notes: The figure shows out-of-sample predicted and observed gains to marriage for homogamous families of ethnic group minorities over the correspondent population share by province of residence (average over the time period). Observed moments are weighted by number of marriages per province. E: Europe-EU15; O: Other Europe; M: North Africa and Middle-East; A: Sub-Saharan Africa; S: East Asia; L: Latin America.

Figure B.8: Cultural Intolerance Estimates and Cultural Distance Measures

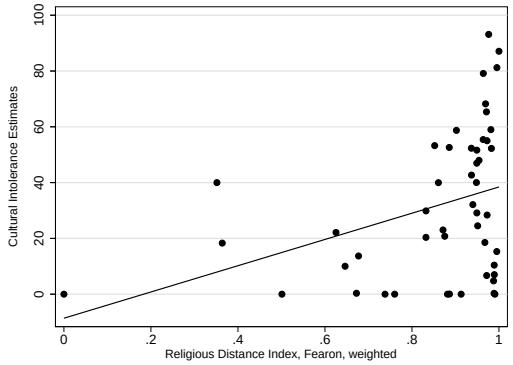
(a) Genetic Distance



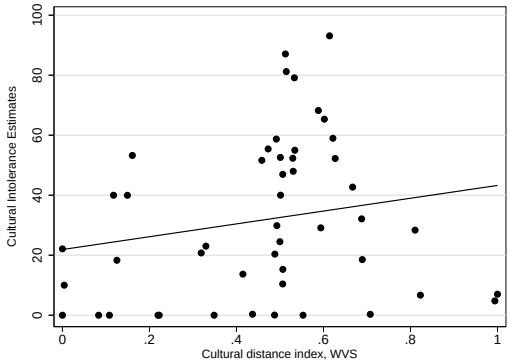
(b) Linguistic Distance



(c) Religious Distance



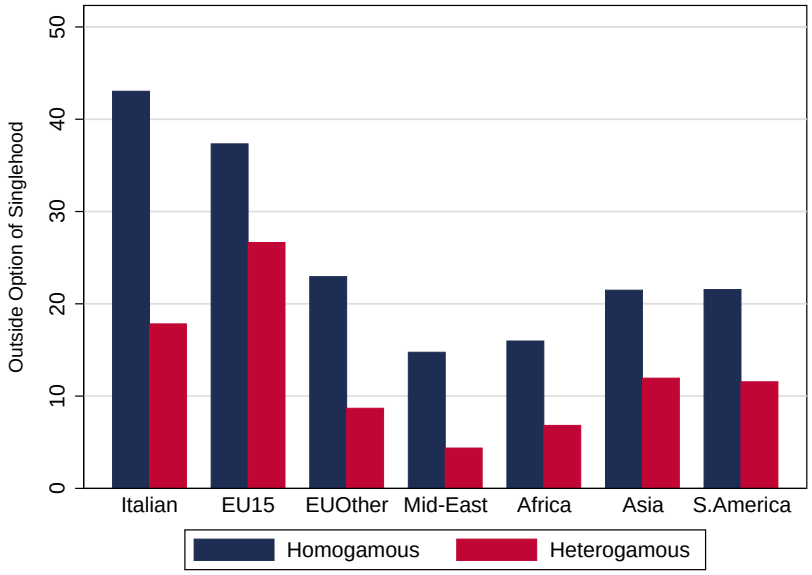
(d) WVS Distance



Notes: The figure shows the relationship between different cultural distance measures and cultural intolerance parameter estimates. We exploit four measures of cultural distance along genetics (panel a), language (panel b), religious (panel c), and values (panel d). Data are available thanks to Spolaore and Wacziarg (2016). Genetic distance measures the probability that two alleles selected at random in two populations will be different: the greater the genetic distance between two populations, the longer they have been apart from each other, and the greater would be the difference in culture. Linguistic distance is based on the language tree classification, which groups languages into families based on perceived similarities between them. Hence, the lower the number of common nodes between two languages, the higher the distance between them. In a similar vein, religious distance originates from a tree-based representation of religions. The last variable measures distance in cultural norms, values and attitudes based on answers to the World Values Survey. Estimates are weighted by the number of marriages per household type.

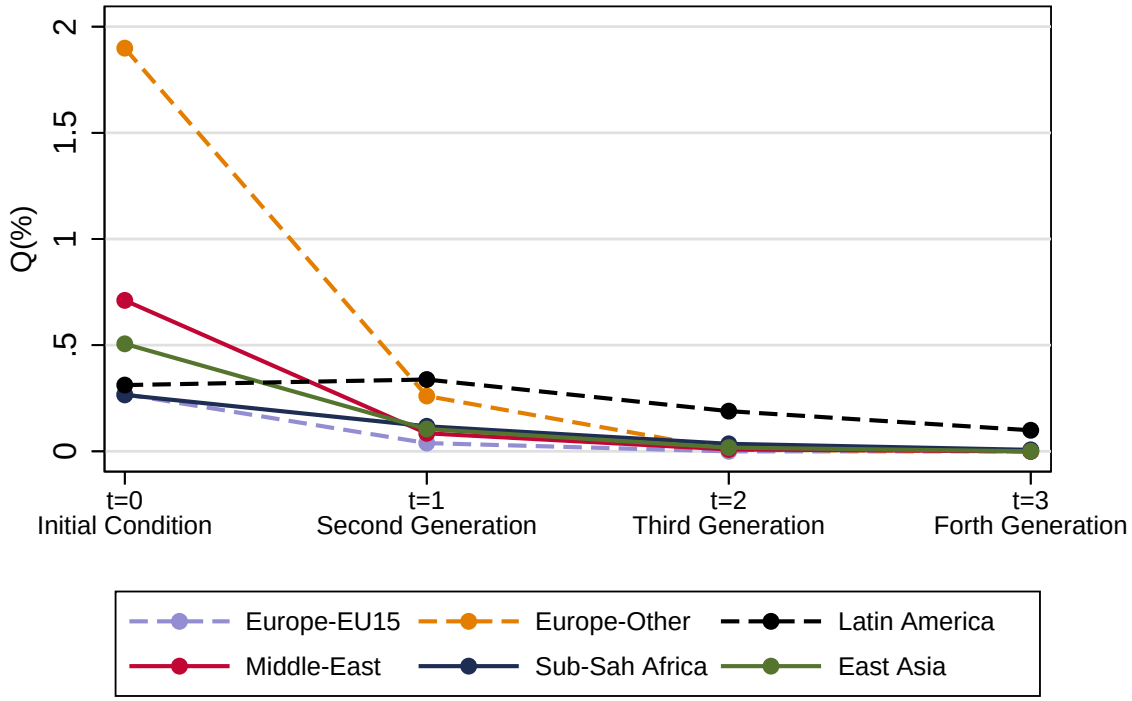
Figure B.9: Outside Option of Singlehood by Type of Family and Cultural-Ethnic Group

(a) Outside Option of Singlehood Parameters



Notes: This figure shows parameter estimates for the outside option of singlehood, ω_{h_s}, by cultural-ethnic group and family type.

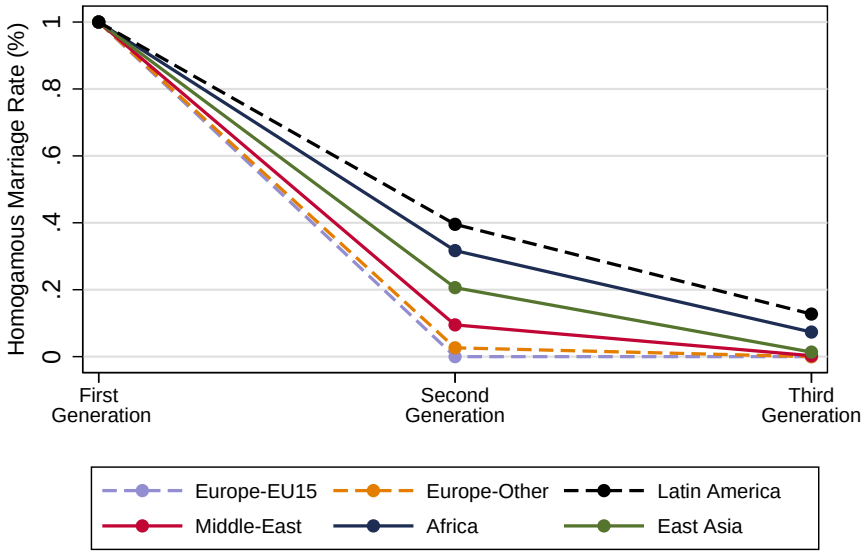
Figure B.10: Long-run Dynamics of Cultural Traits



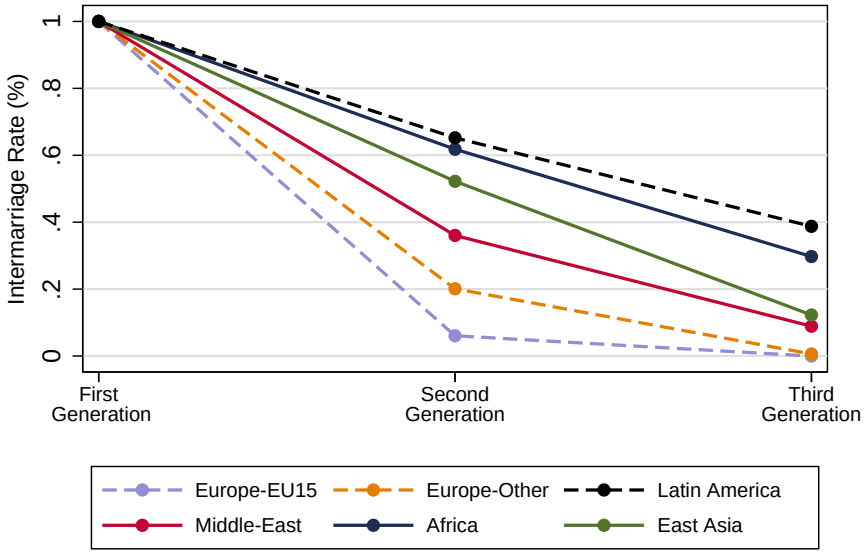
Notes: This figure shows the long-run dynamics of the distribution of cultural traits in the population for minority groups, over successive generations. E: Europe-EU15; O: Other Europe; M: North Africa and Middle-East; A: Sub-Saharan Africa; S: East Asia; L: Latin America.

Figure B.11: Dynamics of Marital Matching

(a) Homogamous Marriages



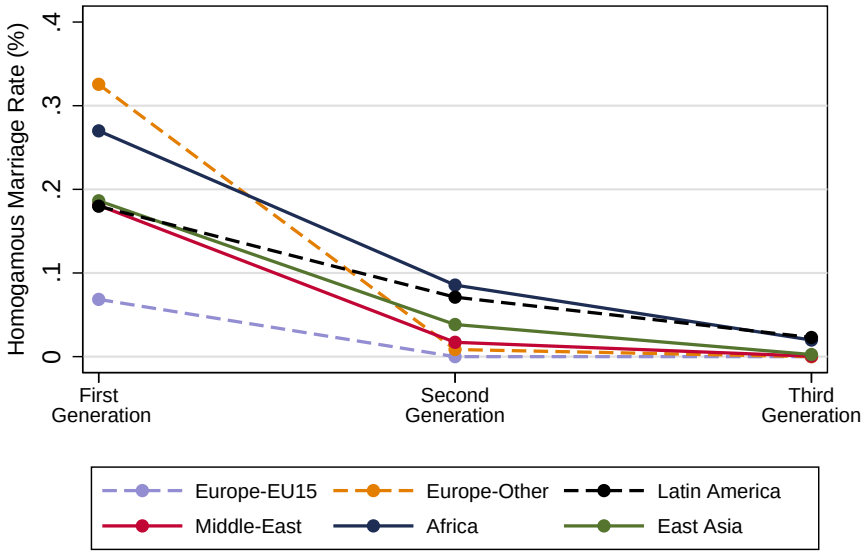
(b) Heterogamous Marriages with Natives



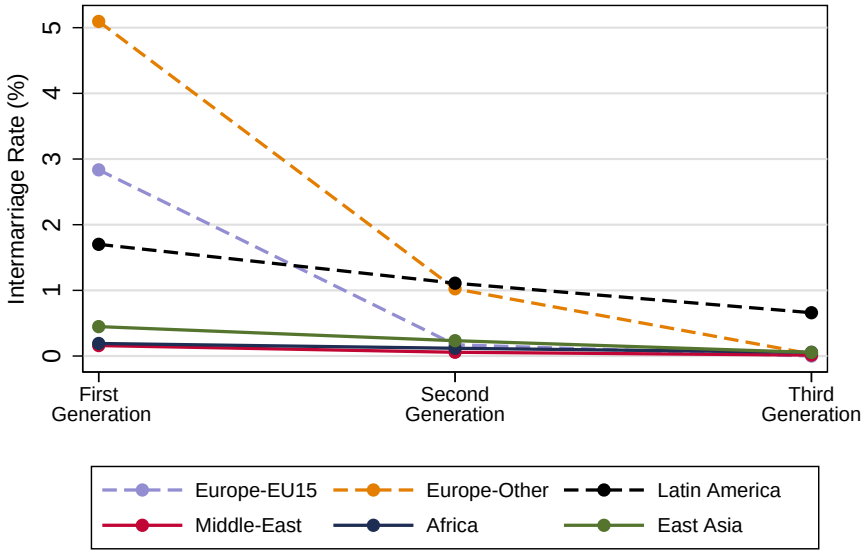
Notes: This figure shows the long-run dynamics of matching patterns for homogamous marriages (Panel a.) and heterogamous marriages with natives, over successive generations. E: Europe-EU15; O: Other Europe; M: North Africa and Middle-East; A: Sub-Saharan Africa; S: East Asia; L: Latin America.

Figure B.12: Dynamics of Marital Matching

(a) Homogamous Marriages



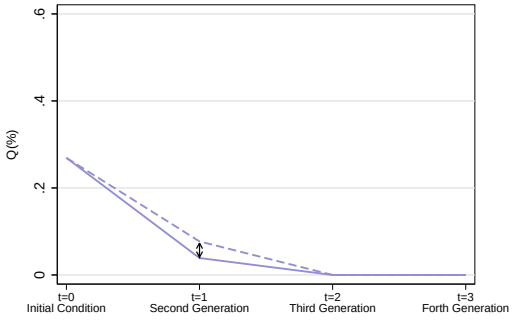
(b) Heterogamous Marriages with Natives



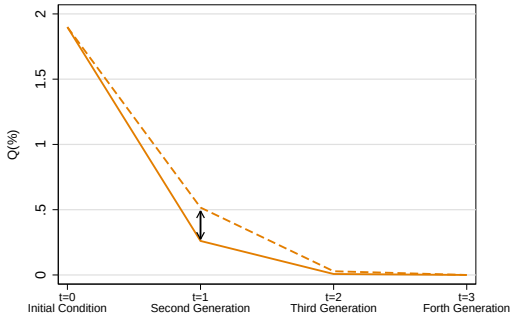
Notes: This figure shows the long-run dynamics of matching patterns for homogamous marriages (Panel a.) and heterogamous marriages with natives, over successive generations. E: Europe-EU15; O: Other Europe; M: North Africa and Middle-East; A: Sub-Saharan Africa; S: East Asia; L: Latin America.

Figure B.13: Long-run Dynamics with Proportional Raise in Migration Inflows

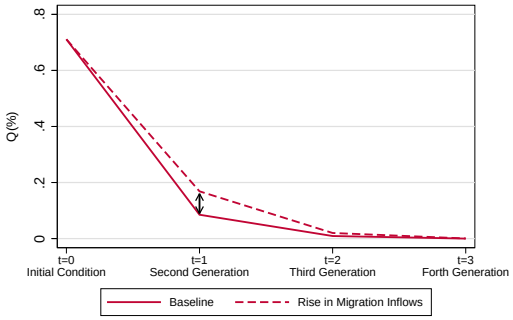
(a) Europe-EU15



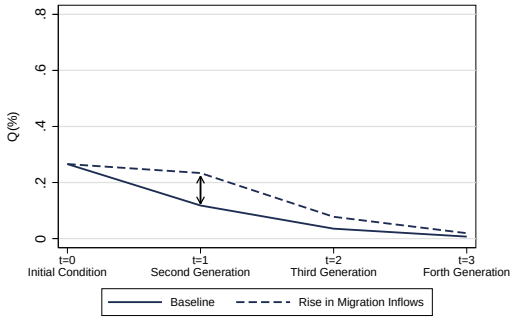
(b) Europe Other



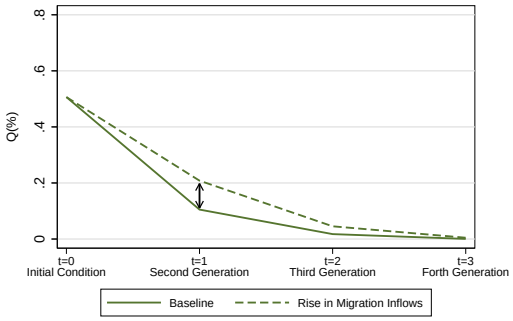
(c) North Africa-Middle East



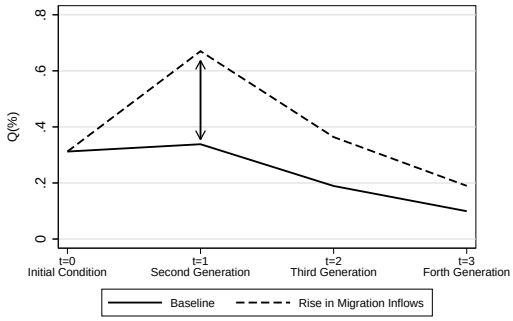
(d) Sub-Saharan Africa



(e) East Asia



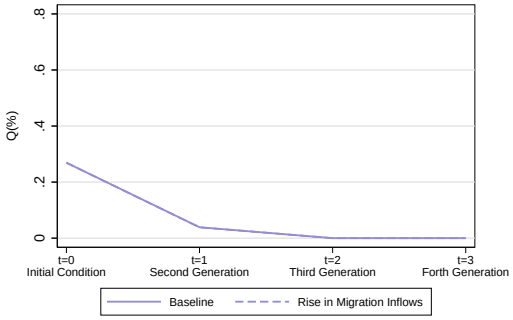
(f) Latin America



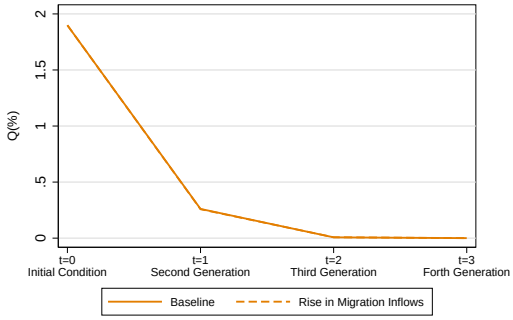
Notes: This figure shows the long-run dynamics of the distribution of cultural traits in the population for minority groups, over successive generations. The solid line represents the dynamics at the baseline, while the dash line represents the dynamics after doubling the share of second generation minorities, proportionally for all minority groups. Black arrows highlight the exogenous rise in inflows for all second generation minorities.

Figure B.14: Long-run Dynamics with Raise in Specific Minorities Inflows

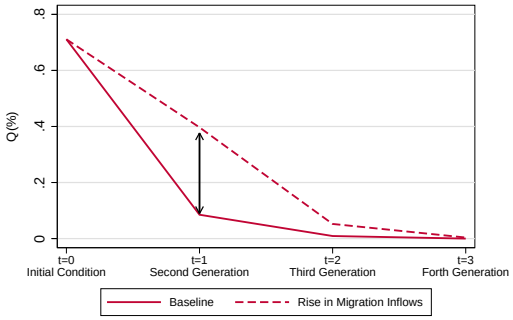
(a) Europe-EU15



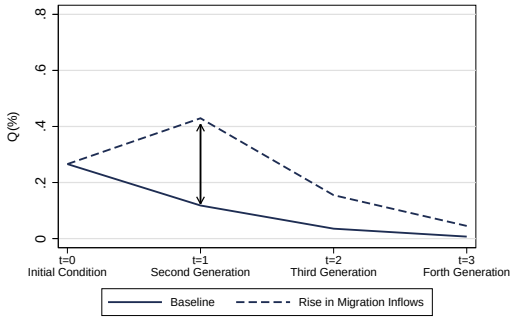
(b) Europe Other



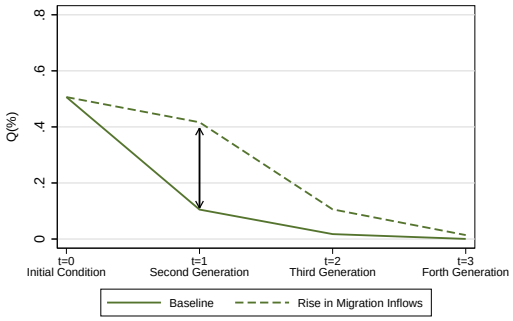
(c) North Africa-Middle East



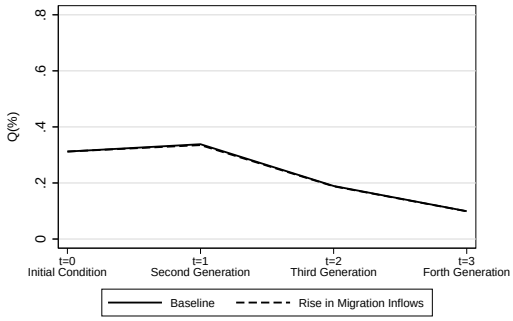
(d) Sub-Saharan Africa



(e) East Asia



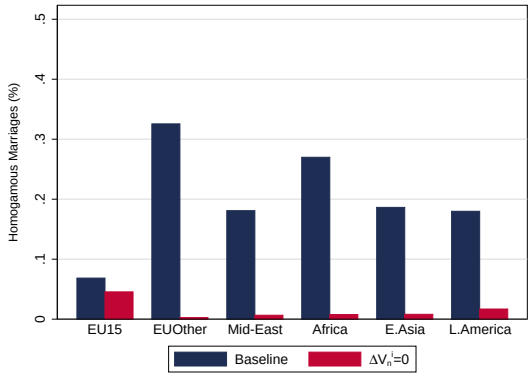
(f) Latin America



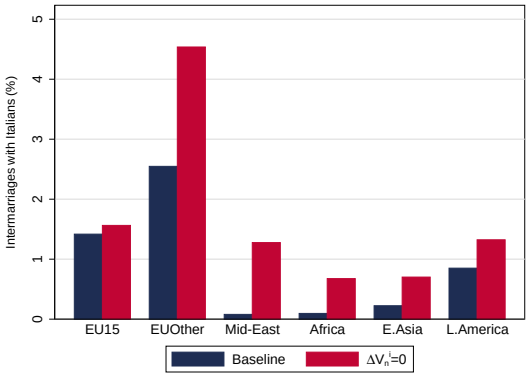
Notes: This figure shows the long-run dynamics of the distribution of cultural traits in the population for minority groups, over successive generations. The solid line represents the dynamics at the baseline, while the dash line represents the dynamics after doubling the share of second generation North Africa-Middle East, Sub-Saharan Africa and East Asia minorities. Black arrows highlight the exogenous rise in inflows for North Africa-Middle East, Sub-Saharan Africa and East Asia second generations minorities.

Figure B.15: Change in Matching Patterns with Italians Fully Tolerant, $\Delta V_n^i = 0$

(a) Homogamous marriages



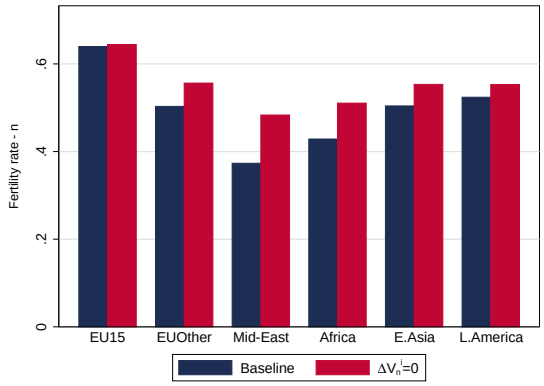
(b) Intermarriages with Italians



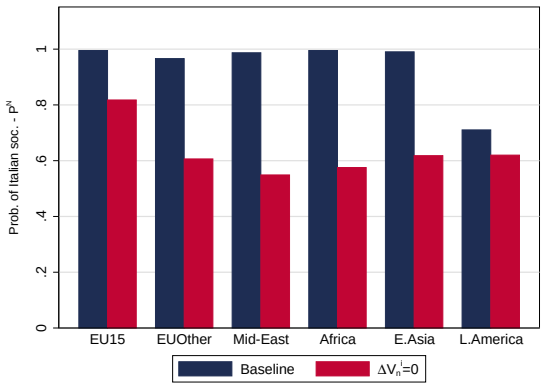
Notes: This figure shows the variation in the percentage of homogamous (panel a.) and heterogamous marriages at the baseline and in case of complete tolerance of Italian majority towards minorities.

Figure B.16: Change in Intra-household Patterns with Italians Fully Tolerant, $\Delta V_n^i = 0$

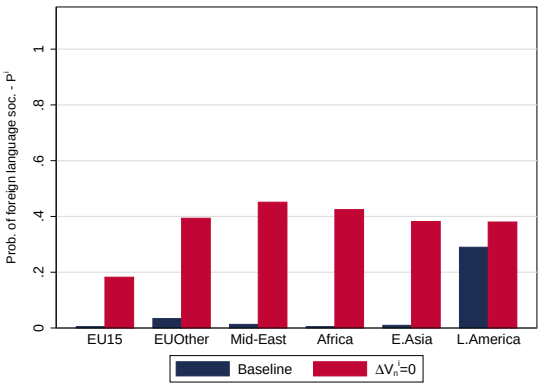
(a) Fertility



(b) Italian socialization

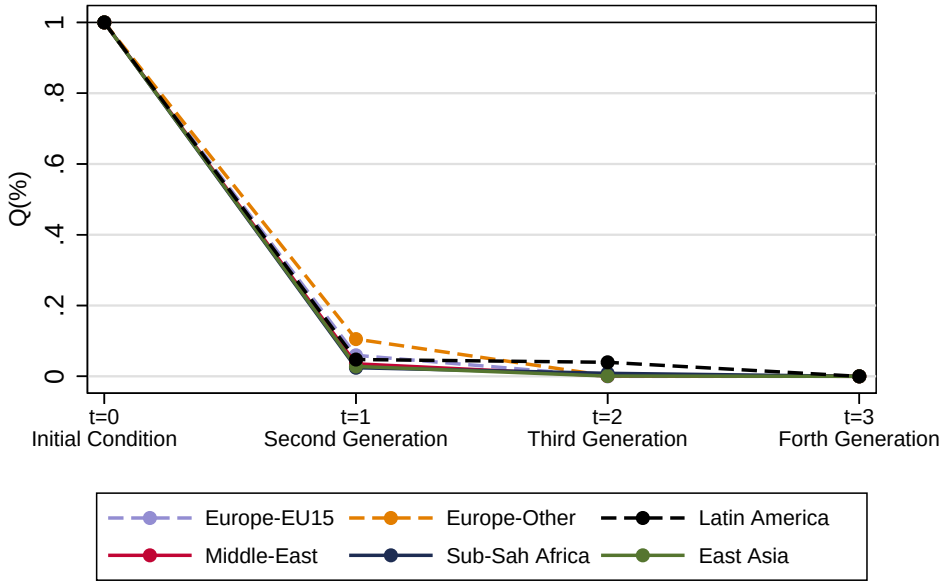


(c) Foreign language socialization



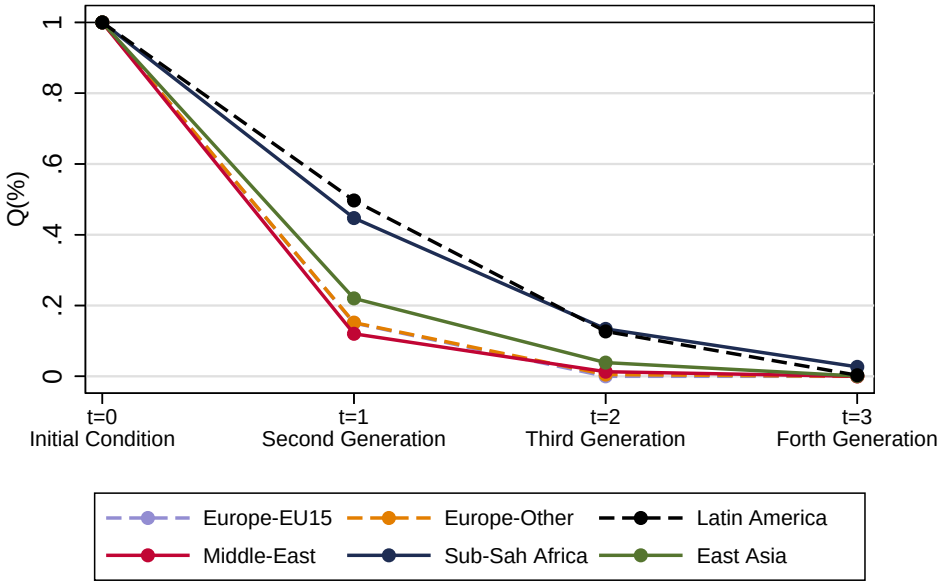
Notes: This figure shows the variation in fertility rate (panel a.), Italian socialization probability (panel b.) and foreign language socialization probability (panel c.) in intermarriages with Italians at the baseline and in case of complete tolerance of Italian majority towards minorities.

Figure B.17: Long-run Dynamics of Cultural Traits with Minorities Fully Tolerant, $\Delta V_i^n = 0$ (index=1 in $t = 0$)



Notes: This figure shows the long-run dynamics of the distribution of cultural traits in the population for minority groups, over successive generations assuming the case of complete tolerance of minorities towards Italian culture.

Figure B.18: Long-run Dynamics of Cultural Traits with Italians Fully Intolerant, $\Delta V_n^i = 100$ (index=1 in $t = 0$)



Notes: This figure shows the long-run dynamics of the distribution of cultural traits in the population for minority groups, over successive generations assuming the case of complete intolerance of Italian majority towards minorities.

Table B.1: Cultural-Ethnic Group Classification of Migrants' Countries of Origin

Cultural-Ethnic Group	(%)	Countries
Europe - EU15 - i^E	4.57	Austria, Belgium, Denmark, France, Finland, Germany, Greece, Ireland, Luxembourg, Netherlands, Portugal, United Kingdom, Spain, Sweden
Other Europe - i^O	46.29	Albania, Andorra, Belarus, Bosnia and Herzegovina, Bulgaria, Cyprus, Croatia, Czech Republic, Estonia, Hungary, Iceland, Isle of Man, Liechtenstein, Latvia, Lithuania, Kosovo, Macedonia (FYROM), Malta, Poland, Republic of Moldova, Monaco, Norway, Russian Federation, San Marino, Vatican City State, Serbia and Montenegro, Romania, Switzerland, Slovakia, Slovenia, Turkey, Ukraine, Vatican City State, United States, Canada
Middle-East - i^M	17.15	Algeria, Egypt, Libyan Arab Jamahiriya, Marocco, Tunisia, Afghanistan, Saudi Arabia, Armenia, Azerbaijan, United Arab Emirates, Islamic Republic Of Iran, Iraq, Israel, Kazakhstan, Kyrgyzstan, Kuwait, Lebanon, Qatar, Syrian Arab Republic, Palestinian Territory, Turkmenistan, Uzbekistan
Sub-Saharan Africa - i^A	7.33	Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo, The Democratic Republic of Congo, Cote D'Ivoire, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Dijbouti, Guinea, Guinea-Bisseau, Equatorial Guinea, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, Swaziland, United Republic of Tanzania, Togo, Uganda, Zambia, Zimbabwe
East Asia - i^S	16.47	Brunei Darussalam, Cambodia, China, Democratic People's Replica of Korea, Republic of Korea, Philippines, Japan, Jordan, Indonesia, Lao Pepople's Democratic Republic, Malaysia, Mongolia, Myanmar, Singapore, Taiwan, Thailand, East Timor, Vietnam, Australia, Fiji, Kiribati, Marshall Islands, Federated States of Micronesia, Nauru, New Zealand, Palau, Papua New Guinea, Solomon Islands, Samoa, Tonga, Tuvalu, Vanuatu, Bahrain, Bangladesh, Bhutan, Georgia, India, Maldives, Nepal, Oman, Pakistan, Sri Lanka, Tajikistan, Yemen
Latin America - i^L	8.2	Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Plurinational State of Bolivia, Brazil, Costa Rica, Cuba, Chile, Colombia, Dominica, Dominican Republic, Ecuador, El Salvador, Jamaica, Grenada, Guatemala, Guyana, Haiti, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and The Grenadines, Suriname, Trinidad and Tobago, Uruguay, Venezuela

Notes: This table reports our classification of foreign countries by cultural-ethnic groups.

Table B.2: Data Sources and Variables of Interest

Data	Frequency (Years)	Source	Variables of Interest
Marriages	1995-2012	Municipality Vital Statistics Registries	Wedding: the date of marriage, the celebration ceremony (religious or civil), the municipality of celebration, the property regime (community or separation property). Spouses: date of birth, municipality of birth, municipality of residence at the time of marriage, municipality of future residence, past marital status, the education level, the employment status, the nationality, citizenship acquisition (Italian born, naturalized Italian and not Italian), the country of origin if foreign
Births	1990-2012	Municipality Births Registries	Newborn: gender, date and municipality of birth, citizenship, family size, presence and number of minor members in the family. Parents: date and province of birth, citizenship, country of origin and marital status
Separations	1995-2012	Registries of Civil Court Chancelleries	Proceeding: judicial and appeal to legal assistance, proceeding end, date of registration, date of separation, court of reference; Marriage: date of marriage, celebration ceremony (religious or civil); Spouses: date of birth, municipality of birth, municipality of residence at the time of marriage, the municipality of future residence, past marital status, the education level, the employment status, the nationality, citizenship acquisition (Italian born, naturalized Italian and not Italian), the country of origin if foreign; Children: number of children born in the marriage, number of children in the family at separation, date of birth and gender; Post-dissolution arrangements (2000-2012): alimony obligations versus children and/or spouse (yes or no), recipient subject and annual amount of contribution to the maintenance, custody assignment of children.
Socialization	2011-2012	Survey: Condition and Social Integration of Foreign Nationals	Household Panel. Individual data: age, gender, relationship with targeted subject, marital status, year of marriage, nationality, citizenship acquisition (Italian born, naturalized Italian and not Italian), country of origin if foreign, partner/mother/father citizenship and country of origin, migratory path, educational level, employment status/ school enrolment, religious affiliation, discrimination and integration perception, social networks (at work, school, free-time). Household data: family composition, area of residence (province), living environment conditions. Language data: first language, verbal and written knowledge of first language, language spoken at home, Italian language proficiency: lecture, writing, reading, comprehension level (good, enough, little, nothing)
Migration records	1995-2010	Municipality Population Balance	End of period data (December, 31): total population, total foreign population, total male and female foreign population by municipality. Male and female foreign population by country of origin by province.

Table B.3: Marriage Distribution by Spouses Cultural-Ethnic Group

	Wife Ethnic Group:							
Husband Ethnic Group:	Italian	Europe-EU15	Other Europe	Middle East	Sub-Sah. Africa	East Asia	Latin America	Total
Italian	3,623,416	49,602	165,778	11,792	11,063	13,682	63,484	3,938,817
Europe-EU15	41,250	3,153	2,358	161	217	293	838	48,270
Other Europe	46,185	1,202	25,027	253	218	307	1,197	74,389
North Africa-Middle East	21,791	554	2,973	4,178	133	131	829	30,589
Sub-Saharan Africa	6,043	260	421	71	10,090	41	144	17,070
East Asia	2,420	127	348	51	44	9,865	129	12,984
Latin America	13,329	322	951	66	46	76	14,642	29,432
Total	3,754,434	55,220	197,856	16,572	21,811	24,395	81,263	4,151,551

Notes: This table reports the bivariate marriage distribution by cultural-ethnic group of spouses (absolute numbers). Source: Marriage records from vital statistics (1995-2012), Italy.

Table B.4: Distribution of Singles by Cultural-Ethnic Group

	Panel A. Adult singles over 18 Years Old							
	Singles 2001				Singles 2011			
	Male	Share (%)	Female	Share (%)	Male	Share (%)	Female	Share (%)
Italian	7947039	36.87	9914990	42.42	8961649	41.29	11038623	47.18
Europe-EU15	84537	48.84	109512	40.05	86625	43.29	124133	46.33
Other Europe	124875	39.18	149279	36.87	312362	35.75	549604	40.31
North Africa-Middle East	61554	35.26	32328	28.59	106598	33.91	73237	30.20
Sub-Saharan Africa	24013	34.87	23711	41.83	58857	41.78	49560	44.94
East Asia	24819	31.54	23912	29.74	98240	34.24	84063	27.12
Latin America	33085	46.36	55992	41.64	84751	51.68	149838	49.23
	Panel B. Adult singles over 90th perc. of the Age at Marriage Distribution							
	Singles 2001				Singles 2011			
	Male	Share (%)	Female	Share (%)	Male	Share (%)	Female	Share (%)
Italian	2506182	18.57	5971291	34.71	3963745	26.13	7458287	40.03
Europe-EU15	19788	26.20	54228	32.53	43088	28.91	86383	42.11
Other Europe	25952	20.32	72587	36.63	86893	18.97	304691	39.04
Middle-East	16071	18.89	19940	35.37	34464	19.23	41189	36.63
Sub-Saharan Africa	5257	20.66	9641	38.54	15600	23.97	23905	42.44
East Asia	2886	12.53	9033	25.02	13949	15.24	36504	27.03
Latin America	11362	28.28	25875	35.86	31456	33.25	79113	43.25

Notes: This table reports the distribution of singles by gender and cultural-ethnic group, separately for 2001 and 2011. Panel a. reports the distribution of adult singles over 18 years old. Panel B reports the distribution of adult singles over the 90th percentile of the age at marriage distribution. Shares are computed as the total number of singles over the total number of individuals by gender and ethnic group, for 2001 and 2011 in turn. Source: Individual Census Data (2001, 2011), Italy.

Table B.5: Gains to Marriage by Spouses Cultural-Ethnic Group

	Wife Ethnic Group:						
Husband Ethnic Group:	Italian	Europe-EU15	Other Europe	Middle East	Sub-Sah.Africa	East Asia	Latin America
Italian	-0.425	-4.183	-3.068	-6.488	-5.992	-5.858	-3.561
Europe-EU15	-4.501	-4.865	-6.811	-10.145	-8.981	-8.576	-7.471
Other EU	-4.994	-7.438	-2.704	-10.000	-9.673	-9.232	-7.361
North Africa-Middle East	-5.803	-8.463	-6.193	-3.393	-9.647	-9.799	-6.989
Sub-Saharan Africa	-7.469	-8.864	-9.054	-10.568	-0.255	-11.666	-9.752
East Asia	-9.555	-10.248	-9.636	-10.822	-10.268	-1.036	-9.809
Latin America	-6.335	-9.078	-8.053	-11.103	-11.359	-11.005	-1.057

Notes: This table reports estimates for gains to marriage, estimated from equation (9), by cultural-ethnic group of spouses. Source: Marriage records (1995-2012) and Individual Census data (2001, 2011), Italy.

Table B.6: Gains to Marriage by Spouses Cultural-Ethnic Group - All Adults Singles

	Wife Ethnic Group:						
Husband Ethnic Group:	Italian	Europe-EU15	Other Europe	Middle East	Sub-Sah.Africa	East Asia	Latin America
Italian	-1.935	-5.892	-4.630	-7.982	-7.699	-7.599	-5.259
Europe-EU15	-6.263	-6.759	-8.499	-11.518	-10.703	-10.218	-9.181
Other EU	-6.886	-9.535	-4.647	-11.936	-11.787	-11.414	-9.473
North Africa-Middle East	-7.452	-10.099	-7.972	-5.285	-11.560	-11.694	-9.001
Sub-Saharan Africa	-9.287	-10.706	-11.034	-12.561	-2.542	-14.043	-11.932
East Asia	-11.487	-12.175	-11.702	-13.056	-12.424	-3.389	-12.097
Latin America	-8.081	-10.862	-9.907	-13.139	-13.418	-13.105	-3.168

Notes: This table reports estimates for gains to marriage, estimated from equation (9), by cultural-ethnic group of spouses. Source: Marriage records (1995-2012) and Individual Census data (2001, 2011), Italy.

Table B.7: Separation Rates in Marriages With and Without Children

	Separation Rates			
	Homogamous		Heterogamous	
	$\pi_{hh}(n>0)$	$\pi_{hh}(n=0)$	$\pi_{hj}(n>0)$	$\pi_{hj}(n=0)$
Italian	0.054	0.095	0.051	0.094
Europe-EU15	0.029	0.025	0.041	0.061
Other Europe	0.016	0.040	0.049	0.093
North Africa-Middle East	0.023	0.072	0.073	0.127
Sub-Saharan Africa	0.017	0.037	0.063	0.108
East Asia	0.010	0.021	0.040	0.080
Latin America	0.026	0.061	0.053	0.114

Notes: This table reports the separation rates by ethnic group of spouses in families with and without children, separately for homogamous and heterogamous couples. Source: Marriage and Separation records (1995-2012), Italy.

Table B.8: Marriage Distribution by Spouses Cultural-Ethnic Group - Socialization Data

	Wife Ethnic Group:						
Husband Ethnic Group:	Italian	Europe-EU15	Other Europe	Middle East	Sub-Sah. Africa	East Asia	Latin America
Italian	49	276	882	59	55	74	271
Europe-EU15	114	27	16	-	1	2	3
Other Europe	114	9	2826	-	-	3	10
North Africa-Middle East	88	6	25	1335	2	-	1
Sub-Saharan Africa	26	2	1	-	430	-	1
East Asia	11	-	2	-	4	929	2
Latin America	15	-	10	-	-	-	326

Notes: This table reports the marriage distribution by cultural-ethnic group of spouses (absolute numbers) of the socialization dataset. Observations: 8,007. Source: Condition and Social Integration of Foreign Nationals Survey (2011-2012), Italy.

Table B.9: Italian Socialization Probabilities by Ethnic Group and Marital Status

	Italian Socialization Frequencies			
	Homogamous Families		Heterogamous Families	
	Married $P^n_{hh}(d=0)$	Separated $P^n_{hh}(d=1)$	Married $P^n_{hj}(d=0)$	Separated $P^n_{hj}(d=1)$
Italian	1	1	0.936	0.736
Europe-EU15	0.410	0.476	0.885	0.750
Other Europe	0.389	0.472	0.940	0.786
North Africa-Middle East	0.268	0.357	0.919	0.619
Sub-Saharan Africa	0.398	0.238	0.927	0.600
East Asia	0.198	0.242	0.856	0.375
Latin America	0.493	0.426	0.927	0.750

Notes: This table shows Italian socialization frequencies by ethnic group of spouses and marital status. The outcome variable corresponds to the probability that a child speaks Italian as main language at home. Columns 1 and 2 report estimates for homogamous families, separately for married and separated unions, Columns 3 and 4 report estimates for heterogamous families, for married and separated respectively. The separated category comprehends both separated and divorced unions. Source: Condition and Social Integration of Foreign Nationals Survey (2011-2012), Italy.

Table B.10: Italian Language Socialization Probabilities by Age of Children for Homogamous Families

	Italian Socialization Frequencies: P^n_{hh}			
	less 5 years	6-10 years	11-15 years	more 16 years
Italian	1	1	1	1
Europe-EU15	0.300	0.416	0.500	0.353
Other Europe	0.248	0.560	0.514	0.368
North Africa-Middle East	0.126	0.380	0.397	0.312
Sub-Saharan Africa	0.182	0.611	0.537	0.352
East Asia	0.074	0.354	0.299	0.140
Latin America	0.425	0.700	0.468	0.364

Notes: This table shows Italian socialization frequencies by ethnic group of spouses, conditional on children's age. The outcome variable corresponds to the probability that a child speaks Italian as main language at home. Source: Condition and Social Integration of Foreign Nationals Survey (2011-2012), Italy.

Table B.11: Correlation Matrix: Italian Language Socialization and Integration Variables

		(1)	(2)	(3)	(4)
(1)	Language Spoken at Home	1			
	1 Italian, 0 otherwise				
(2)	Language Spoken with School Mates	0.176	1		
	1 Italian, 0 otherwise				
(3)	Language Spoken with School Friends out of School	0.250	0.446	1	
	1 Italian, 0 otherwise				
(4)	Nationality of Friends out of School	0.177	0.155	0.144	1
	1 Only Italians and some Italians, 0 otherwise				

Notes: This table shows correlation estimates between our measure of socialization and three measures of socio-cultural integration. The outcome variable in (1) is a dummy equal to one whether the child speaks Italian as main language at home, and zero otherwise. The variable in (2) is a dummy equal to one whether the child speaks Italian with his school mates. The variable in (3) is a dummy equal to one whether the child speaks Italian with his school friends but out of the school. The variable in (4) is a dummy equal to one whether the child has at least some Italian friends out of the school. Observations 2,654. Source: Condition and Social Integration of Foreign Nationals Survey (2011-2012), Italy.

Table B.12: Correlation Matrix: Italian Language Socialization and Integration Variables

		(1)	(2)	(3)	(4)	(5)	(6)
(1)	Language Spoken at Home	1					
	1 Italian, 0 otherwise						
(2)	Proficiency in Italian reading	0.200	1				
	1 very good, 0 poor or very poor						
(3)	Proficiency in Italian writing	0.212	0.914	1			
	1 very good, 0 poor or very poor						
(4)	Proficiency in Italian speaking	0.194	0.822	0.797	1		
	1 very good, 0 poor or very poor						
(5)	Proficiency in Italian comprehension (conversation)	0.184	0.814	0.791	.937	1	
	1 very good, 0 poor or very poor						
(6)	Proficiency in Italian comprehension (television)	0.170	0.761	0.736	.822	.840	1
	1 very good, 0 poor or very poor						

Notes: This table shows correlation estimates between our measure of socialization and five additional measures of socio-cultural integration concerning Italian language proficiency. The outcome variable in (1) is a dummy equal to one whether whether the child speaks Italian as main language at home and zero otherwise. The variables from (2) to (6) represent different measures of Italian language proficiency, in reading, writing, speaking, comprehension in conversation and comprehension of television newscast. Observations 2,151. Source: Condition and Social Integration of Foreign Nationals Survey (2011-2012), Italy.