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Cities as drivers of social mobility☆

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ABSTRACT

The paper studies the role of cities in enhancing intergenerational social mobility. Cities, where children grew up, can provide resources and opportunities able to increase the chance of employment and status attainment.

We assess intergenerational mobility in Italy, the most immobile country in Europe together with Greece and Portugal. We use a data survey providing information on the individual-level track of Italian students' life path from high school to occupation. We merge the data survey with city-level information on socio-economic conditions.

We distinguish between students who attended university in the same city where they grew up and those who migrated to another city for higher education. Upward mobility turns out to be higher in: (*i*) larger cities by population size; (*ii*) more accessible cities; (*iii*) cities with low income inequality and high education levels. Also social values and cultural traits play a role in enhancing upward mobility. More generally, if we look at the bundle of factors identifying the urban context, we find that the effect of factors with a positive impact on upward mobility prevails in the Northern cities while the opposite occurs in the Southern cities.

1. Introduction

Social mobility is one of the primary indicators of socio-economic openness, and the concept is widely considered as a measure of countries' ability to provide equal opportunities (OECD, 2011). Achieving upward social mobility is now in every nations' agenda. Such concerns have given rise to flourishing literature on social mobility at the interface of economics, sociology, and political science. Several studies seek to conceptualise and provide meaningful measures of social mobility. Mobility may be intragenerational within the same generation; or intergenerational, between one or more generations (Lopreato & Hazelrigg, 1970). The latter is the movement in social position across generations; the former is how a person moves up or down the social ladder during her lifetime. In both cases, the research indicates the family background and parental financial resources as the main drivers of success and status attainment (Corak, 2013).

This paper focuses on intergenerational social mobility in Italy and investigates the role played by the cities where offspring grew up and went to university. The aim is to determine whether the resources provided by cities, in terms of economic conditions, education, social values and cultural traits affect the individuals' chances to reach higher socio-economic status than their parents.

Previous studies on intergenerational mobility in Italy find that the country is characterised by lower intergenerational mobility and higher income inequality than other European countries (Breen, 2004). Similar evidence is shown when Italy is compared to the United States. Italy shows lower social mobility, even though there is a lower inequality in Italy than in the US (Checchi et al., 1999). At least two main factors are causing low intergenerational mobility in Italy. The first one refers to the centralised public education system, which is argued to reduce the incentives of low-income families to invest in human capital.[1] As a result, children of these families fail to signal their abilities in an egalitarian education system. The second factor is constituted by the strong family ties that generate a significant degree of social closure, where the family actively shapes individuals' life chances (Schizzerotto & Marzadro, 2008).

In this paper, we aim to go beyond the classic dispute on how the educational system and family structure drive the low intergenerational mobility in Italy. As mentioned earlier, we focus our attention on the role of cities in promoting upward mobility. Two recent papers have

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[1] The concept of human capital dates back to Adam Smith (1776) and refers to workers' individual capabilities conceived as a kind of capital. Education is the main contributor to human capital accumulation (Burton-Jones & Spender, 2011). Human capital is deeper described in Section 3.

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investigated the same issue for Italy. Güell et al. (2018) look at the correlation between intergenerational mobility and several socio-economic outcomes across Italian provinces. They measure mobility by using an indicator – the informational content of surnames – of how much individual surnames explain the total variance of the individual's outcomes. The second paper by Acciari et al. (2019) studies intergenerational income mobility at the national level, as well as across Italian provinces. They use relative and absolute measures of intergenerational social mobility and illustrate the geographical divide between the north and south regions of Italy.

Our work contributes to the literature in several respects. First, we extend the overlapping generations model developed by Becker and Tomes (1979, 1986) by including the urban context in the human capital accumulation function of the young individual. In this way, the model incorporates the influence of urban context in the process of human capital development. Second, we consider an alternative measure of intergenerational mobility to those employed by Acciari et al. (2019) and Güell et al. (2018) for Italy. We use the occupation as a proxy for socio-economic status, which is less volatile than one-shot measures of income and allows drawing more robust conclusions (Goldthorpe, 2013). One of the aims of this paper is to establish whether our empirical findings, based on a different measure of intergenerational mobility, are consistent with the previous ones. Third, we develop an empirical strategy based on a multilevel approach in which individuals are considered as nested in cities. Multilevel models allow one to accommodate the spatial dependency of the residuals by differentiating between-individual errors from between-city errors (Orford, 2000). If the dependence is not considered, the standard error estimates result to be biased (Snijders & Bosker, 1999).

We investigate the relationship between intergenerational mobility and cities focusing on individuals who hold a university degree. Our dataset is the Italian Graduates Employment Survey,[2] which tracks the labour market outcomes of individuals in 2011 four years after university graduation. The dataset is provided by the Italian National Institute of Statistics (ISTAT), which contains an individual-level track of Italian students' life path from high school to occupation in 2011. We merge the data with city-level information on socio-economic conditions such as human capital, social capital,[3] and inequality.

We distinguish students who attended universities in the same province where they presumably grew up from those who migrated to another province for higher education. This approach allows us to test whether spatial mobility of students affects the intergenerational movements in occupation types, and if so, it allows us to determine which characteristics of cities are positively correlated with upward mobility.

Our findings quantify a significant influence of father's occupation on the status of their children. We find that, ceteris paribus, provinces with less inequality and crime, and higher social capital and accessibility are associated with higher intergenerational mobility. Moreover, we show that students who migrated to another city to get higher education benefit from the bundle of resources and services of the university city, and this further increases their likelihood to attain a higher social position than their fathers.

The remainder of the paper is structured as follows. In Section 2, we review the literature about social mobility. Section 3 presents the theoretical background. Section 4 describes data and variables. Section 6 discusses the empirical methodology. Section 7 presents the results. The last section concludes.

[2] Inserimento Professionale dei Laureati dell'anno 2011 (Istat, 2011).

[3] Social capital is defined as the combination of social values and cultural traits that allow individuals to benefit from social networks, interaction, reciprocity and trustworthiness (Putnam, 2000; Helliwell & Putnam, 2004). Previous studies show that social capital play a role in enhancing social mobility. We further discuss this point in Section 6.

2. Social mobility: a view from the literature

Intergenerational mobility has been deeply investigated first by sociologists and then also by economists. While there is a unique definition of intergenerational social mobility common to all disciplines, some differences remain in the way it is measured. The sociological literature is mainly interested in the transition of skills and occupational status between dynasty and offspring, while economists tend to investigate the link between intergenerational mobility and inequality (Solon, 1992, 1999). Consequently, several methods and variables to assess intergenerational mobility put forth over the years. In the sociology literature, occupational status is often considered as categorical functions, based on prestige or skills required to undertake a given job (Erickson & Goldthorpe, 1992). In contrast, mobility in income profiles and income distribution over time has been the prevalent way how economists approach the phenomena (Atkinson, 1980).

In terms of methods, linear regressions (Hodge, 1981), log-linear (Atkinson et al., 1983; Björklund & Jäntti, 1997), and multinomial models (Carmichael, 2000; DiPrete, 1990) have been used to study intergenerational mobility. In these models, occupational status or income are defined as a function of previous generations' status or income along with other covariates. Some standard covariates include, but not limited to, individual and household characteristics such as gender, ethnical background, and parental attributes. A less discovered factor that is potentially significant in the transition process is the effect of locations to which individuals are exposed during their upbringing and subsequent years of higher education. More recently, there has been a growing interest to understand and determine the impact of locational attributes on several socio-economic outcomes. In this respect, research on the so-called neighbourhood effects have contributed to shed light on the relationship between the residential context and socio-economic outcomes (see, for instance, Vartanian, 1999; Leventhal & Brooks-Gunn, 2000; Ludwig et al., 2013; Sharkey & Faber, 2014). For instance, Page and Solon (2003) observe a correlation between neighbouring boys in their adult earnings. Such a correlation is explained by the size of the city in which children grew up and worked forming their own households. Raaum et al. (2007) find similar evidence for the neighbourhood effect with the peculiarity that in their analysis, the neighbourhood effect turns out to be declining on educational attainment. They interpret the declining effect by the increased public expenditure and school reform that took place in Norway in the 1960s and 1970s. For the Netherlands, Musterd et al. (2003) find that the neighbourhood effect in terms of the social environment is more substantial for households with at least a paid job. Andersson and Musterd (2010) focus on the scale of neighbourhoods, where the effect of the area composition on individual income turns out to be statistically significant at all scales, although the impact at the municipal level is the smallest. More recently, Heidrich (2017) studies intergeneration social mobility in Sweden at the regional level and finds a substantial dispersion of relative mobility across regions. Türk and Östh (2019) study equality of opportunity in Sweden analysing the effect of ethnic minority segregation, peer effect, single-parent household, and harmful land use. They find that parental neighbourhood explains 43% of inequality in education. These findings point to straightforward consequences on intergenerational social mobility.

Aydemir and Yazici (2019) look at intergenerational education mobility in Turkey. In particular, they investigate how mobility in education varies with the level of economic development across Turkish regions. They find a positive relationship between economic development and mobility. Moreover, their findings indicate that high mobility areas are characterised by a higher supply of schools and more favourable gender culture toward women (see also Teke Lloyd, 2019for more on gender culture in Turkey). In Chetty's accessible contributions (Chetty et al., 2014, 2016; Chetty & Hendren, 2018a, 2018b) on the United States, it is shown that areas with less residential segregation, higher social capital and better primary schools positively correlate with upward mobility, and children from less deprived US counties show greater chances of higher earnings in adult life.

In summary, the previous literature review provides evidence that urban context or spatial influences matter in intergenerational social mobility. Such issues mainly refer to the socio-demographic composition of the urban context; however, the economic conditions turn out to be important as well. The urban context assumes different spatial scales; walking distances in neighbourhoods where contacts are face-to-face, larger neighbourhoods, cities, metropolitan areas, counties or regions. In the following theoretical section, we consider a set of comprehensive variables representing the urban context. In the empirical application (from Section 4 onward), the urban context is considered in its different aspects, i.e. economic conditions, human capital, social capital, and the so-called spatial variables (distance between the university and the parental residence, city size, accessibility).

3. The theoretical background

The theoretical background relies on the model developed by Becker and Tomes (1979, 1986), and used as a benchmark several papers on intergenerational occupational mobility (Emran & Shilpi, 2011; Long & Ferrie, 2007). It is an overlapping generations model in which all individuals live for two periods. In the present paper, the model is extended by including the urban context in the human capital accumulation function of the young individual. The idea is that urban factors matter in the human capital development process.

Let family i contains one parent in generation $t-1$ and one child in generation t. The child's lifetime outcome, denoted by y_{it}, is determined by the amount of human capital, denoted by h_{it}, which has a rate of return of ρ. Formally,

$$\ln y_{it} = \mu + \rho h_{it} \tag{1}$$

The parent makes an investment of I_{it-1} in the human capital of the child, which is given by

$$h_{it} = \theta \ln I_{it-1} + e_{it} + u_{it} \tag{2}$$

where e_{it} is a human capital endowment that does not depend on parental investments and it is inherited from the previous generation[4]; u_{it} represents the urban context, i.e. all factors specific to a city that are expected to affect the accumulation process of human capital.

The parent must allocate his earnings, y_{it-1}, between the parent's own consumption, c_{it-1}, and the investment I_{it-1} in the child's human capital. The parent's optimal choice is such that he maximises a Cobb-Douglas utility function subject to the budget constraint. Formally:

$$max\,[(1-\alpha)\,ln\,c_{it-1} + a \ln y_{it}] \tag{3}$$

s.t. $y_{it-1} = c_{it-1} + I_{it-1}$where $0 < a < 1$ represents the degree of parental altruism.

The first order condition is:

$$I_{it-1} = \left[\frac{a\rho\theta}{1-a(1-\rho\theta)}\right] y_{it-1} \tag{4}$$

The amount of investment in the child's human capital will be higher if the parent has a higher income; the parent is more altruistic; the return to human capital is higher.

Once the optimal amount of investment in the child's human capital is determined, the child's lifetime earnings are given by

$$\ln y_{it} = \mu^* + \rho\theta ln y_{it-1} + \rho e_{it} + \rho c_{it} \tag{5}$$

where $\mu^* = \mu + \rho\theta ln\frac{a\rho\theta}{1-a(1-\rho\theta)}$.

It is worth mentioning at least two issues about the model. First, notice that h_{it} in (2) is expressed in additive form, hence it represents a very simple case in which urban factors have an impact on human capital and are independent on the parental investment, I_{it-1}, and the human capital endowment, e_{it}. However, some of these variables could be interrelated. For example, consider the case of two areas, one which is rich and culturally vibrant, offering a wide variety of goods and services, while the other area is poorer. The amount the parent decides to invest in the child's human capital could be lower in the richer area than in the poorer, since the child enjoys a stimulating environment with on average high-quality schools. Vice versa, the parent living in the poorer area could decide to invest more in the child's education to compensate for the modest environment in which the child grows. The second issue concerns the choice of the father that could concern not only the investment in the child's human capital but also the place to live in. In such a case, the urban context would be endogenously determined by the model. The development of these two points is beyond the aim of the present paper, and they are left for future research.

4. Data and variables

We use data from the Italian Graduates Employment Survey, which is conducted every four years by the Italian National Institute of Statistics (ISTAT). We consider the 2011 survey since it provides information on the residential location of students and the location of university attended at the provincial level (NUTS 3), while the following two editions of the survey provide this type of information only at the regional level (NUTS 2). Moreover, Italy is characterised by low intergenerational social mobility (diPrete, 1990). Güell et al. (2018) and Acciari et al. (2019) document the same trend in 2008 and 2012, respectively. Therefore, we do not expect dramatic changes from 2011 to present and argue for the validity of the findings beyond the population we examine.

In Italy, there were 107 provinces in the period of the analysis with an average population size of about 557,189 inhabitants. The twenty regions are large administrative areas, each including about five provinces and with an average population size of almost 3 million inhabitants.

The reference year of the survey is 2011, and it contains the data on the professional life-path of students who graduated from a university in 2007. The dataset provides information on the type of the occupation individuals hold in 2011 and the occupation of their fathers (during active years in the labour market), as well as information on university performance of university graduates (grades, attendance at university), their labour market performance (working before graduation, type of contract, type of occupation, unemployment periods), and demographic characteristics (sex, age, nationality, province of residence).

Our dependent variable is the socio-economic status of offspring, constructed as four discrete occupational categories from 37 two-digit occupation codes from the dataset. Occupations are ranked according to the median income paid by each occupation in the generation of children, as in Checchi et al. (1999). There are 37 occupational groups (two-digit occupation codes) available in the dataset. Also, respondents report their incomes after taxes. We first exclude part-time workers, seasonal workers and those who are unemployed. Then by a multilevel regression model, we estimate an earnings function,[5] and rank occupations based on the median predicted income. Finally, we obtain four occupational categories used in the analysis.

Table 1 describes the explanatory variables used in the empirical analysis. The variables are grouped into six categories. The first group includes individual and household variables and are at the individual level. Variables of other groups - spatial, economical, human and social capital - characterise the socio-economic profile of Italian urban areas

[4] e_{it} follows an AR(1) process, $e_{it} = \delta + \lambda e_{it-1} + v_t$, where e_{it-1} is the father's endowment; v_t is interpreted as the child's market luck and it is assumed to be independent of y_{t-1} and e_t.

[5] The model includes gender, age, age squared, the subject of completed degree at the fixed part and parental provinces in the random component.

Table 1
Variables and summary statistics.

Variable name	Definition	Mean	Std. Dev.
Dependent variable			
Son's occupation	Ordinal variable ranging from 1 to 4	2.1240	1.9429
Individual and household variables			
Gender	Dummy variable = 1 if woman; 0 otherwise	0.5535	0.4971
Age	Ordinal variable indicating the age of respondents under four categories: 1 = 21–22; 2 = 23–24 3 = 25–29 4 = 30-more	2.7036	0.8855
Foreign	Dummy variable = 1 if foreign-born; 0 otherwise	0.0127	0.1766
Married	Dummy variable = 1 if married; 0 otherwise	0.0322	0.4632
Final grade	Discrete variable ranging from 1 to 5. 1 = 66–90 2 = 90–100 3 = 101–105 4 = 106–110 5 = 110 with distinction.	3.2682	1.3220
Father's occupation	Ordinal variable ranging from 1 to 4	2.1266	1.0391
Spatial variables			
Distance	Euclidean distance between parents' house and university	78.9057	153.7303
Small Town	Dummy variable = 1 if student commuted more than 30 min between home and university; 0 otherwise	0.1802	0.3844
Accessibility	Multi-modal indicator of accessibility by train, air and car. Year: 2007.	−3.02e-11	1
Economic variables			
Gini	Inequality index per province Years 2004 and 2007. Source: https://sites.google.com/site/sauromocetti/open-data	0.3956	0.0249
Social capital variables			
Social Capital	Share of Individuals working in social cooperations. Year: 2004 and 2007 Source: ISTAT	4.2604	1.370
Crime	Crimes reported by the police forces to the judicial authority (per 100,000 inhabitants) by province Year: 2004; 2007. Source: ISTAT	1.1387	1.0978
Home ownership rate	Percentage of homes that are owned by their occupants by province. Years 2004; 2007. Source: ISTAT, 1991,2001	1.4346	1.9256
Human capital variable			
Tertiary education	Share of individuals over the total population holding at least a bachelor's degree by province. Source: ISTAT Year: 2004; 2007.	0.0593	0.0212

and are at the provincial level. We acknowledge that these variables approximately measure the urban factors available at the city level. However, the figures at the provincial level are average values of the characteristics of the municipalities located in a given province, and the measures are weighted by the municipality's population size over the entire province's population. Since the university is always located in densely populated capital of the province, the extent of the approximation is minimized, and the data measured at the provincial level are a downward measure of the quantities observed in the province's capital. If the individual does not live in the province's capital, the use of the variables at the provincial level is more likely to measure upward values of urban factors to which the individual is exposed. As we explain below, we are able to distinguish students living in the province's capital from those who live in smaller urban areas (commuters).

Some of the variables in the model deserve further explanation. Graduation marks measure academic performance. The final grade is measured by a discrete variable ranging from 1 (mark between 66 and 90) to 5 (110 with distinction). The variable *small town* is a dummy variable equal to 1 if the student commutes more than 45 min to reach the university, and it is equal to 0 otherwise. When *small town* is equal to 1, we assume that the individual lives in a smaller urban area than the province's capital. We expect that the size of the urban area matters on intergenerational social mobility.

The homeownership rate is a measure of social stability (Östh et al., 2018); The 'negative' social capital is measured by the number of crimes per 100,000 inhabitants (Biagi et al., 2011).

Overall, we consider 20,945 respondents belonging to the four occupational classes described above. From the original sample, we excluded all individuals not belonging to the labour force or whose occupation was unknown.

Table 2 shows the raw data in the form of a 4 × 4 matrix, with fathers' occupations across the columns and offspring's occupation down the rows, similarly to Long and Ferrie (2007). This table provides information for a preliminary analysis comparing the main-diagonal values with off-diagonal values. It turns out that around 68% of individuals are employed in occupations different from those of their fathers. Moreover, looking at the values below the main diagonal, 35% of offspring have a higher occupational status than their fathers.

Among offspring, we distinguish students who migrated to another city to attend university from those who studied in the same city where the parents lived. We define a student migrated rather than commuted from the parents' house if the Euclidean distance between parents' house and the university is above 100 km. Considering two different sub-samples with students who migrated and people who did not allows determining if the effect of factors influencing social mobility changes across the two targeted populations. In particular, we aim to determine whether the environment and opportunities offered by the university city to out-of-town students play a significant role in their upward mobility. The data survey contains around 38% of offspring migrated to another city to study. We address two selection concerns: the parent's socio-economic status or the educational attainment of children could guide the selection of students moving to another province to attend university. However, the lack of systematic differences in percentages of people moving to another province by father's occupational category (see Table A1 in Appendix) and the lack of systematic differences in proportions of people moving to another province by grades in the high school diploma (see Table A2 in Appendix) reduce this concern.

Table 2
Intergenerational occupational mobility in Italy, the year 2011.

		Father occupation category				
		1	2	3	4	Total
Offspring Occupation Category	1	2729	2168	1358	788	7043
	2	1834	1833	1037	556	5260
	3	2461	2399	1831	863	7554
	4	331	260	214	283	1088
	Total	7355	6660	4440	2490	20,945

5. Empirical methodology

We use a two-level ordered logistic regression to evaluate the impact of the different factors mentioned above on the probability to have a better job than parents. The dependent variable, denoted by Y, is defined on J ordered occupation categories. The two-level ordered logistic regression assumes that the cumulative logits are expressed as a function of a linear combination of the covariates presented above and denoted by $\boldsymbol{x} = (x_1, \ldots, x_K)$, as follows:

$$logit\,[P(Y \geq j \mid \boldsymbol{x})] = \alpha_j + \boldsymbol{\beta}'\boldsymbol{x} + \boldsymbol{u},\, j = 2,\, \ldots, J. \quad (6)$$

where α_j is the so-called cut-point that estimates the logit of the odds of being into or above than category *j*; the vector $\boldsymbol{x}$ includes all the individual-specific characteristics and urban factors introduced in Section 4; $\boldsymbol{u}$ are the random intercept. Hence, the model has two random terms: the level 1 random term specific to each individual and the level 2 random term specific to each province. The multilevel model is specifically designed to consider variations at two levels simultaneously and it is a suitable alternative to conventional models, such as ordinary least squares that underestimate standard errors and overestimate test statistics (Snijders & Bosker, 1999).

The generic coefficient β_k associated with the explanatory variable x_k measures the marginal variation of the log-odds of falling into or above any category of Y due to a one-unit increase in x_k. A positive coefficient indicates a tendency of the occupational status to increase as the explanatory variable increases.

Model (1) is a proportional odd-model in which for each of the categories the coefficients β_k are equal while the intercepts α_j may differ. Hence, the odds-ratio of the event is independent of the category *j*, i.e. an increase in one of the explanatory variables affects the log-odds similarly (Witte & Rogge, 2013).

The output from the multilevel model can be used to compute the intraclass correlation coefficient (ICC). The ICC permits an assessment of relative variability of the response variable at the group level (Snijders & Bosker, 1999) as follows:

$$ICC = \frac{\tau_{00}}{\tau_{00} + \pi^2/3} \quad (7)$$

where τ_{00} is the variance at the group level, and $\pi^2/3$ is the variance of level-one residuals.[6] The ICC is computed by the latent variable approach (Goldstein et al., 2002) since the response variable has an underlying continuous structure. We also compute the median odds ratio (MOR), which converts the second level variance into odds ratio scale (Merlo et al., 2006). In this paper, the MOR measures the influence of provinces to the likelihood of upward mobility, that is the median values of the distributions of odds ratio between the better and worse provinces when two individuals are randomly picked from different provinces. The MOR is calculated as follows:

$$MOR = \exp(\sqrt{2}\,\tau_{00}.\ \phi^{-1}(0.75)) \quad (8)$$

where τ_{00} is variance at the group level, ϕ^{-1} denotes the inverse of the 75th centile of the standard normal cumulative distribution function. If the MOR is equal to 1, we would conclude that there are no differences between provinces in social mobility; higher values indicate strong locational differences.

6. Results

In this section, we first present the empirical results of three models run on the whole sample composed of 20,945 young individuals (Table 3). The first model specification includes an interaction term between father's occupation and gender of the child (Model I). Model II consists of an interaction term between father's occupation and a dummy variable equal to 1 if the child does not commute to attend the university. This implies that the offspring lives relatively close to the university, which is always located in the province's capital. Finally, the last model interacts the father's occupation and child's spatial mobility, i.e. dummy variable equal to 1 when the child moved to another province to attend the university (Model III). Estimations are obtained by maximum likelihood.[7]

In all the three models, the estimated coefficients associated with the father's occupational categories are statistically significant and positive, implying that the child's occupation is positively correlated with the father's occupation. The coefficient of the interaction term is

Table 3
Regression results.

	Model (I)	Model (II)	Model (III)
	Coeff. (Std. Err.)	Coeff. (Std. Err.)	Coeff. (Std. Err.)
Father's occupation 2	0.142***	0.243***	0.214***
	(0.044)	(0.070)	(0.050)
Father's occupation 3	0.340***	0.329***	0.349***
	(0.050)	(0.080)	(0.056)
Father's occupation 4	0.479***	0.278***	0.306***
	(0.062)	(0.103)	(0.074)
Female	−0.497***		
	(0.076)		
Mobile			0.174**
			(0.080)
Province's capital		0.117	
		(0.099)	
Father's occupation 2*female	0.169*		
	(0.088)		
Father's occupation 3*female	0.168*		
	(0.088)		
Father's occupation 4*female	0.108		
	(0.094)		
Father's occupation 2*mobile			−0.124
			(0.091)
Father's occupation 3*mobile			−0.262***
			(0.092)
Father's occupation 4*mobile			−0.205**
			(0.098)
Father's occupation 2*city center		−0.134	
		(0.114)	
Father's occupation 3*city center		−0.275**	
		(0.114)	
Father's occupation 4*city center		−0.173	
		(0.121)	
Cut1	−1.166***	−0.521***	−0.300***
	(0.084)	(0.052)	(0.090)
Cut2	−0.107	0.531***	0.751***
	(0.083)	(0.052)	(0.090)
Cut3	2.477***	3.109***	3.329***
	(0.088)	(0.060)	(0.095)
Variance (province level)	0.050	0.050	0.050
	(0.007)	(0.07)	(0.007)
Observations	20,945	20,945	20,945
Log likelihood	−25,609.759	−25,706.687	−25,706.757
Pseudo r2	0.096	0.095	0.098
Number of groups	110	110	110
Chibar2(01)	319.05	127.64	127.42
Prob > chibar2	0.000	0.000	0.000

Model specification with an interaction term between: father's occupation and child's gender (Model I); father's occupation and child's spatial mobility to get higher education (Model II); father's occupation and child's residence in the province's capital (Model III).
* Significance at the 0.10 level (** at 0.05, *** at 0.01).

statistically significant for all the three models, with a positive sign in Model I and a negative sign in Model II and Model III. Hence, the positive correlation between fathers' and daughters' is higher than between fathers' and sons', while it is lower for children living in the province's capital and for children moving to another city to attend the university.

Given the effect of living in the province's capital (Model II) and the impact of exposure to an additional city (Model III), we further investigate the role of cities considering specific factors characterizing urban areas.

Table 4 shows the results for a model including variables at the provincial level described in Section 4. The model is run for the whole sample of 20,945 young individuals (Model IV) and two subsamples.

The first subsample includes 12,956 students who did not migrate to another province to attend university (Model V); the second subsample is composed of 8053 graduated students who migrated (Model VI). Covariates at the city level in Model VI are specified for both origin and

[6] The standard logistic distribution has mean 0 and variance $\pi^2/3$.
[7] We used Stata gllamm command.

Table 4
Estimation results of model (1).

	Whole population		Students not migrating to attend the university		Students migrating to attend the university	
	Null model (IV)	Model (IV)	Null model (V)	Model (V)	Null Model (VI)	Model (VI)
	Coeff. (Std. Err.)	Coeff. (Std. Err.)	Coeff. (Std. Err.)	Coeff. (Std. Err.)	Coeff. (Std. Err.)	Coeff. (Std. Err.)
Individual and household variables						
Gender		−0.465***		−0.426***		−0.545***
		(0.027)		(0.034)		(0.045)
Age 23–24		−0.339***		−0.273***		−0.478***
		(0.047)		(0.059)		(0.080)
Age 25–29		−0.190**		−0.097*		−0.383***
		(0.045)		(0.056)		(0.077)
Age 30-more		0.339***		0.397***		0.261***
		(0.052)		(0.065)		(0.087)
Foreign		−0.066		−0.090		0.149
		(0.111)		(0.129)		(0.228)
Married		0.028***		0.035***		0.031
		(0.015)		(0.018)		(0.024)
Graduation mark 91–100		0.250***		0.265***		0.225***
		(0.057)		(0.064)		(0.072)
Graduation mark 101–105		0.451***		0.411***		0.537***
		(0.051)		(0.068)		(0.080)
Graduation mark 106–110		0.709***		0.740***		0.676***
		(0.050)		(0.066)		(0.077)
Graduation mark 110 with distinction		0.712***		0.708***		0.747***
		(0.050)		(0.066)		(0.080)
Father's occupation 2	0.132***	0.135***	0.077*	0.078**	0.213***	0.226***
	(0.031)	(0.031)	(0.039)	(0.040)	(0.051)	(0.051)
Father's occupation 3	0.298***	0.288***	0.265***	0.265***	0.345***	0.336***
	(0.035)	(0.035)	(0.044)	(0.045)	(0.057)	(0.058)
Father's occupation 4	0.389***	0.401***	0.419***	0.425***	0.276***	0.357***
	(0.044)	(0.044)	(0.054)	(0.054)	(0.075)	(0.076)
Spatial variables						
Ln(distance)		0.035***				
		(0.007)				
Small Town		−0.078		−0.106*		0.053
		(0.034)		(0.056)		(0.047)
Accessibility_Home		0.015		−0.023		−0.001
		(0.042)		(0.044)		(0.035)
Accessibility_Univ						0.358*
						(0.186)
Economic variables						
Gini_Home		−4.931**		−4.677***		−3.843*
		(1.336)		(1.426)		(2.009)
Gini_Univ						−5.045***
						(1.847)
Social capital variables						
Social capital_Home		0.045**		0.036*		0.054*
		(0.020)		(0.022)		(0.303)
Social capital_Univ						0.967**
						(0.464)
Crime_Home		−0.094***		−0.083***		−0.036*
		(0.023)		(0.024)		(0.030)
Crime_Univ						−0.124***
						(0.031)
Homeowner_Home		0.174		0.300		0.065
		(0.168)		(0.184)		(0.216)
Homeowner_Univ						0.243
						(0.653)
Human capital variable						
Tertiary education_Home		1.646		2.172*		0.230
		(1.059)		(1.159)		(1.441)
Tertiary education_Univ						−0.529
						(1.423)
Cut1	−0.519***	−2.323	−0.535***	−2.011***	−0.520***	−4.201***
	(0.035)	(0.524)	(0.039)	(0.553)	(0.051)	(1.030)
Cut2	0.532***	−1.232*	0.515***	−0.927*	0.591***	−3.090***
	(0.035)	(0.524)	(0.039)	(0.553)	(0.081)	(1.030)
Cut3	3.110***	1.407***	2.960***	1.571***	3.530***	−0.164
	(0.045)	(0.524)	(0.051)	(0.553)	(0.097)	(1.030)
Variance (Province level)	0.063	0.037	0.057	0.028	0.397	0.059
	(0.012)	(0.008)	(0.014)	(0.010)	(0.080)	(1.030)
Observations	20,945	20,945	12,956	12,956	8053	8053
Log likelihood	−25,713.036	−25,208.8	−16,089.43	−15,809.771	−9488.775	−9163.5843

(*continued on next page*)

Table 4 (*continued*)

	Whole population		Students not migrating to attend the university		Students migrating to attend the university	
	Null model (IV)	Model (IV)	Null model (V)	Model (V)	Null Model (VI)	Model (VI)
	Coeff. (Std. Err.)	Coeff. (Std. Err.)	Coeff. (Std. Err.)	Coeff. (Std. Err.)	Coeff. (Std. Err.)	Coeff. (Std. Err.)
Pseudo R2		0.1801		0.1692		0.2403
Number of groups	110	110	110	110	100	100
Chibar2(01)		61.89		70.44		46.16
Prob > Chibar2		0.000		0.000		0.000
MOR	1.270	1.201	1.255	1.173	1.824	1.260
ICC	0.019	0.011	0.017	0.008	0.107	0.018

Note: ***1%; **5%; *10%; Pseudo-R^2 is based on McKelvey and Zavoina (1975). MOR ranges from 1 to infinity; ICC ranges from 0 to 1. In Model VI, urban factors are specified both at the origin (the year 2004, before migrating to attend university) and at the destination (the year 2007, year of graduation).

destination locations, i.e. province of origin and province where the university is located. In this way, we are able to determine whether the higher mobility of offspring (who moved to a different city) is also due to the urban context of the city where the university is located. Consistently with our theoretical model, we expect that the human capital accumulation process is affected not only by higher education but also by the urban context. We compare each of these models with the corresponding null model that includes the constant term, father's occupation and the intercept random term.

While adding variables to the baseline null model, the variance of random effects decreases on average by almost a half for Model IV and Model V and by nearly three-quarters for Model VI, meaning that the additional explanatory variables explain a relevant portion of the variability in the dependent variable. This is also confirmed by the figures for ICC that are lower for the specification of Models I, II and III, including personal characteristics and urban factors. The ICC can be interpreted as a measure of the improvement of the model's overall fit due to city-level variables. The MOR can be interpreted as the increased (median) odds of upward mobility in an individual's status as they move to a more mobile province. Table 3 shows that MOR varies between 1.173 and 1.824, suggesting that the likelihood of upward mobility is significantly different across Italian cities.

As regards to individual and household characteristics, the signs of estimated coefficients are in line with findings of previous studies focusing on Italy. Upward mobility is less likely for women than men. The fact that women are under-represented among top leadership positions has been extensively discussed in the literature (for Italy, see Profeta et al., 2014 and Ferrari et al., 2018). Students who graduated after 22 years old reduces the probability of upward mobility. The effect of age becomes positive for students graduating at 30 or later. This might be related to the fact that the choice of getting a degree after a specific career allows them to get a job promotion. The positive effect of marriage on upward mobility may be explained by the prevalence of homogamy couples that characterise contemporary Italy (Lucchini et al., 2007; Schizzerotto & Marzadro, 2008). Academic performance of students has a positive effect on upward mobility. Moreover, we find that the higher the graduation mark, the lower the delay to find the first job after graduation, the higher the chance of upward mobility.

As mentioned earlier, the upward mobility of offspring significantly depends on the father's occupational position. In particular, the offspring of fathers with the highest status are more likely to reach the highest status themselves. To deeply assess the intergenerational occupational mobility, we derived the predicted probabilities associated with father's occupation categories for the whole sample of students and the two sub-samples. It turns out that children of fathers at the highest occupational position are 1.47 times more likely to reach the highest occupational category than children of fathers at the lowest occupational position. This effect is stronger for students who migrated to attend university. Our results on the impact of father's occupation are consistent with previous research on intergenerational mobility in Italy. For example, Di Pietro and Urwin (2003) find that the sons of fathers at the top of the income distribution are 2.32 times more likely to reach the same status compared to those with father at the bottom of the income distribution.

Turning on variables characterizing provinces, the coefficients associated with them are statistically significant and have the expected sign.

In model IV, the estimated coefficient associated with distance (in logarithm) reflects the positive effect on upward mobility of long-distance, south-to-north flows to get higher education. This is probably one of the few examples where distance acts as a spatial connectivity factor rather than a cost or separating element. As students (from southern regions) migrate to northern cities, the probability that they reach to top occupations increases. The finding is in line with Page and Solon (2003), where they show that immobility (defined as remaining in the parental residence) causes stickiness in adulthood outcomes.

The coefficient associated with the variable *small city* is negative and statistically significant for all models, implying that living in a small town decreases the probability to get a higher occupation class than father. The result is in line with the literature, which indicates that city size matters in shaping socio-economic patterns (Hochbaum et al., 1955). Smaller cities provide fewer opportunities and more time is spent in commuting to school or university. Similarly, accessibility is positive and statistically significant for destination cities (Model VI). Higher accessibility may be associated with a more developed labour market and job opportunities, the two factors that rise the chances of finding skill matching jobs. Moreover, more accessible areas increase the chances of engaging in educational, cultural and sports activities, which generate positive outcomes, especially, for children.

The coefficient associated with the Gini index is negative and statistically significant for all models (IV, V, VI) confirming the existence of a "Great Gatsby Curve". The curve represents a negative relationship between income inequality and intergenerational mobility. The "Great Gatsby Curve" indicates that higher inequality is associated with lower intergenerational social mobility (Björklund & Jäntti, 2009; Corak, 2013). It is worth noting that the original curve refers to several countries around the world and that we find the same type of relationship for Italian cities (see also Acciari et al., 2019).

As regards to the variables measuring social capital, we find that crime is negatively correlated with upward mobility, while a greater share of employees in social cooperatives (social capital) is positively correlated with upward mobility. Social capital is a proxy for social networks, connectivity and community engagement. It indicates how social relations are shaped and measures the strength of them (Putnam, 1995).

Home ownership is positively correlated to upward mobility. Several studies show that home ownership is related to a set of positive individual and societal outcomes that can be viewed as the causal channels through which social capital affects upward mobility. Homeowners are more likely to participate to non-governmental

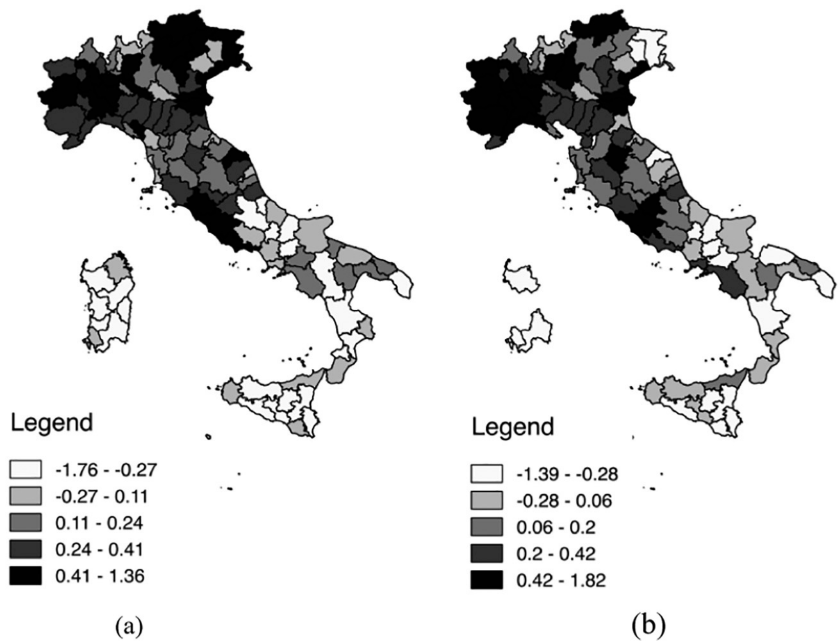

Fig. 1. Map of the contribution of urban factors specific to each province to upward mobility.
The contribution of urban factors to upward mobility by province is calculated as the difference between the estimated intercept terms at the provincial level: one from a specification with all the explanatory variables except urban factors and other is a specification that includes also the urban factors considered in our analysis. This deviation is calculated for the whole sample (panel *a*) and for students migrating to another city to attend the university (panel *b*).

organisations and political activities. More generally, they show a higher commitment to their cities (Blum & Kingston, 1984). They also tend to interact more with their neighbours (Rohe et al., 2013), and their show greater cognitive abilities and success (Haurin et al., 2002).

Fig. 1 shows the contribution of urban factors in explaining the variability of the dependent variable of Model (1). It corresponds to the difference between the estimated intercept terms at the provincial level from two models. The first model is a specification where all explanatory variables except urban factors are present and the second is a specification that includes also the urban factors considered in our analysis. This deviation is calculated for the whole sample (panel *a*) and for students who migrated to another city to attend the university (panel *b*). Darker colours tend to be concentrated in the Northern provinces and indicate a positive correlation between the urban factors specific to each province and upward mobility. White colours indicate a negative correlation between the urban characteristics and upward mobility. This means that darker colours point to provinces where the socio-economic composition is so favourable that it compensates for the negative factors, namely inequality and "bad" social capital as crime. Vice versa, negative values of the estimated deviation of the intercept term indicate that negative factors are not compensated sufficiently by positive urban factors. The rank-correlation between the two maps in Fig. 1 is 0.974 implying that the role of a specific city is similar for the whole sample population and for migrating students.

6.1. Sensitivity analyses

To check the robustness of our results, we run two alternative models. In the first model, intergenerational social mobility is defined as the difference between the occupational ranking of father and the occupational ranking of offspring, as follows:

$$Social\ Mobility = y_{it} - y_{it-1} \qquad (9)$$

where y_{it} and y_{it-1} are the occupational rankings of offspring and fathers, respectively. This equation produces discrete values ranging from -3 to $+3$. A negative value 0 indicates intergenerational downward mobility, a positive value implies intergenerational upward mobility. A value equal to 0 represents the case of intergenerational immobility. This measure of social mobility enters in a multilevel model as dependent variable, and the explanatory variables are those used for Models IV-VI. Table A3 in Appendix shows the results for the whole population[8] that are consistent with the results obtained with the ordered probit model (Eq. (6)), both in terms of estimated coefficients and ICC.

For the second model, we follow Checchi et al. (1999) and aggregate the four occupational categories in two groups. The first group includes the highest occupational categories 3 and 4. Then we define a dummy variable equal to 1 if the son is in the first group. We do the same for the father. We consider a multilevel logit model to estimate the probability that the son falls into an occupation category ranked 3 or 4. Then we estimate a multilevel logit model of the probability that the son is in the highest of these two groups. The explanatory variables are those specified in Models IV to VI, with the exception of father's occupation for which we use the dummy variable introduced above. Also, the outputs of this model are consistent with those described in the previous section both for the significance of coefficients and their sign. Differently from Models IV to VI, the share of highly educated people in a province shows a significant correlation with the likelihood of attaining higher occupational classes. Using a similar framework, Checchi et al. (1999) estimate 0.37 increase in log odds of the likelihood of offspring to be in the two highest income ranks as a response to a unit increase in father's income rank in Italy and 0.22 in the US. We find slightly higher mobility (0.29) as we focus only on university graduates.

7. Conclusions

In this paper, we examine the intergenerational occupational mobility in Italy using relatively recent data from ISTAT. In addition to several individual and household variables typically used in the study of intergenerational mobility, we include a set of variables at the city-level, which are expected to have had an influence on young individuals during upbringing and higher education. The empirical analysis confirms previous findings of the literature as regards the role of individual characteristics and parental background. It also allows determining the effect of cities on upward mobility. In particular, low inequality, higher social capital, low crime, and higher accessibility positively contribute to reaching higher occupational positions. The effect of such variables is magnified for children migrated to another city to attend higher

[8] Results for the two sub-samples -students migrating and not migrating to attend the university – are available upon request.

education. Indeed, children moved to cities endowed, on average, with more resources and services. This result offers an argument in favour of policies promoting a more even availability of urban resources and services across cities in order to equalise opportunities and life-chances. In this perspective, our study has a wide range of applications, from simulating the effects of changes in economic conditions to the analysis of persistent poverty and stratification especially in cities located in the southern regions of Italy.

CRediT authorship contribution statement

Alessandra Michelangeli and Umut Türk conceived of the presented idea. Both authors developed the theory and performed the estimations. They verified the data, discussed the results and contributed to the final manuscript. Both authors contributed equally to this manuscript.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A

Table A1
Distribution of students who migrated to attend university by father's occupation category.

	Father's occupation category					
		1	2	3	4	Total
Spatial mobility	0	4652 (63.25%)	3971 (59.62%)	2697 (60.74%)	1636 (65.70%)	12,956 (61.86%)
	1	2703 (36.75%)	2689 (40.38%)	1743 (39.26%)	854(34.30%)	7989 (38.14%)
	Total	7355 (100%)	6660 (100%)	4440 (100%)	2490 (100%)	20,945 (100%)

Note: Spatial mobility = 0 if the child studied in a university located within an Euclidean distance of 100 km from parents' house; spatial mobility = 1 otherwise.

Table A2
Distribution of student who migrated to attend university by secondary school graduation marks.

	Secondary school graduation marks			
		< 90	90–100	Total
Spatial mobility	0	8741 (60.60%)	4215 (64.63%)	12,956 (61.86%)
	1	5682 (39.40%)	2307 (35.37%)	7989 (38.14%)
	Total	14,423 (100%)	6522 (100%)	20,945 (100%)

Note: Spatial mobility = 0 if the child studied in a university located within a Euclidean distance of 100 km from parents' house; spatial mobility = 1 otherwise.

Table A3
Regression results for sensitivity analysis.

	Whole population	
	Model (A.I)	Model (A.II)
	Coeff. (Std. Err.)	Coeff. (Std. Err.)
Individual and household variables		
Gender	−0.229*** (0.013)	−0.332*** (0.030)
Age 23–24	−0.157*** (0.023)	−0.451*** (0.053)
Age 25–29	−0.075*** (0.022)	−0.374*** (0.050)
Age 30-more	0.178*** (0.026)	0.248*** (0.057)
Foreign	−0.030 (0.053)	0.006 (0.122)
Married	0.015** (0.007)	0.055*** (0.016)
Graduation mark 91–100	0.128*** (0.024)	0.344*** (0.058)

(*continued on next page*)

Table A3 (*continued*)

	Whole population	
	Model (A.I)	Model (A.II)
	Coeff. (Std. Err.)	Coeff. (Std. Err.)
Graduation mark 101–105	0.229***	0.627***
	(0.025)	(0.061)
Graduation mark 106–110	0.352***	0.911***
	(0.025)	(0.059)
Graduation mark 110 with distinction	0.362***	0.868***
	(0.025)	(0.060)
Father's occupation		0.290***
		(0.031)
Spatial variables		
Small town	−0.040**	−0.034
	(0.017)	(0.039)
Ln(distance)	0.019***	0.022***
	(0.003)	(0.007)
Accessibility_Home	0.010	−0.033
	(0.021)	(0.045)
Economic variables		
Gini_Home	−2.233***	−6.587***
	(0.646)	(1.410)
Social capital variables		
Social capital_Home	0.021**	0.039*
	(0.010)	(0.020)
Crime_Home	−0.043***	−0.086***
	(0.011)	(0.024)
Homeowner_Home	0.085	0.214
	(0.081)	(0.178)
Human capital variable		
Tertiary education_Home	0.803	2.023*
	(0.514)	(1.115)
Constant	1.822***	1.667***
	(0.254)	(0.551)
Variance (Residual)	0.830	
	(0.008)	
Variance (Province level)	0.008	0.036
	(0.002)	(0.009)
Observations	20,945	20,945
Log likelihood	−27,823.975	−13,608.288
Pseudo R2	0.6184	0.4295
Number of groups	110	110
Prob > Chibar2	0.0000	0.000

Intergenerational social mobility estimates. Model A.I is a linear multilevel model, where dependent variables is the difference between the occupational ranking of offspring and fathers. Model A.II is a Multilevel Logit model, where the dependent variable takes a value 1 if offspring's occupational ranking is 3 or 4.

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