

ANNALI
DEL DIPARTIMENTO
DI METODI
E MODELLI
PER L'ECONOMIA
IL TERRITORIO
E LA FINANZA

2024

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ANNALI DEL DIPARTIMENTO DI METODI
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2024

INDEX

1. Preface 7
Immacolata Oliva, Venere Stefania Sanna

Research Papers

2. Dynamic optimal asset allocation in a multivariate setting 13
Sara Iannilli
3. CDO su misura: la nuova era delle cartolarizzazioni 27
Maria Giuseppina Bruno, Maria Rita Scarpitti, Luca Semerari
4. Location models of electric charging stations in the city of Rome 37
Marisa Cenci, Massimiliano Corradini, Francesca Luciani
5. “Mobilità richiama mobilità”? Uno studio empirico sulle intenzioni di espatrio degli studenti dell’Università di Udine 63
Gian Pietro Zaccomer, Laura Pagani
6. Educationally heterogamous unions and country level inequalities in Europe before and after 1990 81
Alessandra Trimarchi
7. Settlement in the reclaimed Pontine Marshes during Fascism in Italy: evidence from an unexplored archive 103
Alessandra De Rose, Filomena Racioppi, Elisabetta Barbi
8. Tra dominio e affetto. Cani di razza e umani nelle aree cani 117
Marco Nocente
9. Translating employment contracts: insights from corpus linguistics 131
Vanessa Leonardi, Patrizia Giampieri

Critical Reviews

10. Bridging theoretical advancements and empirical practices in environmental justice research: towards a mixed-methods approach 155
Giorgia Scognamiglio
11. The ecosystem services analytical framework in Italy. A human geography prospect 179
Valentina Capocefalo, Flaminia Leuti
12. Mobility and innovation: a critical review 191
Francesco Castellano

Book Reviews

- | | |
|--|-----|
| 13. Francesca Sabatini, <i>Geografia delle aree interne</i> , Guerini Scientifica, 2024, pp. 320
<i>Annalisa Spalazzi</i> | 207 |
| 14. Giorgia Bressan (a cura di), <i>Conoscere i Castelli Romani. Risorse, attori e prospettive</i> , Bologna, P'atron, 2024, pp. 164
<i>Roberta Gemmiti</i> | 211 |



PREFACE

We are delighted to introduce the 2024 edition of *Annali MEMOTEF*, the multidisciplinary journal published by the Department of Methods and Models for Economics, Territory and Finance at Sapienza University of Rome.

Annali MEMOTEF is a peer-reviewed journal that compiles original studies across the department's disciplines, which include demography, economic geography, languages, mathematics, statistics, and economic history, as well as the broader field of applied and behavioural sciences. The 2024 edition continues to look to an international audience, fostering scientific, cultural, and multidisciplinary debate.

This year, *Annali MEMOTEF* has introduced a new section entitled Critical Reviews. This aims to showcase and disseminate works, mainly – but not exclusively – by young scholars and/or PhD students in the journal's research areas, offering a platform to discuss and present cutting-edge research, and includes comprehensive literature reviews, innovative approaches, methodologies, and data sources.

Annali MEMOTEF is now organized into the following sections: Research Papers, featuring innovative theoretical and empirical manuscripts; Notes and Discussions, serving as a forum for current research thought; Critical Reviews, providing detailed commentaries and evaluations of current research; and Book Reviews, highlighting new and significant volumes.

For each section in this printed volume, the order of the contributions follows the chronological order of publication on the journal's website. This volume's first research paper, *Dynamic optimal asset allocation in a multivariate setting*, by Sara Iannilli, investigates a multivariate portfolio choice problem when the market exhibits discontinuities to describe market shocks. The goal is to maximize returns while controlling the risk associated with the specific investment type, and the theoretical results are tested against real data.

The second research paper, *CDO su misura: la nuova era delle cartolarizzazioni*, by Maria Giuseppina Bruno, Maria Rita Scarpitti, and Luca Semerari, offers an overview of Collateralized Debt Obligations (CDOs) and Bespoke Tranche Opportunities (BTOs), discussing the role played by these financial products in the 2008 global financial crisis.

Our third research paper, *Location models of electric charging stations in the city of Rome* by Marisa Cenci, Massimiliano Corradini, and Francesca Luciani, uses quantitative methods to address the problem of locating electric vehicle charging stations in Rome. The methodology employed refers to operations research and exploits a p-median model for waiting time distribution and queuing theory, to measure the impact of the placement of new charging points.

The fourth paper to be published is “*Mobilità richiama mobilità*”? *Uno studio empirico sulle intenzioni di espatrio degli studenti dell’Università di Udine* by Gian Pietro Zaccomer and Laura Pagani. This manuscript analyses the emigration intentions of Italian students attending the university who were about to complete a bachelor’s degree, investigating factors contributing to their decisions to seek opportunities abroad, with a specific focus on the University of Udine, in Italy.

This is followed by our fifth research paper, *Educationally heterogamous unions and country level inequalities in Europe before and after 1990* by Alessandra Trimarchi, which analyses the association between the educational gradient in heterogamous union formation and country level indicators of socioeconomic inequalities before and after 1990 in fifteen European countries.

After this we present our sixth paper, *Settlement in the reclaimed Pontine Marshes during fascism in Italy: evidence from an unexplored archive* by Alessandra De Rose, Filomena Racioppi, and Elisabetta Barbi, which uses a previously unexploited dataset about allocated portions of land reclaimed from the marshes, to analyse the colonists who settled in southern Lazio during the Integral Land Reclamation carried out by the fascist regime in the 1930s.

The penultimate paper, *Tra dominio e affetto. Cani di razza e umani nelle aree cani* by Marco Nocente, contributes to current research on animal geographies by exploring the intricate relationship of dominance and affection between humans and purebred dogs.

Our final contribution, *Translating employment contracts: insights from corpus linguistics* by Vanessa Leonardi and Patrizia Giampieri, explains how corpus-based studies can be applied to the field of specialized legal translation. In particular, the article proposes an ad-hoc monolingual corpus of employment contracts, and the authors carry out a case-study regarding the translation of employment contracts from Italian into English.

This year we have not published any Notes and Discussions, meanwhile for the new Critical Reviews section, the first contribution *Bridging theoretical advancements and empirical practices in environmental justice research: towards a mixed-methods approach* by Giorgia Scognamiglio, explores the evolution of environmental justice research, highlighting the transition from a primary focus on the distribution of environmental “goods” and “bads” to a multidimensional approach that includes recognition, participation, and socio-historical analysis.

The second critical review, *The ecosystem services analytical framework in Italy. A human geography prospect* by Valentina Capocefalo and Flaminia Leuti, examines the ecosystem services (ES) analytical framework from a human geography perspective, with an in-depth discussion about the development of the ES paradigm within international and Italian scientific discourse.

The third and final contribution, *Mobility and innovation: a critical review*, by Francesco Castellano, critically examines key findings in the area of inventors’ mobility, and its rela-

tionship with regional innovative activity.

The last section of this volume contains Book Reviews of two important texts that have enjoyed great publishing success. The first review by Annalisa Spalazzi is of the manuscript *Geografia delle aree interne*, authored by Francesca Sabatini, while the second, by Roberta Gemmiti, is a critical view of the text *Conoscere i Castelli Romani. Risorse, attori e prospettive* by Giorgia Bressan.

We thank the authors of the contributions and all who responded to our call for papers. We also thank our referees for their commitment to reviewing the submitted papers. It is our hope that this issue will further stimulate interdisciplinary debate and will be an ongoing, valuable resource for the scientific community.

Finally, it is with immense sorrow that we must pay tribute to the late Dr Tommaso Fasciani, a promising researcher at MEMOTEF, much appreciated by his colleagues, who we sadly lost during the year. We wish to dedicate this volume to him. May this work be a tribute to his memory.

December 2024

Immacolata Oliva
Venere Stefania Sanna

RESEARCH PAPERS



Research paper

First published online: April 9, 2024

Sara Iannilli*

DYNAMIC OPTIMAL ASSET ALLOCATION IN A MULTIVARIATE SETTING

Abstract

This article analyzes a portfolio allocation problem to determine how resources should be allocated among several possible investments. Investors aim to maximize the profit of an investment while also considering the risks arising from infrequent events. The global financial crisis, which began with subprime mortgages in the United States, has fundamentally changed the way we invest. As we know, investors want to maximize returns while controlling the risk associated with a particular investment. This behavior must be modeled mathematically using optimal control theory and expected utility maximization. A continuous-time market is considered in a multivariate context in which there exist risky asset classes and a risk-free asset with a constant interest rate. We deviate from the traditional approach by considering co-precision, the inverse of the covariance matrix, as a measure of risk. The optimal weights obtained are proportional (inversely) to the risk measure (volatility). The model is tested on 11 asset classes used by a large company also carrying out a stress test on the jump component to analyze the allocation of the investors' portfolio in a real context.

Keywords: asset allocation, jumps, stochastic volatility, Wishart process, dynamic programming.

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1 Introduction

In recent years, the occurrence of some unprecedented events has caused prices to decline across markets. Rarely have investors had to contend with situations such as those arising from a global economy recovering from a devastating pandemic, monetary policy interventions, and the outbreak of wars in Europe.

Market turmoil weighs on the investment outlook, with implications ranging among economic growth and decline, central bank policies for interest rates, credit quality and earnings, changing investor risk-aversion levels, and other key indicators.

The discontinuous movement of asset prices generates jumps in the market causing a deviation of the stock distribution from the Gaussian one and, leading to investment opportunities. As a consequence, the mean-variance approach described by Markowitz (1952) turns out to be no longer efficient, given its static nature. Furthermore, such an approach ignores the presence of price volatility. Therefore, adopting this type of allocation model could result in potential losses. A solution widely adopted in the literature is to consider continuous-time models for price dynamics: by allowing continuous trading, the investor can immediately react to possible changes in price volatility. The randomness and unpredictability of asset prices are some of the reasons why most investors tend to rebalance their portfolios throughout the investment term.

This article analyzes a dynamic allocation problem in a real-world context. We consider a suitable market model, calibrated on real data to evaluate the impact of the jumps. Our findings indicate that jump risk tends to lead investors to adopt a more conservative allocation overall, thereby mitigating the need for dramatic adjustments in dynamic portfolio rebalancing over time.

The wealth of a risk-averse investor is allocated to both risk-free and risky assets by considering an expected constant return. Furthermore, we consider a time-varying diffusion term in the model, which allows for volatility and stochastic correlations, and a jump component driven by a Poisson process.

By analyzing the results in a multivariate context, we specify the dynamics of the inverse of the covariance matrix of risky assets, called co-precision. According to Oliva and Renò (2018), we use a Wishart mean-reverting process, to have a multivariate affine process.

The contribution to the existing literature is to assess the impact of jumps and prove the crucial role of the latter in defining the allocation of a risk-averse investor.

As in Chacko and Viceira (2005), we consider a model where the allocation is proportional to the inverse covariance but not to the risk aversion coefficient. User It seems like there is a correlation between the excess returns, which is the short-sighted part, and the covariance between returns and volatility, which is the hedging aspect. Furthermore, unlike Chacko and Viceira (2005), we model a multivariate context.

In the literature, the pioneering work of Merton (1971) can be considered a starting point for dynamic portfolio management in continuous time. The author derived optimal consumption and investment rules by maximizing the investor's expected utility in an economy including both private activity risk and risky stocks, when the asset price dynamics follow a geometric Brownian motion.

Subsequently, several authors generalized Merton's work within the incomplete market.

Framework, to name but a few, we mention Liu et al. (2003), where an investor would hold fewer risky assets when price jumps occur, Liu (2007), where a dynamic portfolio choice is solved by exploiting affine models to face stochastic volatility.

In a complete market framework, the optimal portfolio allocation can be composed of risk-free assets, stocks, and derivatives considering a stochastic volatility environment, with or without the presence of jumps, see e.g. Liu et al. (2003) and Branger (2017).

Wu (2003) demonstrates that the effects of market movements on portfolios are intrinsically linked to the moments of returns. In particular, the investor demand for a specific asset may vary due to market disruptions. Therefore, in the case of a reduction in the demand for the asset, the value of the asymmetry (negative in the case of a negative average jump size) and the positive kurtosis generates greater volatility in the return of the asset, see e.g. Wu (2003). Thus, the variance over time of the returns of an investment opportunity can increase (or decrease).

Differently from the model proposed by Wu (2003), in the present paper described we consider the jump variable constant for each asset and stress its value according to a linear growth, in order to highlight the possible impacts of jumps. However, by observing the descriptive statistics of the returns it is possible to have a first intuition about the portfolio allocation.

Liu (2007), Buraschi (2010) and Liu et al. (2003) use affine stochastic volatility models to manage volatility and the presence of jumps in the allocation. In particular, Liu et al. (2003) studied how investment strategies may change considering changes in prices and volatility. In addition to considering the dynamic aspect in selecting the optimal allocation, other recent works study the role of predictability, see e.g. Brandt (1999), Brennan (1997) and Lynch (1999).

Paper is organized as follows. Section 2 describes the model of an optimal investment allocation problem. Section 3 is dedicated to the empirical application using real data. Section 4 concludes.

2 The optimal investment problem

Let $(\Omega, \mathcal{F}, \{\mathcal{F}_t\}_{t \in [0, T]}, \mathbb{P})$ a filtered probability space. We propose a model where the risky asset follows a jump-diffusion process with deterministic jump component.

We assume there exists one riskless asset $B = \{B_t\}_{t \in [0, T]}$ with dynamics:

$$dB_t = rB_t dt, \quad t \in [0, T], \quad (2.1)$$

where $r \in \mathbb{R}$ denotes the risk-free interest rate.

Moreover, we consider N risky assets $S_t = (S_{t,1}, \dots, S_{t,N})' \in \mathbb{R}^{N \times 1}$, with dynamics

$$\begin{cases} dS_t = \text{diag}(S_t) \left[\mu dt + \sqrt{Y_t^{-1}} dW_t^{(1)} + J dN_t \right] \\ dY_t = (\Omega \Omega' + K Y_t + Y_t K') dt + \sqrt{Y_t} dW_t^{(2)} Q + Q' \left(dW_t^{(2)} \right)' \sqrt{Y_t}, \quad t \in [0, T], \end{cases} \quad (2.2)$$

where $\text{diag}(S_t)$ is the square matrix with S_t in the diagonal and 0 on the off-diagonal

elements, $\mu \in \mathbb{R}^{N \times 1}$ is the drift and $J \in \mathbb{R}^{N \times 1}$ is the price jump component. We also consider $W_t^1 \in \mathbb{R}^{N \times 1}$ is a Wiener process of the stock and $W_t^{(2)} \in \mathbb{R}^{N \times N}$ is a matrix of Wiener process of inverse of the instantaneous variance-covariance matrix Y_t , called *co-precision*, that follows a Wishart process. The matrices $K, Q \in \mathbb{R}^{N \times N}$, see Kang C. et al (2017).

Discontinuous movements in price are driven by a single Poisson process N_t with intensity $\lambda \in \mathbb{R}$.

Denoting by $GL_N(\mathbb{R})$ the set of real invertible matrices in $\mathbb{R}^{N \times N}$. Also assume $\Omega\Omega' \geq (N+1)QQ'$, implying that equation (2.2) has a unique global strong solution on $S_N^+(\mathbb{R})$ the later being the set of symmetric positive definite matrices of dimension $N \times N$, see e.g. Bru (1991).

In particular, Ω satisfies

$$\Omega\Omega' = \alpha QQ', \quad (2.3)$$

with $\alpha \in \mathbb{R} \geq N-1$. Equation (2.3) is sufficient to guarantee the positive definiteness and the mean-reversion of Y_t for any $\text{tin}[0, T]$, see e.g. Bru (1991). The matrix Q is proportional to the volatility of the co-precision matrix.

As highlighted in Oliva and Renò (2018), the matrix K is assumed to be negative semidefinite in such a way as to guarantee the strict positivity and the mean-reverting characteristic of the volatility. Furthermore, the matrix K represents the mean reversion rate of the co-precision at its mean reversion level $\bar{Y}$ is such that:

$$\alpha QQ' + K\bar{Y} + \bar{Y}K'.$$

The Wiener processes determining shocks in prices and variance-covariance matrix $\Sigma_t = Y_t^{-1}$ are correlated according to

$$W_t^{(1)} = W_t^{(2)}\rho + \sqrt{1-\rho'\rho}W_t^{(3)}, \quad t \in [0, T],$$

where $\rho \in \mathbb{R}^{N \times 1}$, $W_t^3 \in \mathbb{R}^{N \times 1}$ is a Wiener process and the elements of W_t^3 and W_t^2 are independent. Equation (2) allows to correlate returns and their variance-covariance matrix, typically in a negative way, see e.g. Branger (2017).

Let $\pi_t \in \mathbb{R}^{N \times 1}$ denote the vector of shares of wealth X_t invested in the risky asset while the proportion of wealth invested in the riskless asset is given by $(1 - \pi_t'1)$ with 1 being the $N \times 1$ vector of ones.

The investor's wealth evolves according to

$$dX_t = [\pi_t'(\mu - r1) + r]X_t dt + \pi_t'X_t \sqrt{Y_t^{-1}}dW_t^1 + \pi_t'JX_t dN_t, \quad t \in [0, T]. \quad (2.4)$$

The investor chooses the portfolio that maximizes her wealth at maturity in terms of a power utility, with risk aversion parameter γ . Considering X_0 the initial wealth, the optimization problem is

$$V(t, Y_t, X_t) := \max_{\pi_t, t \in [0, T]} \mathbb{E}_t \left[\frac{X_T^{1-\gamma}}{1-\gamma} \right], \quad \gamma > 0, \gamma \neq 1 \quad (2.5)$$

subject to the dynamic budget constraint (2.4).

The Hamilton-Jacobi-Bellman (HJB) equation associated with the investment problem, using standard dynamic programming techniques, is given by

$$\begin{aligned}
 0 = \max_{\pi_t, t \in [0, T]} & \left\{ \frac{\partial V}{\partial t} + [\pi'_t(\mu - r\mathbf{1}) + r]X_t \frac{\partial V}{\partial X} + Tr([\Omega\Omega' + KY_t + Y_tK']\Delta V) \right. \\
 & + \frac{1}{2}X_t^2\pi'_tY_t^{-1}\pi_t \frac{\partial V^2}{\partial X^2} + \left(2\pi'_t\Delta Q'\rho \frac{\partial V}{\partial X} \right) X_t + \frac{1}{2}Tr(4Y_t\Delta Q'Q\Delta)V \\
 & \left. + \lambda\mathbb{E}[V(t, X_t(1 + \pi'_tJ), Y_t) - V(t, X_t, Y_t)] \right\},
 \end{aligned} \tag{2.6}$$

where

$$\nabla := \left(\frac{\partial}{\partial Y_{i,j}} \right)_{1 \leq i,j \leq N}.$$

To solve the optimal investment problem (2.5), the jump component must be linearized through a first-order Taylor expansion, so that

$$(1 + \pi'_tJ)^{(1-\gamma)} = 1 + (1 - \gamma)\pi'_tJ + o((\pi'_tJ)^2),$$

and ignoring the term $o((\pi'_tJ)^2)$.

The approximated solution is provided in the following

Proposition 2.1. *Consider the HJB equation (2.6), the optimal strategy that solves the investment problem (2.5) is given by*

$$\pi_t^* = Y_t \left[\frac{(\mu - r\mathbf{1}) + 2A_tQ'\rho + \lambda J}{\gamma} \right] =: Y_t M_t, \tag{2.7}$$

where $M_t \in \mathbb{R}^{N \times 1}$.

The value function is given by

$$V(t, X_t, Y_t) = \exp \{ Tr(A_t Y_t) + G_t \} \frac{X_t^{1-\gamma}}{1-\gamma}, \tag{2.8}$$

where the matrix function $A_t \in \mathbb{S}_N$ and the function $G_t \in \mathbb{R}$ satisfy the following system of ODEs

$$\begin{cases} \dot{A}_t + (1 - \gamma)(\mu - r\mathbf{1})B'_t + A_tK + K'A_t - \frac{\gamma(1 - \gamma)}{2}B_tB'_t + \\ + 2(1 - \gamma)A_tQ'\rho B'_t + 2A_tQ'Q'A_t + \lambda(1 - \gamma)JB'_t = 0, & A_T = 0 \\ \dot{G}_t + (1 - \gamma)r + Tr(\Omega\Omega'A_t) = 0, & G_T = 0. \end{cases} \tag{2.9}$$

Proof. The proof retraces the steps provided in Oliva and Renò (2018). $\square$

Given Equation (2.7), the optimal weights for portfolio selection are composed of two components. The first component is the of *myopic demand* and is equal to $\frac{(\mu-r1)+\lambda J}{\gamma}$, the latter highlights the dependence with the performance in excess and risk aversion without considering the multi-period nature of the investment. The second component, $\frac{2A_t Q' \rho}{\gamma}$, is the *intertemporal hedging demand*, characterized by the presence of the correlation coefficient between Brownian motions and co-precision. Its value depends on the sign of both the function A_t and on ρ , which is assumed to be positive. As for the jump component, its amplitude and intensity can positively or negatively influence the portfolio allocation.

3 Empirical application

We apply the methodology described in Section 2 to a challenging financial problem. We consider allocating wealth in a portfolio of 11 indices, mimicking the behavior of large corporate portfolios.

The indices included in our analysis are: ICE BofA 0-1 Year Euro Government Index (EG0A), ICE BofA 1-3 Year Italy Government Index (GI10), ICE BofA 1-3 Year Euro Government Exchanging Italy Index (NI1T), ICE BofA 1-10 Year Italy Government Index (G510), ICE BofA 1-10 Year Euro Government Exchanging Italy Index (N510), ICE BofA Global Government Exchanging Euro Governments Index (N0Q1), ICE BofA Euro Large Cap Corporate Index (ERL0), ICE BofA Global Large Cap Corporate Excluding Euro Index (GCXZ), ICE BofA Global High Yield Index (HW00), MSCI Europe Total Return Index (MSDEE15N) and MSCI World A.C. ex Europe Total Return Index (MSDEWXEN).

The indices chosen allow for a diversified portfolio allocation, consistent with the investor's needs. Companies can create products that respond to market disruptions and can transfer risk.

We consider the time series of monthly returns from December 1998 to September 2023 for a total of $T = 289$ months. Table 3.1 shows the descriptive statistics of the monthly

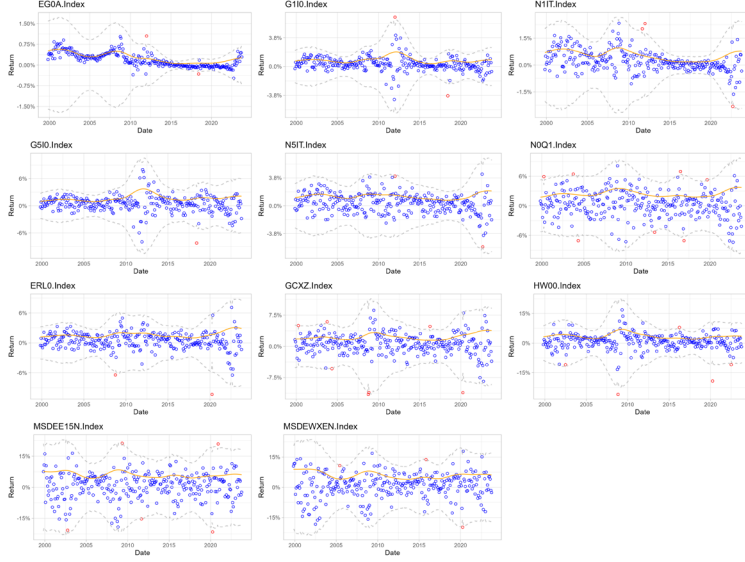
Table 3.1. Descriptive statistics for the returns of the 11 indices, expressed in percentages and in annualized units.

	EG0A	GI10	NI1T	G510	NS1T	N0Q1	ERL0	GCXZ	HW00	MSDEE15N	MSDEWXEN
Mean	1.54	2.61	1.83	3.52	2.76	2.34	3.42	4.18	6.26	5.28	6.60
Std	0.60	2.24	1.39	4.32	3.02	6.14	4.12	6.10	9.83	15.27	14.68
Skewness	0.63	0.46	0.36	-0.42	-0.33	-0.24	-1.12	-0.87	-1.21	-0.44	-0.48
Kurtosis	3.14	12.10	4.95	7.60	4.54	3.53	9.30	6.99	10.68	4.05	3.62

returns. The returns show a positive mean and a low standard deviation. We further notice that, except for the first three indices reported in Table 3.1, the indices present a negative asymmetry, demonstrating the typical event risk signals. Despite this, the values are not particularly high.

We calibrate the model according to the method reported in Bandi and Renò (2016), and along the lines of Mancini (2009). Specifically, we implement the methodology for threshold definition on the analyzed dataset. This technique allows to estimate of the amplitude of jumps to evaluate the optimal policies, according to the theoretical findings.

Figure 3.1. Monthly returns for all indices, along with the calibrated threshold used to generate the jumps and the corresponding estimated standard deviation.



We denote by r_{t_i} the return of the i -th index with $i = 1, \dots, N$ at time t_i with $i = 1, \dots, T$. We define θ_{t_j} the threshold function of the i -th index at time t_i as

$$\theta_{t_j} = 3 \sqrt{\frac{\frac{\pi}{2} \sum_{i=1, t_i \neq t_j}^{T-1} \mathcal{K}\left(\frac{t_i - t_j}{L}\right) |r_{t_i}| |r_{t_{i+1}}|}{\sum_{i=1, t_i \neq t_j}^{T-1} \mathcal{K}\left(\frac{t_i - t_j}{L}\right)}} \quad j = 1, \dots, T, \quad (3.1)$$

where $L = 12$ and $\mathcal{K}(x) = \sqrt{\frac{1}{2\pi}} e^{-\frac{x^2}{2}} \mathbf{1}_{\{|x| \leq L\}}$.

The threshold separates the discontinuities in the observed performance of the security from the fluctuations caused by the uncertainty of the security itself.

We identify a jump for each index when the absolute value of the return exceeds the quantity calculated eq. (3.1).

The average covariances and correlations among the indices are reported in Table 3.2. These quantities are calculated by considering only the values of returns less than the threshold calculated in eq. (3.1). Finally, the inverse of the covariance matrix at month t represents the co-precision variable Y_t at month t .

In Figure 3.1, the overall graph shows the monthly returns of the 11 asset classes of the companies analyzed. The returns are represented by the blue dots and the gray dashed line represents the calibrated threshold used to separate the highlight jumps (red dots). The solid orange line represents the estimated standard deviation.

Table 3.2. Average covariances (for returns expressed in percentages and monthly units) and correlation (in bold) among the indices.

	Covariances/Correlations										
	EG0A	G1I0	N1IT	G5I0	N5IT	N0Q1	ERL0	GCXZ	HW00	MSDEE15N	MSDEWXEN
EG0A	0.04	0.08	0.06	0.11	0.10	0.09	0.08	0.09	0.06	-0.07	-0.12
	-	0.59	0.76	0.41	0.52	0.25	0.35	0.28	0.11	-0.09	-0.14
G1I0	-	0.39	0.17	0.70	0.33	0.26	0.36	0.40	0.40	0.09	-0.24
	-	-	0.67	0.91	0.61	0.25	0.51	0.41	0.26	0.03	-0.09
N1IT	-	-	0.16	0.28	0.30	0.30	0.26	0.28	0.10	-0.33	-0.33
	-	-	-	0.55	0.85	0.44	0.57	0.44	0.09	-0.20	-0.20
G5I0	-	-	-	1.54	0.69	0.58	0.85	0.90	0.78	0.48	-0.07
	-	-	-	-	0.65	0.28	0.60	0.46	0.25	0.09	-0.01
N5IT	-	-	-	-	0.75	0.78	0.69	0.76	0.17	-0.43	-0.41
	-	-	-	-	-	0.54	0.70	0.55	0.08	-0.12	-0.11
N0Q1	-	-	-	-	-	2.79	0.87	1.87	0.87	-1.03	-1.42
	-	-	-	-	-	-	0.46	0.70	0.21	-0.15	-0.21
ERL0	-	-	-	-	-	-	1.29	1.44	1.50	1.31	1.30
	-	-	-	-	-	-	-	0.80	0.52	0.28	0.27
GCXZ	-	-	-	-	-	-	-	2.52	2.51	1.49	1.19
	-	-	-	-	-	-	-	-	0.62	0.23	0.18
HW00	-	-	-	-	-	-	-	-	6.40	5.45	4.78
	-	-	-	-	-	-	-	-	-	0.53	0.45
MSDEE15N	-	-	-	-	-	-	-	-	-	16.75	13.64
	-	-	-	-	-	-	-	-	-	-	0.80
MSDEWXEN	-	-	-	-	-	-	-	-	-	-	17.29

In general, negative jumps correspond to the most turbulent periods from an economic point of view such as the 2008 crisis (bankruptcy of Lehman Brothers), the 2020 pandemic, and the outbreak of war between Russia and Ukraine in 2022. These geopolitical events have had a more severe impact on the financial market. Furthermore, for corporate indices, it is possible to notice a jump between 2015 and 2016 when quantitative easing was extended to corporate. In these periods, structural changes and extreme movements in the price dynamics of financial assets have occurred. These extreme changes and movements have consequences for investors.

Table 3.3. Parameter estimates the model of price jumps ($\alpha = 48.3709$) considering the intensity of the jump equal to $\lambda = 0.0123$. The estimates refer to returns expressed in percentages and monthly units.

	Only jumps in price										
	EG0A	G1I0	N1IT	G5I0	N5IT	N0Q1	ERL0	GCXZ	HW00	MSDEE15N	MSDEWXEN
μ	0.74	0.60	0.59	0.53	0.60	0.40	0.70	0.57	0.61	0.69	0.61
$diag(Q)$	0.09	0.10	0.03	0.11	0.10	0.14	0.15	0.05	0.22	0.07	0.06
$diag(K)$	-0.12	-0.15	-0.17	-0.13	-0.05	-0.03	-0.16	-0.13	-0.14	-0.16	-0.13
J	0.24	0.88	0.45	-5.49	-0.51	0.48	-5.59	-2.23	-7.89	-2.05	1.05
	No-jumps										
	EG0A	G1I0	N1IT	G5I0	N5IT	N0Q1	ERL0	GCXZ	HW00	MSDEE15N	MSDEWXEN
μ	0.54	0.61	0.57	0.56	0.59	0.51	0.6	0.57	0.57	0.54	0.54
$diag(Q)$	0.09	0.10	0.03	0.11	0.10	0.14	0.15	0.05	0.22	0.07	0.06
$diag(K)$	-0.12	-0.15	-0.17	-0.13	-0.05	-0.03	-0.16	-0.13	-0.14	-0.16	-0.13
J	-	-	-	-	-	-	-	-	-	-	-

To the sake of completeness, we report in Table 3.3 the estimates of the model param-

ters of the monthly percentage returns defined based on the presence of the jump component.

The intensity of the λ jump is equal to 0.0123, meaning that on average the jumps occur every 6.77 years. The risk aversion parameter used is exogenously fixed equal to 3, considering an investment horizon of 1 year. Furthermore, we assume that Y_t equals the average co-precision in our sample.

Table 3.4. Optimal allocation percentage of the portfolio π^* considering 3 cases: No-Jumps (second column), Jumps in Price (third column) and the increasing Jumps component (fourth column).

Indexes	No-Jumps (%)	Jumps in Price Only (%)	Increasing Jumps in Price Only (%)
EG0A	25.8015	17.2892	13.9757
G110	1.3939	1.4405	1.2372
N11T	7.3629	7.1726	6.1764
G510	1.1589	1.1554	1.0012
N51T	3.7897	3.7136	3.1815
NOQ1	-1.5790	-1.8697	-1.6765
ERL0	11.3745	8.5772	6.9509
GCXZ	1.8713	1.8313	1.5773
HW00	1.0694	0.9064	0.7614
MSDEE15N	-0.3678	-0.2689	-0.2215
MSDEWXEN	-0.2082	-0.1867	-0.1599
Total Allocation (%)	51.6673	39.7611	32.8037

The results of the optimal weights for portfolio allocation are reported in table 3.4. We observe that by considering all sources of risk in the model, the overall optimal allocation to risky assets is reduced. Considering only the price jumps, the change in the overall allocation is 0.23%.

From Table 3.4 we further notice that the portfolio allocation is mainly concentrated on the bond part of the portfolio. Compared to past years, the risk premium between the stock and bond markets has reduced due to recent geopolitical and economic events. As a result, investors prefer to risk less, to immediately obtain a more attractive return. Hence, the market is adapting to the geopolitical and economic situation of recent years and in particular to the increase in volatility. We must therefore base our estimates on structural changes and look beyond short-term movements. To reduce interest rates by central banks, holding medium/long duration products can be crucial. This is also confirmed by the negative correlations between bond and stock indices, see Table 3.2.

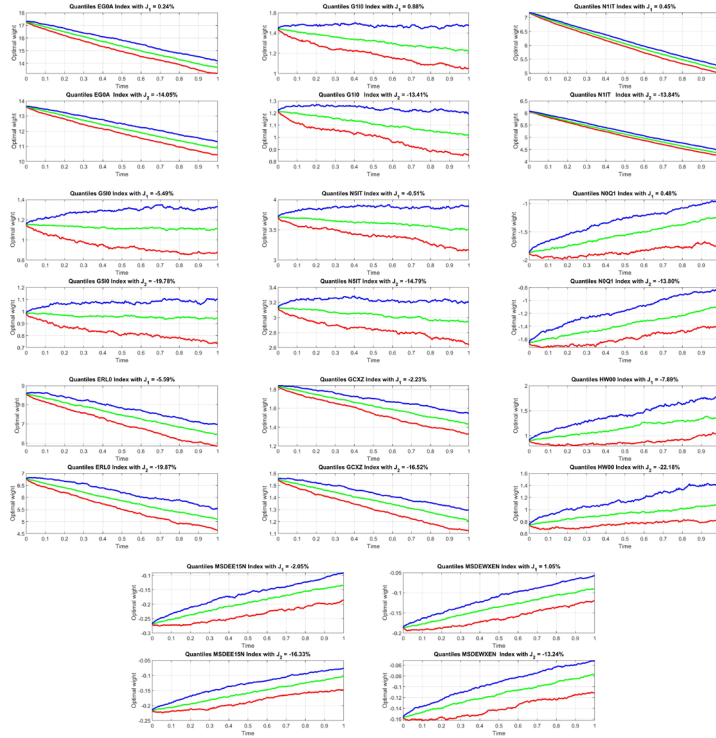
Within bonds, Government Bonds are preferred over corporate Bonds, it is highlighted the value of the optimal weights in Table 3.4, since thanks to the increase in yields the attractiveness of Government Bonds increases in the short/medium term. Therefore, this asset class is preferred to investment grade (IG) credit, where spreads offer lower rewards for higher risk. This is caused by lower debt levels of companies.

The last column of Table 3.4 shows the optimal weights of a portfolio allocation when the value of the jump component suffers an additive shock equal 2,5%. The overall allocation, in this scenario, is reduced by 0.37% compared to the no-jumps scenario. However, we witness a weak increase in the equity component.

The ex-Europe stock index has a higher weight than the European one. It could most be explained in terms of the corresponding profit growth, especially thanks to the advent of Artificial Intelligence, see e.g. BlackRock (2024). In general, from a medium/long-term

strategic perspective, the equity component is preferred over the bond component.

Figure 3.2. Different performance in asset classes following an additive shock of the jump component considering median and extreme scenarios for optimal weights as a function of time (expressed in years).



In Figure 3.2 we show that an additive variation of the jump component can influence the performance of activity classes, illustrating three different types of scenarios. In particular, the 95% quantile (red line), the median (green line), and the 5% quantile (blue line) corresponding to the best, median, and worst scenarios respectively are represented.

The presence of jumps on some asset classes leads to having a greater (or lesser) weight based on the correlation, see Table 3.2. , in the case of stocks, the MSDEE15N index and the MSDEWXEN index have a greater weight than other asset classes. As the size of the jump increases, the portfolio allocation in the risk-free component increases, so that it becomes crucial that companies hold products capable of gradually reaching the riskier component. To increase the risk of the portfolio to have a higher return, we can look at High Yield while remaining prudent given its positive weight in the three scenarios presented in Table 3.4.

In fact, already during and after the Covid pandemic in 2020, many companies have

tried to create products that allow this gradual transition, such as. multi-sector insurance policies.

When market crashes occur, especially in the short term, this can lead to a slow adjustment of returns leading to the loss of all market opportunities.

As bond yields have higher levels, the fixed-income asset class has gained relative attractiveness compared to stocks. The benefits of diversification are expected to return when central banks lower interest rates.

4 Conclusion

In this article, we propose an approximate solution to a portfolio problem in a multivariate context considering risky and risk-free assets and considering the presence of price jumps. In our model we consider co-precision, whose dynamics follow a Wishart process. From the theoretical results, we show that the optimal weights depend on two terms: a myopic component and an intertemporal coverage demand. Generalizing the Markowitz intuition, the two components are inversely proportional to the instantaneous volatility. However, we apply the described methodology to a portfolio selection problem in a multivariate context by mimicking the behavior of large Italian companies. Considering a realistic market calibration, we show that investors modify their portfolios in the short term after a market crash by decreasing the allocation to risky assets. The presence of jumps, regardless of their size, confirms a reduction in the allocation so their non-inclusion could lead to considering a riskier allocation and therefore a risky attitude of the investor.

The advantage of this model is the dynamic portfolio allocation where the optimal weights are inversely proportional to the volatility. You might consider a rolling windows-based analysis to capture information on different scenarios (corresponding to the timing of the investment) as best as possible.

This article represents a first step. A possible extension could be considered a smaller period with the non-constant jump component. In particular, it could be interesting to use an analysis based on stress tests to evaluate both the impact of different scenarios on the portfolio allocation and the policies to be implemented to ensure the achievement of the investor's objective by evaluating the trade-off between risk and return. A robust analysis could be done to estimate the jump component to capture the effects of possible crisis periods, along the lines of see Cesarone et al. (2023b). Furthermore, it could also be interesting to carry out an out-of-sample analysis as in Cesarone et al (2019), Cesarone et al (2023a), Cesarone et al (2023c) to test the model and evaluate and calculate the optimal weights. These additions are left for future research.

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Research article

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CDO SU MISURA: LA NUOVA ERA DELLE CARTOLARIZZAZIONI

Abstract

This paper reviews the structure of Collateralized Debt Obligations (CDOs), financial products used in the period of the 2008 sub-prime mortgage crisis, in order to understand the reasons that lead them to be considered the main responsible for it. The legacy of CDOs, which is reflected in Bespoke Tranche Opportunities (BTOs), is then discussed in order to understand whether they are equally “toxic” products, as CDOs were defined after the outbreak of the crisis, or they are really innovative tool of securitization.

Keywords: Collateralized Debt Obligations, Bespoke Tranche Opportunities, Credit Default Swaps, securitization, sub-prime mortgage crisis.

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1 Introduzione

Questo lavoro ripercorre la struttura del Collateralized Debt Obligation (CDO) (Lucas et al (2006)), noto prodotto derivato, considerato il principale responsabile della crisi finanziaria globale del 2008 (Wojtowicz (2014)).

Lo scopo è quello di mostrare come le cause della crisi non siano da attribuirsi alle caratteristiche intrinseche del prodotto, quanto alle modalità di costruzione e impiego dello stesso, unite alla forte deregolamentazione dell'epoca.

Dopo la crisi, si è assistito ad una vera e propria restaurazione normativa, confluita in Solvency II per il mercato assicurativo e Basilea III per quello bancario. Tali normative hanno irrigidito i requisiti di capitale e i processi di gestione e controllo dei rischi. Hanno in particolare limitato l'uso dei derivati a scopo speculativo e regolamentato in modo puntuale le operazioni di cartolarizzazione.

Eppure, dette operazioni continuano ad essere ampiamente utilizzate dal mercato ed esistono esempi attuali e concreti del loro utilizzo.

In Italia, successivamente all'emanazione del decreto legge "rilancio", che ha introdotto le agevolazioni fiscali cosiddette eco-bonus (Servizio Studi Camera dei deputati (2023)), alcuni player del mercato, al fine di capitalizzare su di esse, hanno sfruttato meccanismi di cartolarizzazione non dissimili da quelli trattati in questo lavoro. La Compagnia di assicurazione Reale Mutua, ad esempio, ha emesso un prodotto multiramo ("Straordinaria Reale") (Reale Mutua (2023)) di cui una gamba è una specifica provvista di attivi formata tramite cartolarizzazione di crediti fiscali eco-bonus e garantisce all'assicurato un rendimento minimo garantito del 4,2% per 5 anni.

Un esempio ancora più calzante si può trovare sul mercato secondario, nel più ampio mondo degli Exchange Traded Funds (ETF). Esistono infatti fondi detti Exchange Traded Notes (ETN) (Justetf (2021)) che operano su commodity e/o cripto valute attraverso lo scambio di CDO, posizioni sintetiche e swap, secondo schemi del tutto analoghi a quelli che caratterizzarono gli anni della crisi.

La stessa idea di questo paper è nata dopo la visione del film "The Big short" (Mckay (2015)), al termine del quale viene insinuato il dubbio che i CDO non siano mai scomparsi dai mercati ma siano stati, fin da subito, semplicemente oggetto di un "re-brand", cambiando nome in Bespoke Tranche Opportunity (BTO) (Johansson and IJsendijk (2017)).

Con questo lavoro si intende quindi anche indagare sulla veridicità di questa affermazione, al fine di capire se i CDO su misura, così vengono anche chiamati i BTO, siano ugualmente pericolosi per il sistema rispetto ai CDO usati nel 2008 o possano essere considerati effettivamente un innovativo strumento di cartolarizzazione. Si rimanda comunque a futuri lavori un'analisi accurata dei "non semplici" aspetti quantitativi legati alla loro valutazione (Li (2010)) e agli effetti della loro negoziazione.

Allo scopo, il presente lavoro è così strutturato: nel paragrafo seguente, spieghiamo cosa sia di fatto un CDO e quali siano le sue varianti più significative; nel paragrafo 3, descriviamo la loro struttura, concentrandoci in particolare sul meccanismo delle priorità di rimborso e sul sistema di rating; nel paragrafo 4, spieghiamo come le ragioni della crisi del 2008 siano sicuramente legate ad alcune delle caratteristiche intrinseche e varianti dei CDO descritte nei paragrafi precedenti, ma siano anche e soprattutto legate all'uso, o sarebbe me-

glio dire l'abuso, di tali strumenti di cartolarizzazione; infine, nel paragrafo 5, analizziamo il caso specifico dei BTO, per rispondere alla domanda: "I BTO sono i nuovi CDO?".

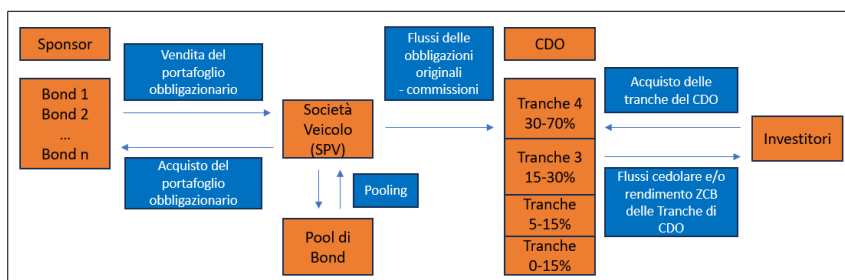
2 Cosa è un CDO

Un Collateralized Debt Obligation (CDO) è uno strumento finanziario obbligazionario, formato tramite un processo di cartolarizzazione, nel quale vengono "impacchettate" obbligazioni aventi profili di rischio e caratteristiche diverse. Il fine è quello di creare un prodotto nuovo che, grazie all'effetto di diversificazione, diminuisce il rischio di controparte delle obbligazioni sottostanti.

Il meccanismo di formazione di un CDO è riassumibile come segue (v. Fig. 1):

- una società (detta sponsor) detiene nel proprio portafoglio una serie di crediti obbligazionari quali bond, corporate bond, mutui, Asset-Backed Securities (ABS) e altri CDO;
- lo sponsor mediante una società veicolo, detta Special Purpose Vehicle (SPV), "cartolarizza" queste obbligazioni, cioè le scorpora dai contratti originari per riaggregarle in modo diverso e incorporarle in un nuovo prodotto, il CDO;
- il CDO viene poi suddiviso in diverse tranches di rischio-rendimento che la SPV immette sul mercato.

Figura 1. Struttura dei CDO



Source: Fonte propria

La SPV acquista dalla società sponsor il portafoglio di crediti obbligazionari; lo sponsor, di conseguenza, si libera dal rischio di default delle obbligazioni rientrando immediatamente della somma prestata, rinunciando così al maggior rendimento che avrebbe ottenuto per effetto del premio per il rischio.

I flussi delle obbligazioni originarie passano alla SPV che, a sua volta, dopo aver applicato uno spread di intermediazione, li trasferisce agli investitori sotto forma di tranche di CDO, con un grado di diversificazione più alto delle obbligazioni sottostanti grazie all'effetto pooling.

Chi investe in una specifica tranche di CDO, a fronte del pagamento del prezzo di acquisto, ottiene il diritto a ricevere un rendimento (in forma cedolare o zero-coupon) contrattualmente definito in base al livello di rischio-rendimento della tranche stessa.

In pratica, un CDO è a tutti gli effetti un ABS con la differenza che i sottostanti possono essere obbligazioni non omogenee fra loro per tipologia e duration. Un CDO può addirittura essere ottenuto mediante un processo di ri-cartolarizzazione partendo da prodotti anch'essi frutto di cartolarizzazione, come per esempio tranche di ABS e altri CDO. In questo secondo caso, si parla di CDO al quadrato. Il processo può poi essere replicato n volte, generando così *CDO alla n*.

Esistono inoltre CDO cosiddetti sintetici. In finanza, esporsi in posizione sintetica significa compiere un'operazione che riproduce il comportamento di un asset attraverso altri strumenti. Come mostrato in Fig. 2, un CDO sintetico può essere per esempio ottenuto attraverso un Credit Default Swap (CDS).

Un CDS è uno strumento derivato con il quale il detentore di un credito (protection buyer), al fine di volersi coprire dall'eventuale insolvenza del debitore, si impegna a pagare a favore di una controparte (protection seller) una somma fissa periodica (premio), percentuale di un capitale nozionale fissato contrattualmente. In cambio, il seller si assume il rischio di insolvenza del debitore, come in un rapporto assicurativo. In realtà, tale scambio può anche configurarsi come una "scommessa" su un rapporto di debito-credito tra terze parti (reference entity). In tal caso, oggetto dell'operazione non è il vero e proprio credito ma solamente il merito creditizio del debitore terzo.

Dunque, nel caso dei CDO sintetici creati mediante CDS, il compratore del CDO sintetico è il protection seller del CDS e il venditore è il protection buyer; la reference entity è invece rappresentata da tranche di CDO classici. Di conseguenza, un CDO sintetico può essere visto come il "versante opposto" dello swap sul CDO.

Per riassumere, da uno stesso pool di crediti è possibile creare CDO classici, CDO sintetici, e da questi CDO alla n .

3 Gerarchia delle tranche di CDO

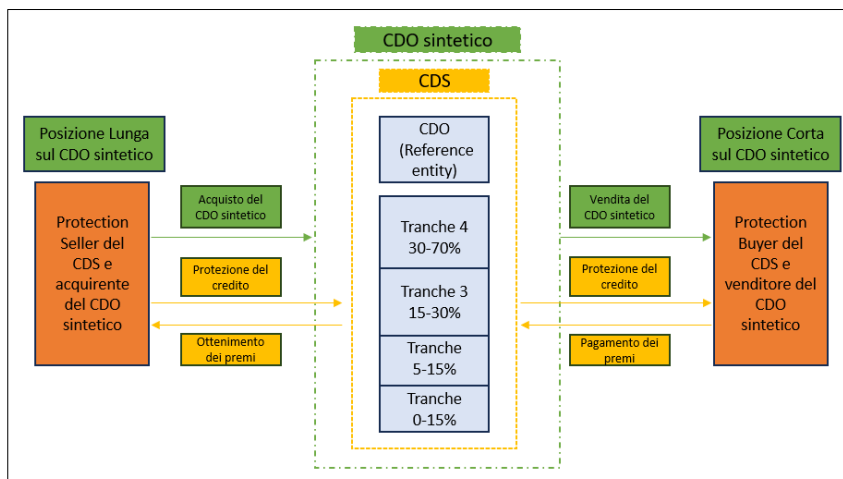
Ciascuna tranche di CDO è identificata attraverso un range di percentuali, da una minore, detta "attachment percentage", ad una maggiore, detta "detachment percentage". Esso rappresenta l'intervallo di perdita di valore del sottostante pool di collateral, dovuta al default delle sue componenti, cui consegue una perdita per la tranche del CDO.

Per esempio, nel caso di un range 5%-15%, la tranche inizia a perdere valore quando il sottostante pool perde più del 5% (attachment percentage) fino ad andare in default quando la perdita di valore del sottostante raggiunge il 15% (detachment percentage). Va quindi da sé che a tranche con percentuali più alte corrispondono rischi minori essendo più difficile entrare in quel range di perdita.

In conseguenza di ciò, a diversi range di percentuali corrisponde una diversa priorità di rimborso, nel senso che le tranche con percentuali minori vengono pagate in via residuale rispetto a quelle con percentuali maggiori, pagate in via prioritaria.

Tale meccanismo, per questo detto "a cascata", si traduce in una gerarchia fra tranche. Le tranche con percentuali maggiori sono dette "senior", quelle con percentuali minori so-

Figura 2. CDO sintetico



Source: Fonte propria

no dette "junior"; queste ultime sono ulteriormente distinte in "mezzanine", di gerarchia superiore, e "equity", di gerarchia inferiore, ed eventuali step intermedi.

Alle diverse tranches può inoltre essere assegnato un rating esterno basato, oltre che sulla priorità di rimborso, anche sul merito creditizio delle obbligazioni sottostanti.

Operazioni di ri-cartolarizzazione di CDO possono però generare nuovi CDO con rating e/o gerarchia diversi dall'originale con la conseguenza che, al crescere del grado di cartolarizzazione, viene meno il significato intrinseco di gerarchia e/o rating e ne viene distorta la valutazione del rischio.

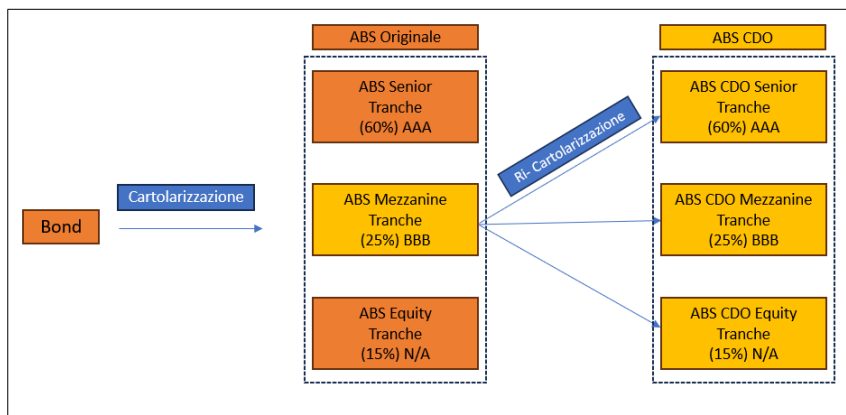
In Fig. 3, è illustrato il meccanismo di creazione di un CDO a partire da tranches di ABS. Come si vede, il CDO ottenuto da una tranche ABS "BBB" sarà diviso in tranches con uno spettro di rischio più ampio della tranche ABS originaria.

Allo stesso modo, in Fig. 4, si vede il meccanismo di creazione di un CDO al quadrato (ovvero, come detto, un CDO fatto di CDO): tranches di basso rango di CDO diversi, spesso rimaste invendute, vengono ri-cartolarizzate fra loro dando origine ad un nuovo prodotto con tranches di gerarchia e rating anche superiori rispetto a quelle del CDO originale.

Di conseguenza, tranches senior di CDO al quadrato possono essere composte da tranches di CDO di rango inferiore risultando di fatto più rischiose di quanto possano apparire. Infatti, in caso di eventi sistemici tali da far andare in default le tranches di basso rango di cui è composto, tutte le tranches di CDO al quadrato andrebbero in default indipendentemente dalla loro seniority.

Il meccanismo appena descritto, può portare ad una mancanza di trasparenza e ad una conseguente sopravvalutazione del beneficio di diversificazione e sottovalutazione del rischio. Di fatto, come descritto nel paragrafo seguente, queste sono state le ragioni alla base

Figura 3. ABS CDO



Source: Fonte propria

della crisi finanziaria globale del 2008.

4 Le ragioni della crisi finanziaria del 2008

Furono proprio i CDO sintetici e i CDO al quadrato di cui al paragrafo sopra i protagonisti della famosa crisi che da immobiliare divenne globale. Citando il noto film “The Big Short” (Mckay (2015)) “la bomba atomica con il presidente ubriaco che tiene il dito sopra il bottone”.

Esattamente, cosa andò storto?

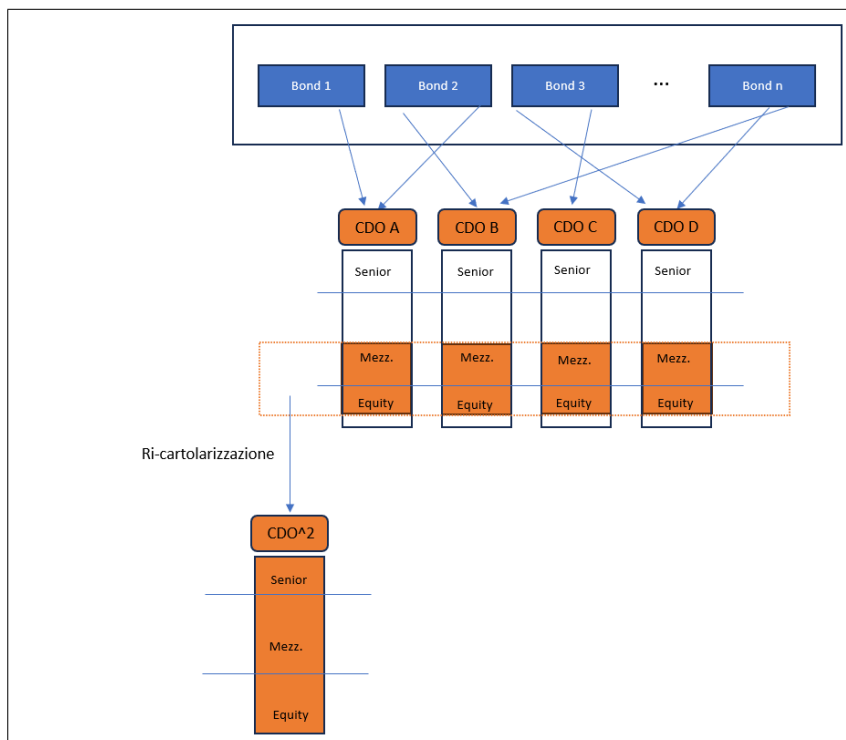
Oltre ad eventuali fattori dolosi e alla deregolamentazione del settore finanziario, ci furono delle problematiche intrinsecamente presenti in questi prodotti, ovvero problemi di valutazione che, da una parte, portarono a sottostimare il rischio sistemico dei CDO e, dall'altra, spinsero gli operatori del mercato ad utilizzare metodologie macchinose, se non arbitrarie, di pricing (Semerari (2022)).

Il tutto fu aggravato dal comportamento delle società di rating che, agendo in modo non del tutto indipendente dalle banche, assegnarono rating gonfiati a questi prodotti sottovalutandone il rischio in nome della diversificazione e della presunta stabilità e crescita sempre verde del mercato immobiliare.

Tuttavia, il problema principale fu la ramificazione di questi prodotti che portò a distaccare i CDO dal sottostante originario, quello immobiliare. Il processo continuo di ricartolarizzazione attivato con la creazione di CDO su CDO e la creazione di un mercato parallelo di CDO sintetici rese in particolare il mercato delle assicurazioni sui mutui paradossalmente più grande del mercato immobiliare stesso, così trasformandolo in un moltiplicatore del danno conseguente al default di quest'ultimo.

Supponiamo per esempio che:

Figura 4. CDO al quadrato



Source: Fonte propria

- una banca conceda mutui per un certo valore;
- dal pool di mutui, tramite cartolarizzazione, venga generato un CDO;
- da questo CDO vengano prodotti, tramite CDS, CDO sintetici e, tramite ri-cartolarizzazione delle sue tranche più basse, CDO al quadrato;
- il processo del punto precedente venga ripetuto più volte dando origine ad altri CDO sintetici e CDO al cubo, di quarto, quinto grado etc.

Tale processo genera posizioni lunghe e corte sul mercato immobiliare per un valore esponenzialmente più alto di quello di partenza, tanto più elevato quanto maggiore è il numero di CDO sintetici e CDO alla n prodotti. Ciò comporta che, in caso di default dei mutui sottostanti, si verificherebbe un vero e proprio effetto domino che eroderebbe un valore investito aggregato estremamente più alto rispetto a quello “reale” di partenza.

Un ulteriore problema, oltre alla distribuzione tentacolare dei CDO, fu la loro standardizzazione considerata che vennero venduti indistintamente a investitori retail, fondi pensione, banche di investimento, etc...

Stando ai dati (Wikipedia (2010)), il costo complessivo della crisi per le banche è stimato a:

- 110 miliardi di dollari a novembre 2007,
- 188 miliardi nel marzo 2008,
- 250 miliardi nell'aprile 2008,
- 400 miliardi nel giugno 2008.

Da questi valori numerici delle perdite, è possibile rendersi ulteriormente conto di quanto il mercato dei CDO fosse grande.

Dopo il 2008, l'utilizzo di questo prodotto è radicalmente cambiato dando luogo a strumenti di analogia struttura, ritenuti potenzialmente meno rischiosi per il mercato. E' veramente così?

Nel paragrafo seguente, analizziamo in particolare il caso dei Bespoke Tranche Opportunity (BTO).

5 Bespoke Tranche Opportunity

Il termine BTO appare per la prima volta nel 2015 in una email di un dipendente di Goldman Sachs (Johansson and IJsendijk (2017)) che così scrive *"A tranche of a bespoke portfolio of credits can offer exposure to diversified risk with the possibility of leverage, credit enhancement and enhanced returns"*.

Un BTO è infatti uno strumento finanziario derivato formato da una singola tranche di un portafoglio di crediti cartolarizzati; tale tranche è creata su misura di un investitore per offrirgli opportunità di investimento diversificate con un potenziale effetto leva, un miglior merito creditizio e un maggior rendimento.

Tale descrizione corrisponde esattamente a quella di un CDO. Si parla infatti anche di Bespoke CDO. Ciò può far credere che i BTO siano semplicemente un modo per ricommercializzare lo stesso prodotto, cambiandone il nome, allo scopo di riscattarlo dalla sua cattiva reputazione.

Effettivamente, il meccanismo di base è lo stesso.

Tuttavia, mentre nel CDO è la banca a creare il prodotto, cartolarizzarlo e poi venderlo, nel BTO, invece, è l'investitore che di sua iniziativa chiede alla banca di creargli un CDO personalizzato, cercandone la controparte.

Un altro aspetto da considerare è il riferimento al potenziale effetto leva. Nella pratica infatti, ciò può tradursi nella possibilità che i BTO vengano creati esclusivamente mediante CDS, riproponendo in sostanza un CDO sintetico con le sue caratteristiche di illiquidità, forte volatilità e conseguente elevata rischiosità.

Tuttavia, per sua natura, essendo espressamente creato per soddisfare gli obiettivi specifici delle due controparti, un BTO è unico e non ripetibile e i rischi ad esso associati rimangono "in pancia" ai due soggetti direttamente coinvolti.

Inoltre, per le sue specificità tecniche, questo prodotto può essere scambiato solo fra soggetti altamente specializzati e con alto budget, quali Hedge Fund e società finanziarie in genere; non è quindi un prodotto retail e manca di un mercato secondario.

Per tutte queste ragioni, il fallimento di un BTO non può generare quella catena di distruzione di valore vista durante la crisi del 2008.

6 Conclusioni

I BTO sono per definizione dei CDO, ma non sono sostanzialmente la stessa cosa.

Come mostrato in questo paper, la piccola ma fondamentale differenza sta nella loro unicità ed estrema sartorializzazione che ne rende decisamente meno pericoloso il loro impiego per il sistema finanziario.

Il ricorso a detti strumenti non è dunque da demonizzare, come invece sembra voler fare molta della stampa divulgativa nel definirli una strategia di “marketing”. Si tratta invece di strumenti potenzialmente utili per una maggiore liquidità dei mercati e una efficace personalizzazione del sistema di gestione dei rischi di portafoglio.

E’ pur vero che ci troviamo in un momento storico in cui, a causa della volatilità sistemica e alle conseguenti politiche di sostegno statali sotto forma di crediti, le cartolarizzazioni per accedere a mercati illiquidi stanno riprendendo piede sotto forme diverse. Inoltre, il pricing di prodotti così sofisticati e personalizzati rimane un problema ancora aperto.

Pertanto, nonostante i fattori legislativi più stringenti, il mercato delle cartolarizzazioni va ulteriormente indagato e la sua evoluzione costantemente controllata.

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Research article

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LOCATION MODELS OF ELECTRIC CHARGING STATIONS IN THE CITY OF ROME

Abstract

The issue of the location of charging stations for electric vehicles is becoming very important due to governmental decisions on electric mobility. Many authors have addressed this problem with the support of graph theory and graph optimization. In dealing with this problem, typical operational research models and approaches used for facility location, such as p-median, coverage problem and queuing theory, have been resorted to. In this paper we apply these models to the location of charging stations in the city of Rome. In particular, we analyze the suitability of existing charging sites and suggest where to implement new chargers using a p-median-like model. Finally, we study the waiting time distribution when the nearest charging stations are occupied, and we use queuing theory to show how much demand for the service would improve with the implementation of the new charging points.

Keywords: p-median, coverage problems, queuing theory, charging stations.

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1 Introduction

The deployment of electric vehicles (EVs) is instrumental to reduce CO_2 emissions and tackle climate change. According to the BCG report *Electric Cars Are Finding Their Next Gear* (Boston Consulting Group, 2022), it is estimated that electric vehicles will represent 20% of global car sales in 2025 and 59% in 2035, but with different rates of increase depending on geographical localization. The EU's strict environmental regulations will boost sales of electric cars in Europe by more than 90% by 2035. Regarding Italy, Forbes Italy (Forbes, 2022) estimates that in 2035 the expected market share of sales of new zero-emission vehicles will be over 85% of the total. Furthermore, zero-emission vehicles are estimated to grow from 1% in 2021 to over 27% in 2035.

Achieving these goals will require a major effort to create networks of charging stations capable of sustaining the above-mentioned growth rates, as highlighted by Beckers et al. (2015) and by The National Academies (2023).

Clearly location of charging stations is very important in order to meet future customers demand. For this reason, extensive literature has been devoted to this problem in recent years and various models, algorithms, and approaches, both in theory and in practice, have been proposed and studied. Here, we report some recent works where approaches are presented that share some similarities with ours. Frade et al. (2011) propose a location model to maximize the coverage of electric charging demand in a neighbourhood in Lisbon, distinguishing between night-time and day-time demand. In Xi et al. (2013), the authors propose a simulation-optimization model to determine location and size of electric charging infrastructures by estimating the expected number of electric vehicles charging at a location as a function of the stations at that location and apply the model to the central-Ohio region. Zhu et al. (2017) rely on a model which combines p-median and maximum-coverage approaches to determine the location of charging stations so to maximize traffic satisfaction and to optimize charging capacity using queuing theory. In Baouche et al. (2014), an optimization model is presented with the aim of locating charging stations so that fixed costs related to the stations and cost of travelling for electric vehicles are minimized. The model incorporates an estimate of energy consumption of electric vehicles in urban centres. In Zhu et al. (2016), the authors propose a mathematical model to determine where to locate charging stations and the number of chargers to be placed: construction and access costs, distance between destinations and charging points, and drivers preferences are taken into account. Andrenacci et al. (2016) present a demand-side approach to find the suitable locations for charging stations, assuming a complete switch to electric vehicles. The authors use a large dataset of vehicle usage in the city of Rome and, applying cluster analysis, estimate the energy demand. He et al. (2016) compare three classical facility location models, i.e. set covering, maximal covering location and p-median, by applying them to the real scenario of the city of Beijing; locations obtained from the p-median approach are shown to be more convenient and affordable. Likewise, in Bouguerra and Layeb (2019), a real case study is presented related to the city of Tunis, and five linear integer programming formulations are considered based on weighted set covering models, with real constraints.

Many other studies have been conducted on location strategies for charging stations: the interested reader is referred to the thorough reviews in Kchaou (2021); Pagany et al. (2019);

Shareef et al. (2016) and also to Farahani et al. (2012).

Following this line of research, we focus on the difficult context of the city of Rome, Italy. According to the fourth edition of MOTUS E reports (MotusE, 2023), Rome is the Italian city with the largest number of charging points. However, Rome is the most populous city in Italy, and the urban area has the largest surface in the country. So, when relating the number of charging points to these aspects, the pictures change.

Our aim is to improve the quality of charging services by identifying, among already existing charging sites, those where to place additional charging points. Under the assumption of demand and supply occurring at the existing sites, we propose to find the optimal ones where to install new charging points by minimizing a measure of their distance from all the other sites. In a nutshell, we rely on a p -median-like model, which result in a linear integer programming problem. This is a typical approach for the location of facilities where some service is available to customers. Then, we validate our approach via numerical testing and a posteriori analysis. We analyze the time needed to reach the nearest sites in the presence of congestion and, taking a hint from Marianov and ReVelle (1996), we resort to queuing theory to study the advantages of the approach in terms of service demand.

We believe that one of the strengths of our approach lies in its simplicity: it can be easily interpreted and replicated; also, solution procedures are available to practically implement it. Yet, the model we propose, while simple, seems to be sufficiently accurate and to retain descriptive power, as witnessed by the numerical evidence we have obtained. We remark that we have tested our approach on real-world data, focusing on the problem of improving charging services in the difficult context of the city of Rome.

The rest of the paper is organized as follows. In Section 2 we introduce the p -median-like model. In Section 3 we analyze the distribution of charging points in the city of Rome. In Section 4 we focus on the results obtained from the application of the model to the context of the city of Rome, focusing on several different scenarios. In Section 5 we investigate waiting times in case of congestion, and in Section 6 queuing theory is used to analyze improvements in terms of meeting the demand. In Section 7 we give some final remarks.

2 P-median-like model

Given a set of n already available charging sites, and assuming demand and supply to occur at such locations, we wish to find the best ones to be upgraded by installing additional charging points. We rely on the distance of these sites from the other ones as a selection criterion to be minimized.

We consider a graph $G(N; A)$ where N denotes the set of nodes corresponding to the charging sites and A the set of arcs connecting the nodes, and the distance matrix D where d_{ij} indicates the distance between node i and node j . We want to identify p nodes in the graph where new chargers are to be installed by solving the following linear integer programming problem (similar to Christofides (1975)):

$$\begin{aligned}
& \underset{x}{\text{minimize}} && \sum_{i=1}^n \sum_{j=1}^n d_{ij} x_{ij} \\
& \text{s.t.} && \sum_{i=1}^n x_{ij} = 1 \quad j = 1, \dots, n \\
& && \sum_{i=1}^n x_{ii} = p \\
& && x_{ij} \leq x_{ii} \quad \forall i, j \\
& && x_{ij} \in \{0, 1\}
\end{aligned} \tag{1}$$

Binary decision variable x_{ij} is equal to 1 if upgraded service (consisting in the presence of additional charging points) is available for site j at location i , 0 otherwise. In particular, $x_{ii} = 1$ if site i is upgraded by placing there new charging points.

Constraints ensure that:

- upgraded service for site j is provided by one site where new charging points are to be installed, for every j ;
- the number of charging sites where to install new charging points is equal to p ;
- upgraded service for site j is not available at site i if no additional charging points are to be installed there.

The linear integer optimization problem (1) belongs to the class of p-median-like models. The p-median is a min-sum problem where the average distance between points where demand appears and locations where services are provided is to be minimized (see e.g., Hakimi (1964); Hakimi (1965); ReVelle and Swain (1970)). This model has been widely used and developed in the literature to determine the location of facilities (see e.g., Drezner and Hamacher (2004); Daskin and Maass (2015); Serra and Marianov (1998); Karatas and Yakıcı (2019); Blanco (2019)).

Due to our initial assumptions and choices, model (1) turns out to be easily interpretable. Also, efficient algorithmic procedures are available to compute solutions. Thus, the core aspects of our approach are readily implementable and replicable. Yet, the simple model we rely on retains descriptive power, as confirmed by the numerical evidence we describe in the next sections.

3 Data analysis

To perform our analysis, we consider the charging points activated and operating at the date of 24th of October 2022 in the city of Rome in all the fifteen municipalities. The locations where the stations are located have been retrieved and collected from the *Roma Capitale* institutional website (Roma Capitale (a)). It turns out that the total number of functioning chargers is 656 as of the given date.¹

We report the data per municipality in tab. 1 with a color scale ranging from deep green to deep red, where deep green represents the largest number of chargers installed and deep red the smallest one.

¹ At <https://www.comune.roma.it/web/it/informazione-di-servizio.page?contentId=IDS1090137>. it is possible to find, for each municipality, the updated list of locations where the charging points are active

Table 1. Charging points for each municipality activated at the date 24 October 2022.

Municipality	Activated Stations	%
I	92	14.0%
II	99	15.1%
III	24	3.7%
IV	23	3.5%
V	24	3.7%
VI	12	1.8%
VII	84	12.8%
VIII	57	8.7%
IX	87	13.3%
X	65	9.9%
XI	23	3.5%
XII	19	2.9%
XIII	16	2.4%
XIV	15	2.3%
XV	16	2.4%
Total	656	1

Source: Authors' elaboration on data from Roma Capitale (a) website.

We also relate the number of charging points to population density of each municipality. Data are obtained from the *Roma Capitale* Institutional website (Roma Capitale (b)) and are updated to 31st of December 2022. For some areas, as reported in table 2, the number of chargers seems proportional to population density (see e.g., the I and II), but for other ones (which we highlight in bold) this relation does not seem to apply.

We consider as nodes in $G(N; A)$ the locations where charging stations are already present and active, and derive the coordinates of each point using Google Maps. We aggregate some locations that are a few meters apart to simplify the collection of coordinates and representation of data. We report, in figure 1, the resulting 358 nodes in a map of Rome, generated using MATLAB.

We consider the upgrade of existing charging sites and not the construction of new ones. We make this choice for simplicity, because to identify sites where charging stations are to be located, supply and demand factors must be considered. Demand factors may be proximity to attractive places and the purpose of parking, while supply factors are the availability of grid connection and parking areas (for more details see MotusE (2022)). Existing sites are, thus, the locations where demand is assumed to appear. Focusing on existing sites is also crucial to streamline construction procedures and to keep construction costs at bay. However, demand-related aspects are considered in the subsequent analysis of charging station congestion, in section 5, and of the arrival rate λ , in section 6.

Table 2. Population density for each municipality

Municipality	Surface (sq.km)	Population	Density (pop/sq.km)
I	20.1	164520	8185.1
II	19.7	165496	8400.8
III	98	204342	2085.1
IV	48.9	171890	3515.1
V	26.9	237648	8834.5
VI	112.3	242082	2155.7
VII	47.6	311500	6544.1
VIII	47.2	128417	2720.7
IX	183.2	183282	1000.4
X	150.7	228042	1513.2
XI	71.5	152569	2133.8
XII	73.1	140337	1919.8
XIII	66.9	130379	1948.9
XIV	133.5	190283	1425.3
XV	187.2	160630	858.1
Not classified		2127	
Rome	1286.8	2813544	2186.47

Source: Roma Capitale (b) website; Authors' representation with a color scale for Density.

Relying on the coordinates of the 358 nodes, we compute, via an API² implemented in MATLAB R2021b, the distance matrix in meters/km and minutes of journey (in the absence of traffic).

4 Computational results

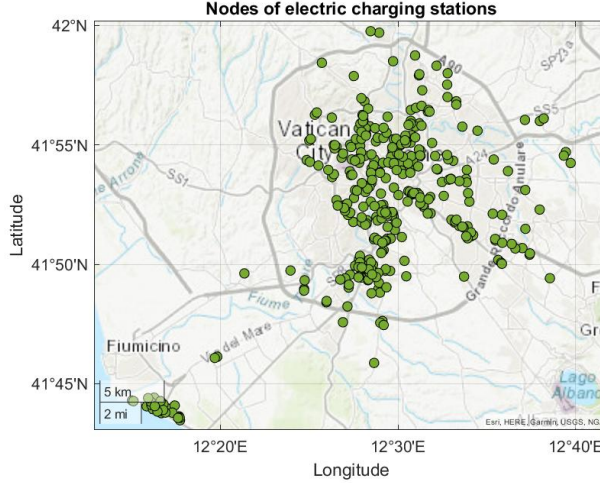
To address the integer linear problem, we use the Gurobi 10.0.0 optimizer. We test our approach considering four different scenarios, depending on the value of the parameter p : we set p equal to 72,107,143 and 179, that is a fraction of 20%, 30%, 40% and 50% of the total number of the sites, respectively. So, we take into account considerable increases in the number of charging points. We also apply the model to two matrices of distances, one in terms of travel minutes, one in terms of km.

The output of the approach is given by the matrix containing all the Boolean variables x_{ij} , where the diagonal represents the p -median. We remark that for all the tests we have conducted the procedures give the output in the order of seconds.

After identifying the sites to be upgraded, we estimate the number of chargers to be added to each of them. We make assumptions to satisfy as many requests from other nodes as possible, and at the same time, consider a plausible scenario. In order to do so, according to the output matrix from Problem (1), for each site a where additional charging points have to be installed, we compute the number of sites ($nodes_a$) for which the upgraded service

² OSRM API Documentation: <https://project-osrm.org/docs/v5.5.1/api/#general-options>

Figure 1. Map of existing nodes of electric charging stations in the city of Rome



Source: Authors' elaboration on existing positions generated via MATLAB.

is given at location a . Given maximum (denoted by max), minimum (denoted by min) and median ³ of $nodes_a$ over sites a , we estimate the number of charging points to install ($newpoints_a$) as follows:

$$\begin{aligned} newpoints_a &= 1 & \text{if } nodes_a &= min \\ newpoints_a &= 2 & \text{if } min < nodes_a \leq median \\ newpoints_a &= 3 & \text{if } median < nodes_a < max \\ newpoints_a &= 4 & \text{if } nodes_a &= max \end{aligned} \quad (2)$$

Fig. 2, 3 show the nodes where one has to increase the number of charging points in a map of Rome generated by MATLAB. We represent nodes in a color scale ranging from yellow (where to add 1 charger) to dark red (where to add 4 chargers), both for the distance matrix in minutes and in km.

In the summarizing tables, tab. 3 - 6, we report, for each municipality, the number of charging points to be installed. We note no differences in our analysis if distances are evaluated in terms of space or time. Furthermore, as for the sensitivity analysis we perform with respect to the value of parameter p , the number of charging points to be installed increases significantly from $p = 72$ to $p = 107$, while, for larger values of p , the growth of the number of new chargers is smaller.

³ We considered the median and not the mean to get integer numbers

Table 3. Summary table of the new chargers to install, matrix in minutes, $p=72$ and $p=107$

Municipality	Nodes to upgrade $p=72$	Chargers to add $p=72$	Nodes to upgrade $p=107$	Chargers to add $p=107$
I	6	14	12	27
II	7	18	11	27
III	4	8	6	11
IV	5	9	7	11
V	3	6	5	9
VI	3	6	5	7
VII	9	20	14	27
VIII	6	14	9	20
IX	9	20	13	27
X	6	15	5	14
XI	3	5	5	8
XII	2	5	3	7
XIII	2	4	4	7
XIV	3	6	3	7
XV	4	7	5	8
Total	72	157	107	217

Table 4. Summary table of the new chargers to install , matrix in km, $p=72$ and $p=107$

Municipality	Nodes to upgrade $p=72$	Chargers to add $p=72$	Nodes to upgrade $p=107$	Chargers to add $p=107$
I	7	16	11	25
II	6	16	12	27
III	4	8	6	11
IV	4	8	7	11
V	3	6	5	9
VI	3	6	6	8
VII	8	18	13	27
VIII	6	15	8	19
IX	9	20	14	28
X	6	14	6	15
XI	3	5	4	6
XII	2	5	3	7
XIII	3	6	3	6
XIV	3	6	3	7
XV	5	7	6	9
Total	72	156	107	215

Figure 2. Map of additional charging points for the distance matrix in minutes, created with MATLAB

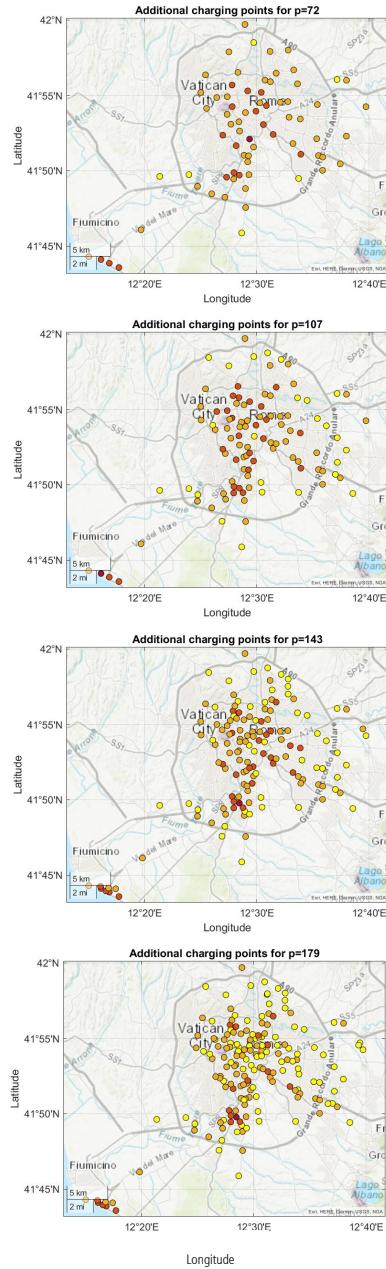


Figure 3. Map of additional charging points for the distance matrix in km, created with MATLAB

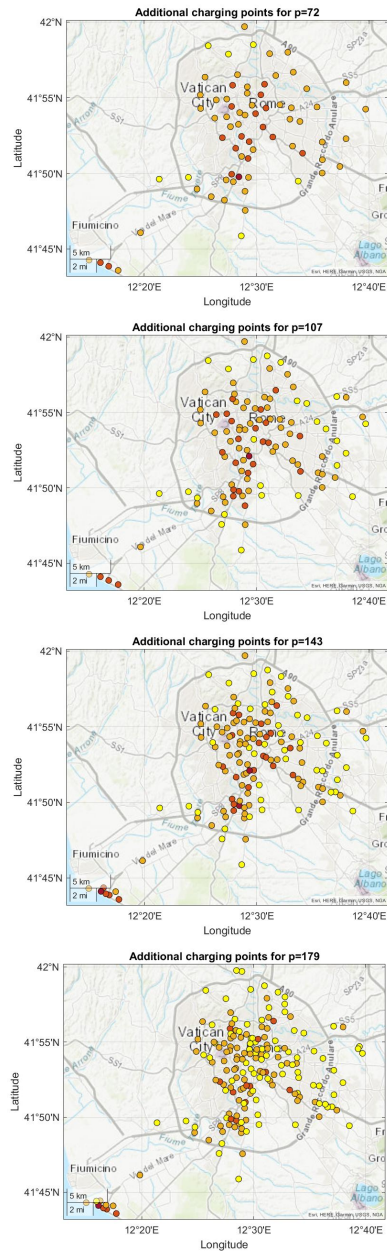


Table 5. Summary table of the new chargers to install, matrix in minutes, $p=143$ and $p=179$

Municipality	Nodes to upgrade $p=143$	Chargers to add $p=143$	Nodes to upgrade $p=179$	Chargers to add $p=179$
I	19	38	25	39
II	17	34	23	40
III	10	15	11	15
IV	7	11	9	12
V	6	11	10	12
VI	7	8	8	8
VII	15	31	20	36
VIII	12	25	16	28
IX	17	34	19	36
X	9	23	9	23
XI	5	8	7	12
XII	4	9	5	9
XIII	4	7	5	8
XIV	4	7	5	8
XV	7	10	7	10
Tot	143	271	179	296

Table 6. Summary table of the new chargers to install, matrix in km, $p=143$ and $p=179$

Municipality	Nodes to upgrade $p=143$	Chargers to add $p=143$	Nodes to upgrade $p=179$	Chargers to add $p=179$
I	18	36	22	39
II	16	34	24	39
III	9	15	10	15
IV	8	11	9	12
V	8	12	10	12
VI	7	8	8	8
VII	17	34	23	38
VIII	11	24	13	25
IX	17	34	20	35
X	9	24	11	26
XI	4	6	6	9
XII	4	9	5	10
XIII	4	7	5	8
XIV	4	7	5	8
XV	7	10	8	10
Tot	143	271	179	294

5 Charging station congestion and waiting times

Focusing on demand, we also study charging station congestion with the aim of deriving waiting times estimates. More precisely, we deal with time and travel distance to reach the nearest node if the stations at the considered location and in the surrounding area are occupied.

We deal with four different cases when considering a location: the two nearest nodes are occupied, the three nearest nodes are occupied, the four nearest nodes are occupied, the eight nearest nodes are occupied.

Then, we calculate the Probability Density Function (PDF) and the percentiles of the distance distribution in minutes and in km. Namely, we order the results (i.e., minutes/km to reach the nearest nodes) from the largest one to the smallest one and take the values corresponding to different percentiles to study the distribution. We use the results to represent the empirical PDF and identify the most frequent values, normalizing the number of events to have a frequency between 0 and 1. The results are reported in tables 7-9 below and in the plots 4-6 in the Appendix.

If we analyze congestion when distances in km are considered (see tab.7 and fig. 4), we notice that, on average, drivers do not have to travel long distances in case nearby stations are occupied. For instance, to reach the 5th nearest node, drivers have to travel less than 1.5 km in 50% of cases, and only 5% of cases require more than 5.5 km. To reach the 9th nearest node, 2 km and 6.5 km have to be covered in 50% and 5% of cases, respectively.

If we consider the distance matrix as expressed in time, without traffic, the picture does not change much (see tab.8 and fig. 5). For example, if the stations of the considered location and of the three nearest nodes are occupied, the time to reach the 4th nearest node is less than 2.35 minutes in 50% of cases and, only in 5% of cases it is greater than 8.5 minutes. But such a scenario is almost unrealistic for a busy city like Rome.

Table 7. Congestion with distance matrix in km

	5perc	25perc	50perc	75perc	95perc
to the 3th nearest node	0.36	0.72	1.06	1.65	4.52
to the 4th nearest node	0.44	0.87	1.24	1.87	5.24
to the 5th nearest node	0.56	0.99	1.38	2.02	5.38
to the 9th nearest node	0.75	1.39	1.87	2.59	6.46

So, it is worthwhile to study how these values change in presence of traffic, but we cannot obtain this information from the API we rely on. In absence of actual data, we attempt to estimate a distance matrix with traffic correction by adding, to the distance in minutes, an increasing multiplying factor ranging from 0.5 (in case of shorter distances in km) to 1 (in case of longer distances in km).

Indeed, the analysis conducted when traffic correction is adopted reveals longer travel times of about 5-10 minutes, depending on the circumstances (see tab. 9 and fig. 6). Hence, the time needed to reach the 4th nearest node is about 4 minutes in 50% of cases, and in 5%

Table 8. Congestion with distance matrix in minutes

	5perc	25perc	50perc	75perc	95perc
to the 3th nearest node	0.73	1.44	2.06	3.09	7.33
to the 4th nearest node	0.86	1.61	2.36	3.44	8.48
to the 5th nearest node	1.09	1.90	2.62	3.61	8.96
to the 9th nearest node	1.46	2.53	3.43	4.54	10.14

of cases it is above 13 minutes, while to reach the 9th nearest node, drivers need more than 5 minutes in 50% of cases and more than 15 minutes in 5% of cases.

Therefore, since, if traffic is accounted for, the time to reach the furthest stations can be long, one can expect queues to form at the stations closest to the demand point. For this reason, in order to quantify the improvements resulting from the installation of new chargers, it is useful to study the fractions of demand that can be satisfied in a certain area in an hour, both in the current situation and after applying our approach.

Table 9. Congestion with distance matrix in minutes with estimated traffic correction

	5perc	25perc	50perc	75perc	95perc
to the 3th nearest node	1.10	2.16	3.08	4.64	10.99
to the 4th nearest node	1.29	2.42	3.54	5.15	12.72
to the 5th nearest node	1.63	2.84	3.94	5.41	13.44
to the 9th nearest node	2.19	3.80	5.15	6.82	15.21

6 The arrival rate λ

We try to calculate the flow of charging demand that can be satisfied at each node and its surroundings.

Following the work of Marianov and ReVelle (1996) and referring to the queuing theory, we calculate the customers' arrival rate (λ_i) at each node and in a surrounding area, which indicates how many charging requests per hour each node and its neighborhood can meet. We calculate this metric in the initial conditions and after applying our approach, so as to capture the improvements in meeting the demand that would result from adding new chargers ⁴.

We rely on the formula proposed by Marianov and ReVelle (1996) to compute the prob-

⁴ We do this study only using the matrix in time because queuing theory is based on the study of waiting times.

ability α of at least one "server" being available within the radius considered:

$$1 - \left(\frac{\rho_i}{s_i} \right)^{s_i} \geq \alpha, \quad (3)$$

where $\rho_i = \frac{\lambda_i}{\mu_i}$ is the traffic intensity since $\frac{1}{\mu_i}$ is the single server's mean service time and s_i is the number of available servers in the considered area. We measure the arrival rate λ_i for each node i as follows:

$$\lambda_i = \mu_i s_i (1 - \alpha)^{(1/s_i)}. \quad (4)$$

For each node, we consider the total number of charging points within two minutes, including those at the node itself. This value is the number of chargers easily reachable from each node, that is the number of available servers s_i within the radius. We set a radius of two minutes, considering that, even with traffic, it is an easy distance to cover.

Then, we fix the single server's mean service time $\frac{1}{\mu_1} = 1.5$ i.e. we consider an average charging time of an hour and a half ⁵. We focus on three different levels of reliability of the probability of at least one server being available within the range considered, i.e. $\alpha = 0.90, 0.95, 0.98$.

We then calculate how many requests can be fulfilled in one hour at a node and its neighbors up to a two-minute radius. To make a comparison, keeping the other parameters unchanged, we calculate again the arrival rate λ after applying our approach and increasing the number of chargers accordingly, and thus updating the number s_i of available servers in the selected area.

The results show, as detailed next, that in sites where additional charging points are installed, an increase in the number of requests that can be met is experienced.

We report statistics related to the arrival rate for the three α reliability levels and for the four scenarios about the number p of sites to be upgraded. Referring to tab. 10, 11, 12 and plots concerning the empirical PDF (fig. 7, 8, 9) reported in the Appendix, increasing the confidence level of finding at least one unoccupied server leads to a reduction of λ . We also observe that the percentile values of the distribution of the new arrival rate do not change substantially from $p=72$ to $p=179$, except regarding 5th and 95th percentiles, which, however show minor variations.

So, one might infer that, if new charging points are well positioned to optimize the distance between the different sites, upgrading already existing nodes by 20%-30% may suffice to satisfy more requests. As a consequence, it would be possible to meet the new charging demand, while also keeping construction time and costs at bay.

Overall, the application of our approach leads to a significant increase of the value of λ . Indeed, with the activation of new charging points, each upgraded site is able to meet more charging demands. For example, to date, with a 90% probability of finding an unoccupied server within a 2-minute radius, in 75% of cases, the areas within 2-minute radius from each node's location are able to serve up to 6 cars per hour. Following the indications given by our approach, this number is 8 when $p = 72$, and almost 9 for other values of p .

⁵ We used an indicative charging value, considering that the stations are both quick and fast. For actual charging times, see MotusE (2022)

Table 10. Summary statistics for the arrival rate with $\alpha = 0.90$

P=72	5perc	25perc	50perc	75perc	95perc	P=107	5perc	25perc	50perc	75perc	95perc
Initial λ	0.07	0.93	2.73	5.95	17.86	Initial λ	0.07	0.93	2.73	5.95	17.86
New λ	0.21	1.50	4.00	7.92	21.85	New λ	0.42	1.50	4.00	8.58	21.85

P=143	5perc	25perc	50perc	75perc	95perc	P=179	5perc	25perc	50perc	75perc	95perc
Initial λ	0.07	0.93	2.73	5.95	17.86	Initial λ	0.07	0.93	2.73	5.95	17.86
New λ	0.42	2.10	4.00	8.58	23.84	New λ	0.42	2.10	4.65	8.58	23.84

 Table 11. Summary statistics for the arrival rate with $\alpha = 0.95$

P=72	5perc	25perc	50perc	75perc	95perc	P=107	5perc	25perc	50perc	75perc	95perc
Initial λ	0.03	0.74	2.43	5.59	17.44	Initial λ	0.03	0.74	2.43	5.59	17.44
New λ	0.14	1.26	3.67	7.54	21.42	New λ	0.30	1.26	3.67	8.19	21.42

P=143	5perc	25perc	50perc	75perc	95perc	P=179	5perc	25perc	50perc	75perc	95perc
Initial λ	0.03	0.74	2.43	5.59	17.44	Initial λ	0.03	0.74	2.43	5.59	17.44
New λ	0.30	1.83	3.67	8.19	23.41	New λ	0.30	1.83	4.30	8.19	23.41

 Table 12. Summary statistics for the arrival rate with $\alpha = 0.98$

P=72	5perc	25perc	50perc	75perc	95perc	P=107	5perc	25perc	50perc	75perc	95perc
Initial λ	0.01	0.54	2.08	5.14	16.89	Initial λ	0.01	0.54	2.08	5.14	16.89
New λ	0.08	1.00	3.27	7.06	20.87	New λ	0.19	1.00	3.27	7.70	20.87

P=143	5perc	25perc	50perc	75perc	95perc	P=179	5perc	25perc	50perc	75perc	95perc
Initial λ	0.01	0.54	2.08	5.14	16.89	Initial λ	0.01	0.54	2.08	5.14	16.89
New λ	0.19	1.52	3.27	7.70	22.86	New λ	0.19	1.52	3.88	7.70	22.86

7 Conclusion

The use of electric vehicles is spreading in all countries: this is one of the actions that can be taken to tackle climate change and to help decarbonization. Accordingly, a widespread network of charging stations needs to be implemented in all urban centers. We choose to address this issue in the city of Rome by relying on an optimization p-median-like technique. In summary, our goal is to devise a simple methodology that can be relied upon by the city administration to make decisions on where to place new charging points to improve charging service. With such aim in mind, a crucial feature of our approach is its simplicity: to streamline construction procedures and to keep construction costs at bay, we focus on already existing charging sites; we then resort to a p-median-like optimization model to identify charging sites where to install additional chargers. The best charging sites to be upgraded are selected by minimizing their distances from locations where demand is assumed to appear. The resulting model belongs to the class of linear integer programming problems; also, one can rely on available efficient algorithms to compute solutions. Hence, the overall approach turns out to be easily interpretable, implementable and replicable.

Despite its simplicity, the model appears to be accurate, as witnessed by the results that we have obtained in our numerical analysis; in fact, empirical evidence supports our choices. We remark that the tests we have conducted are based on the real-world data related to the context of the city of Rome. In the *a posteriori* study, we focus on demand, whose dynamics has not been factored in explicitly in the model. More in detail, we rely on queuing theory to give estimates on the number of charging requests that can be met including the new charging points. Notably, we also incorporate the presence of traffic in our study.

Moreover, we consider several scenarios to perform a sensitivity analysis and to investigate the behavior of the output of our approach with respect to some problem parameters values.

The coverage of charging stations, in most cases, results to be correlated with the population density of municipalities. Indeed, applying our approach essentially requires new charging points to be installed where they are already numerous and, mainly, in most populated municipalities. Even so, the most peripheral areas are still not perfectly covered. However, we point out that to determine number and position of new chargers to be implemented, we use simplifying assumptions based on the possibility of being able to easily accommodate requests coming from other nodes.

In terms of charging demand that can be met, in almost all cases, the improvements resulting from the suitable increase in the number of charging points at existing nodes are significant. They do not seem to depend substantially on the number of nodes to be upgraded (i.e. whether $p=72$, $p=107$, $p=143$, or $p=179$): this indicates that, if new charging points are well located, even if fewer of them are built, charging sites can handle the overall demand.

Clearly, our study leaves room for further developments: as future research, we would like to enhance our analysis by using more elaborated models in the optimization phase. For instance, we intend to treat demand not only in an *a posteriori* analysis, but already in the optimization model. For this purposes, we wish to consider, e.g. Competitive Location

models (see e.g., Drezner and Eiselt (2023)), set covering and maximal covering location models (see e.g., Farahani et al. (2012)) and Capacitated Facility location models (see e.g., Current and Storbeck (1988)). In addition, we would like to compare some of these facility location models to identify the ones that suit the most the context of complex and crowded cities like Rome.

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A Additional results

Figure 4. PDF in case of congestion for matrix in km

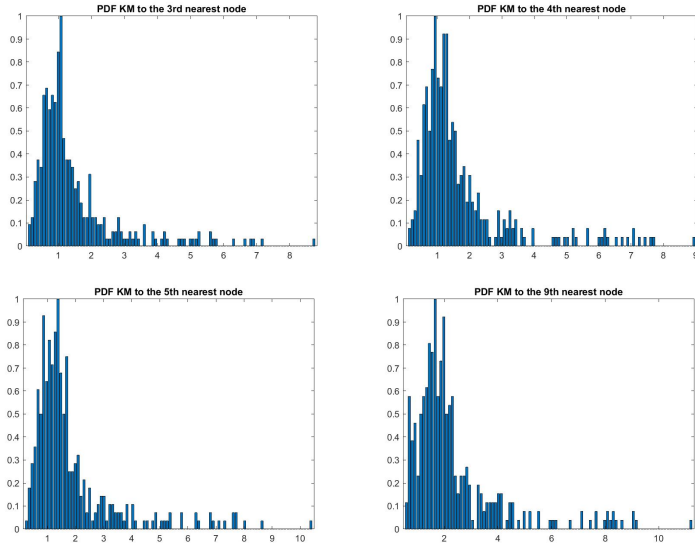


Figure 5. PDF in case of congestion for matrix in minutes

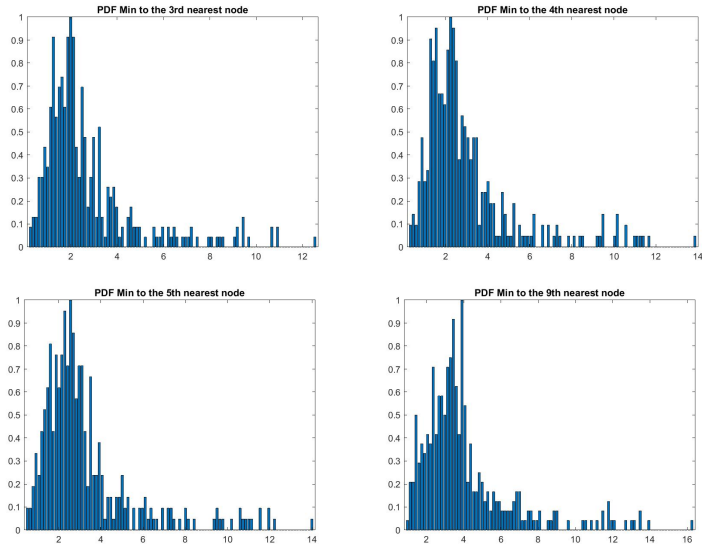


Figure 6. PDF in case of congestion for matrix in estimated minutes of traffic

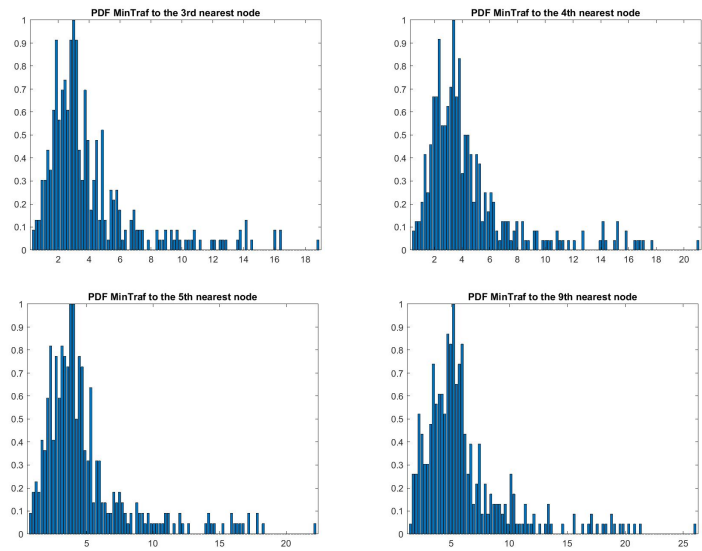


Figure 7. PDF of the arrival rate with $\alpha = 0.90$

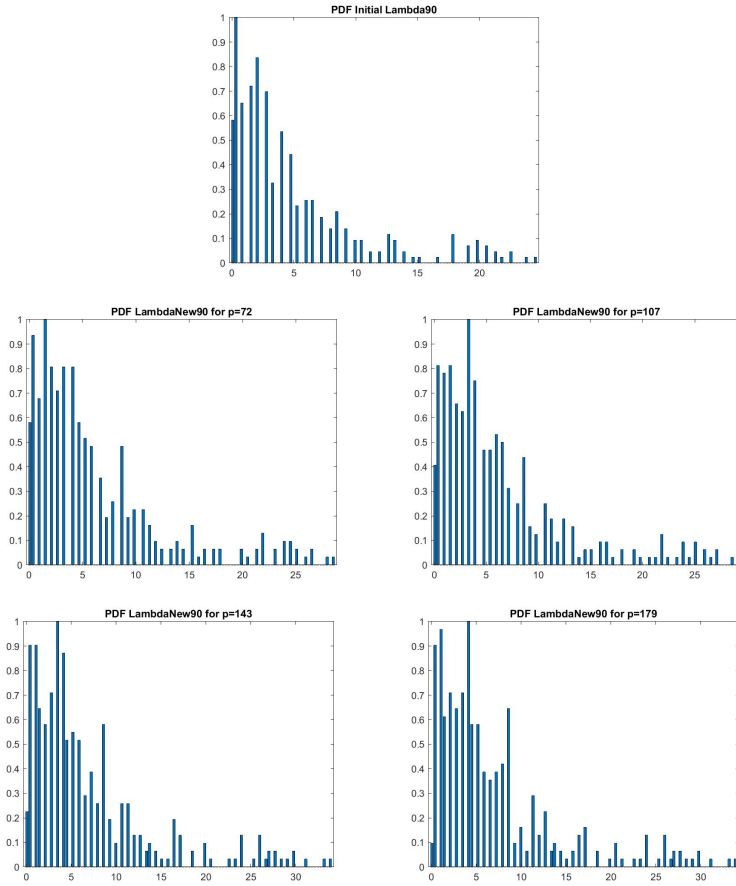


Figure 8. PDF of the arrival rate with $\alpha = 0.95$

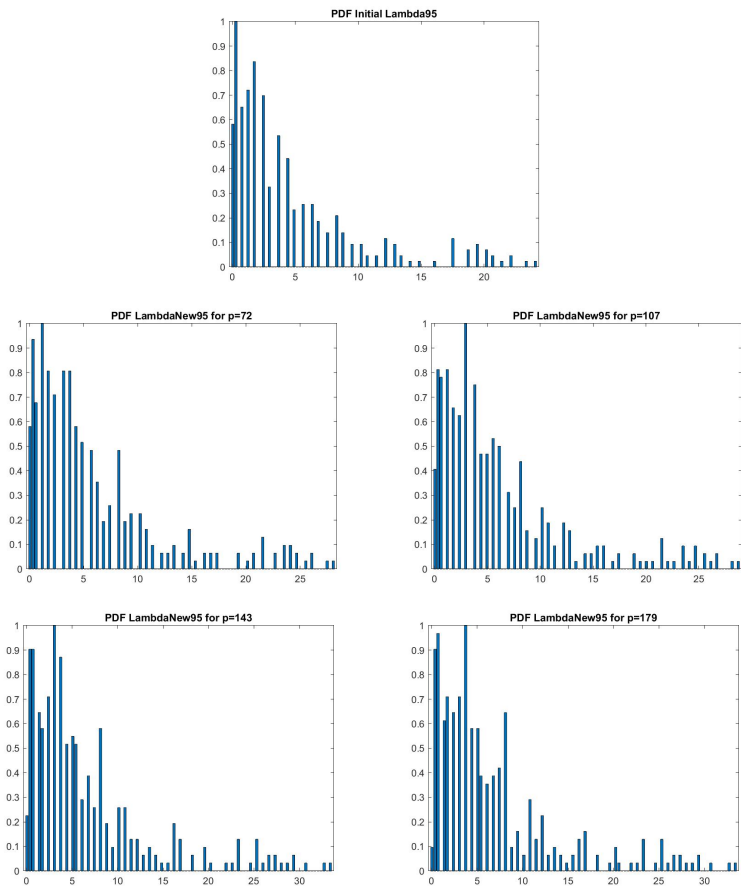
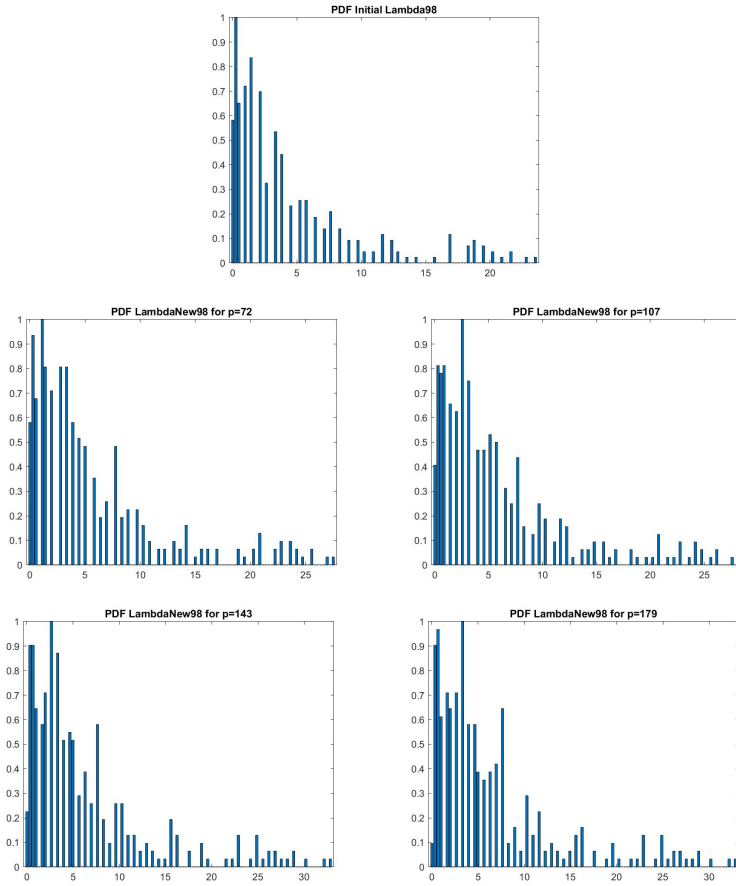


Figure 9. PDF of the arrival rate with $\alpha = 0.98$





Research Paper

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“MOBILITÀ RICHIAMA MOBILITÀ”? UNO STUDIO EMPIRICO SULLE INTENZIONI DI ESPATRIO DEGLI STUDENTI DELL'UNIVERSITÀ DI UDINE

Abstract

The recent increase in emigration of young Italian university graduates represents a significant challenge for the country's economy, reflecting a global phenomenon of academic and professional mobility. This paper focuses on the University of Udine in order to understand the emigration intentions of attending students who were about to complete a Bachelor's degree. Through analysing a sample of more than ten thousand questionnaires completed between 2018 and 2022 by Bachelor's degree candidates, we investigated their international mobility intentions and factors contributing to the decision to seek opportunities abroad. Using a logit model, it was possible to highlight the significant impact of previous international mobility experiences during university studies, such as those related to the Erasmus programme. This study confirms that international student mobility may lead to more emigration, bolstering the conclusions of a previous report by AlmaLaurea, an Italian consortium linking universities, graduates and companies.

Keywords: emigration, tertiary education, census survey, pandemic, logit models.

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[°]Department of Economics and Statistics, University of Udine, Italy. Il contributo è frutto del lavoro congiunto degli autori, ma la sua stesura finale va attribuita per il paragrafo 3 a L. Pagani, mentre il resto a G.P. Zaccomer.

1 Introduzione

La forte ripresa del fenomeno dell'emigrazione (Bonifazi, 2017), registrata anche tra i giovani laureati italiani (ISTAT, 2017), riflette una lunga tendenza internazionale verso la mobilità studentesca e lavorativa (Coccia, 2023) – specialmente all'interno dell'Unione Europea dove questa mobilità è fortemente auspicata – ma implica altresì una rilevante sfida per il futuro dell'intero “sistema Italia”. Diventa quindi cruciale indagare le determinanti che spingono questi giovani a lasciare, anche momentaneamente, il loro paese.

La forte ripresa del fenomeno dell'emigrazione (Bonifazi, 2017), registrata anche tra i giovani laureati italiani (ISTAT, 2017), riflette una lunga tendenza internazionale verso la mobilità studentesca e lavorativa (Coccia, 2023) – specialmente all'interno dell'Unione Europea dove questa mobilità è fortemente auspicata – ma implica altresì una rilevante sfida per il futuro dell'intero “sistema Italia”. Diventa quindi cruciale indagare le determinanti che spingono questi giovani a lasciare, anche momentaneamente, il loro paese.

L'obiettivo principale di questo contributo consiste proprio nel verificare empiricamente, attraverso i dati raccolti tramite un'indagine censuaria pluriennale, se questo principio si conserva anche a livello locale per un ateneo del Nord-Est, nello specifico l'Università di Udine. Tale scelta come caso di studio è motivata sia dalla sua posizione geografica, situata in una regione di confine altamente permeabile e con una lunga tradizione migratoria (Bertuzzi & Fait, 2010; De Liva, 2021), sia dal fatto che nel 2023 il Friuli Venezia Giulia è stato identificato dalla Commissione Europea come una delle regioni cadute nella cosiddetta *Talent Development Trap* (TDT).

Prima di concentrare l'attenzione sul caso di studio, è necessario ricordare che la letteratura demografica ha già messo evidenza come il fenomeno migratorio non si sia manifestato in modo omogeneo, ma piuttosto in forma complessa e articolata, con radici che affondano ben prima dell'unificazione nazionale (Tirabassi, 2018). Circoscrivendo l'attenzione al solo periodo post-bellico, Bonifazi (2013) individua due fasi fino alla crisi finanziaria del 2007-08. A partire da tale crisi, Pugliese (2018) conferma l'esistenza di una terza fase dell'emigrazione italiana, denominata anche “nuova emigrazione” (Gjergji, 2015; Sanfilippo, 2017; Bonifazi *et al.*, 2021).

Per evitare narrazioni parziali¹, va subito sottolineato che la maggior parte dei “nuovi emigranti” riguarda ancora le “braccia”, ossia persone con un titolo di studio che arriva al massimo alla maturità o equipollente (Colucci, 2018). Questi ultimi decenni sono però caratterizzati da una crescente emigrazione di giovani laureati che lasciano il bel paese in cerca di opportunità lavorative o educative all'estero², tenuto anche conto che questi possono fare esperienze all'estero ben prima del raggiungimento del titolo accademico grazie ai programmi internazionali di mobilità studentesca (King, 2003; Cocorullo & Pisacane, 2017) che, come già esplicitato a livello nazionale da AlmaLaurea, possono fungere da catalizzatrici per una futura decisione di espatrio.

1 Dai mezzi di comunicazione emergono spesso due narrazioni contrapposte: la prima riguarda gli sbarchi “di massa” degli immigrati, mentre la seconda è centrata sulla fuga dei giovani italiani (Attanasio & Ricci, 2019). A livello scientifico, è però importante sottolineare che questi sono solo due aspetti di un quadro migratorio attuale piuttosto complesso.

2 Questa crescita è ovviamente correlata anche alla maggiore istruzione delle nuove generazioni.

La fuoriuscita di giovani laureati da un paese è una delle facce del fenomeno del brain drain, termine introdotto negli anni Sessanta per indicare l’emigrazione di scienziati inglesi verso gli Stati Uniti (Balmer *et al.*, 2009) e, successivamente, definito da Grubel (1994) come la migrazione di persone altamente qualificate, formate in un paese, ma che risiedono e lavorano in un altro.

Anche se questo lavoro non si propone di esplorare i modelli sottostanti ai concetti di *brain drain/gain/circulation*³ (come discusso da Beltrame, 2007; Krasna, 2013; Saint-Blancat, 2017), i quali coinvolgono anche i flussi migratori in entrata, è comunque necessario focalizzare l’attenzione sulla letteratura relativa alla loro misurazione. Infatti, nonostante i progressi teorici, persistono diverse sfide nella quantificazione di questi concetti (Livi Bacci, 2014; SGI, 2018). Oltre agli ostacoli legati alle fonti statistiche, che si basano spesso su registri amministrativi con finalità diverse (Bonifazi & Strozza, 2006), rimane ancora l’ambiguità presente nelle stesse definizioni di “cervello”, “talento” o di “persona altamente qualificata” poiché questa varia tra i differenti studi internazionali, così come sottolineato da Albano e Carella (2013). Già in precedenza Brandi (2001) aveva rimarcato la problematica sostenendo che la maggior parte degli studiosi era concorde nel considerare “altamente qualificati” coloro che hanno conseguito un titolo di istruzione terziaria, mentre Beltrame (2008) conferma successivamente che questa prassi è soprattutto invalsa all’interno della letteratura economica dove si privilegia proprio il possesso di un titolo di istruzione di tale livello. Questo studio si allinea a quest’ultimo approccio perché indaga le intenzioni migratorie degli studenti che stanno per conseguire un primo titolo di laurea, triennale o a ciclo unico, oppure uno successivo di specializzazione biennale.

1.1 Giovani che espatriano: un bilancio nazionale decennale

Un quadro informativo sulla situazione nazionale emerge chiaramente dal bilancio decennale elaborato da ISTAT (2023) come elemento di novità del rapporto annuale sulle migrazioni della popolazione residente. Questo bilancio rivela che, nel periodo tra il 2012 e il 2021, oltre un milione di persone hanno lasciato l’Italia per stabilirsi all’estero. L’aspetto più importate, che caratterizza la “nuova emigrazione” italiana come precedentemente evidenziato, è rappresentato dal fatto che circa un quarto di questi espatriati erano laureati. Focalizzando l’attenzione sui soli 25-34enni, l’Istituto certifica che la differenza annuale tra partenze e rientri dei giovani laureati si è mantenuta saldamente negativa, senza invertire la tendenza nemmeno durante la pandemia. Questo *trend* demografico ha portato ad una perdita netta di oltre 79mila giovani laureati nell’arco dell’intero decennio considerato, con circa 120mila in uscita e 41 in entrata.

Rizzuto (2023), discernendo su come si può “invertire” tale emorragia, ripropone la stima fatta da Bruno e Tucci (2023) del Sole 24 Ore che, incrociando i dati ISTAT appena citati con quelli ministeriali, arrivano ad affermare che circa il 5-8% dei laureati ha lasciato il bel paese. Più recentemente, ISTAT (2023b), all’interno del dominio dell’Innovazione, Ricerca e Creatività utilizzato per lo studio del *Benessere Equo e Sostenibile* (BES) dei territori, utilizza un indicatore sulla mobilità dei laureati tra i 25 e i 39 anni: nel 2021 l’Italia perde verso l’estero 2,7 laureati per mille residenti di pari età e livello di istruzione.

3 Per una loro definizione ufficiale corrente si veda il glossario IOM (2019).

1.2 Uno sguardo ai dati regionali

Per comprendere la situazione regionale del Friuli Venezia Giulia (FVG) è possibile andare oltre l'analisi di Zaccomer (2023) – basata principalmente su dati ISTAT delle iscrizioni e cancellazioni dalle anagrafi comunali e altri indicatori internazionali – che dimostra come il fenomeno della migrazione dei laureati per l'estero interessi anche questa regione di confine.

Partendo dagli allegati socio-statistici del *Rapporto italiani nel mondo*, considerando la recente serie storica del quoziente tra gli iscritti all'*Anagrafe degli Italiani Residenti all'Estero* (AIRE) e la popolazione residente in FVG⁴, si osserva un suo aumento dal 14,8% del 2018 al 16,7% del 2023. Tale variazione è attribuibile sia al calo della popolazione, che nel 2021 è scesa sotto l'1,2 milioni di individui, sia all'incremento del numero di iscritti all'*Anagrafe* – *stock* che risulta comunque sottostimato come evidenziato da Krasna (2013) e, più recentemente, da Latmiral *et al.* (2023) – che non si è arrestato nemmeno durante la pandemia.

In aggiunta a questi dati consolidati, questo contributo vuole introdurre due elementi di novità per una visione più completa della situazione regionale. Innanzitutto, si vuole analizzare la più recente mobilità degli studenti universitari iscritti presso le università del FVG. Per ottenere un'idea generale su tale mobilità è possibile far riferimento al rapporto sulla mobilità della conoscenza redatto dal Sistema Scientifico e dell'Innovazione del FVG (2023). Per l'A.A. 2021-22, il rapporto segnala un aumento degli studenti in mobilità *outgoing*, da 474 a 1.158, rispetto all'anno accademico precedente. Le maggior parte delle scelte riguarda i paesi dell'Unione Europea, che rappresenta ben l'88% delle destinazioni, mentre la metà di questi studenti è iscritta a corsi inerenti alle Scienze Umane e Sociali. È importante notare che questo riavvio degli scambi internazionali viene confermato anche degli studenti stranieri in mobilità *incoming* che sono aumentati da 139 a 660 unità. Tuttavia, la percentuale di studenti iscritti a corsi riguardanti le Scienze Umane e Sociali scende al 38%. Dal punto di vista dell'analisi qui condotta, è interessante considerare il rapporto tra gli studenti *outgoing* e quelli *incoming* per il quale si osserva una diminuzione da 3,4 unità dell'A.A. 2020-21 a 1,8 dell'A.A. 2021-22. In altre parole, nonostante l'aumento di entrambi i flussi di mobilità studentesca, gli studenti regionali sembrano essere ancora titubanti a trascorrere un periodo di studio all'estero rispetto ai loro colleghi stranieri.

1.2.1 La capacità di attrazione regionale

Un secondo elemento di novità punta ad esaminare la capacità del FVG di attrarre i talenti. Questa capacità è di fondamentale importanza per il futuro sviluppo economico della regione poiché è direttamente legata al suo potenziale di crescita, quindi inversamente correlata al fenomeno della fuga all'estero delle persone altamente qualificate.

A tal fine, si ricorre al *Regional Attractiveness Index* (RAI) sviluppato da Fano e Toschi (2023a). Dal punto di vista della sua costruzione (OECD & JRC, 2008), il RAI si ottiene attraverso una media ponderata degli indicatori di base normalizzati nell'intervallo [0; 100], dove il sistema di pesi è basato sui *loading* di un'analisi delle componenti principali,

4 Cfr. Fondazione Migrantes (2018-23) su dati ISTAT e AIRE.

seguendo quanto fatto in Navarro *et al.* (2014). Per costruzione, il RAI può assumere valori compresi nello stesso intervallo degli indicatori di base.

Secondo gli autori, tale indicatore composito si distingue dagli altri proposti da istituzioni internazionali (Tuccio, 2019) grazie alla sua esclusiva focalizzazione sull’attrattività nei confronti dei talenti, aspetto che si concretizza nell’opportuna scelta di 26 indicatori di base. Questi sono stati raggruppati in cinque dimensioni tematiche; le prime quattro riguardano: l’economia in termini di produzione, povertà e occupazione; la capacità di attrazione; il potenziale innovativo degli occupati in attività finanziarie, scientifiche e tecniche; la capacità di trattenere le persone. La quinta dimensione, definita *Global Knowledge Skills* (GKS), riguarda non solo i giovani istruiti, ma anche i lavoratori nei settori creativi e della conoscenza, i brevetti e le infrastrutture (aeree, stradali e ferroviarie).

I dati utilizzati per la costruzione del RAI provengono da fonti OECD ed Eurostat con un orizzonte temporale al 2021, mentre il dettaglio territoriale è quello dell’Unione Europea dei 27 paesi post-*Brexit* al livello NUTS-2, equivalente alle regioni italiane⁵. La prima analisi svolta riguarda la scala nazionale per singolo paese dell’Unione: considerando la mediana, il podio viene conquistato dal Lussemburgo, dai Paesi Bassi e dalla Svezia, mentre l’Italia conquista il dodicesimo posto. La misura di posizione non è quindi del tutto sfavorevole, anche se forse non è quella che ci si aspetterebbe per un paese membro del G7. Considerando una misura di variabilità che non risente dei valori estremi della distribuzione, ossia lo scarto interquartile, gli autori mostrano come sia proprio il bel paese a far registrare la più grande eterogeneità interna.

Per illustrare i risultati a livello NUTS-2 si è costruita la tabella 1, mettendo in rilievo i primi tre e gli ultimi tre paesi, nonché la singola posizione di ogni regione italiana. Questo permette di capire l’intervallo empirico di variazione del RAI che va da 16,74 a 65,49. Il podio è detenuto dall’area di Stoccolma, dall’Ile-de-France e dall’Oberbayern, mentre l’ultima posizione dalla regione francese d’oltremare della Guyana. Gli autori avvertono subito della presenza di un *effetto capitale* che spinge la regione di appartenenza, tanto che le prime tre posizioni ricadono in questa casistica.

L’analisi dei dati rivela una situazione piuttosto complessa per l’Italia, ma ad ogni modo nessuna delle sue regioni viene considerata dagli autori “altamente attrattiva” per i talenti in quanto i valori del RAI sono sempre inferiori a 50. Esaminando il loro posizionamento all’interno della tabella 1 (delimitato da linee tratteggiate), si può osservare che si va dal 38° posto della Lombardia al 222° della Calabria. Oltre alla Lombardia, soltanto altre otto regioni italiane ritrovano nel gruppo delle “regioni inseguatrici” di quelle più attrattive, compreso il Lazio che gode dell’effetto capitale. Le restanti regioni sono classificate come “in cerca di attrattività” o come le “meno attrattive” dell’Unione, sempre secondo la metrica del RAI.

Le regioni del Nord-Est si collocano prevalentemente nel gruppo delle “regioni inseguatrici”, ad eccezione della Provincia Autonoma di Bolzano che si colloca più indietro, ossia tra quelle in cerca di attrattività. L’analisi degli indicatori evidenzia che queste regioni possiedono, in gran parte, profili piuttosto simili e non molto distanti dalle regioni più performanti: presentano livelli di ricchezza piuttosto alti con buone opportunità di lavoro,

5 Rispetto alle 270 regioni presenti a livello NUTS-2, sono state prese in esame soltanto 230 a causa di dati mancanti. Cfr. Fano e Toschi (2023a).

un'elevata qualità delle istituzioni e bassi livelli di corruzione. Tuttavia, il punto debole riguarda gli indicatori dei *Global Knowledge Skill* (GKS), in particolare lo scarso numero di laureati tra i giovani di 25-34 anni, la ridotta quota di lavoratori nei settori creativi e della conoscenza e la minor produzione di marchi e brevetti. Gli autori attribuiscono quest'ultima difficoltà più all'arretratezza della cultura imprenditoriale che alle ridotte dimensioni delle imprese nordestine.

Tabella 1. Posizione e classificazione delle regioni italiane all'interno degli estremi della classifica europea RAI con situazione rispetto alla Talent Development Trap (TDT)

Rank	Regione NUTS-2	Paese UE-27	RAI	Classe	Classificazione regione	TDT
1	Stockholm	Svezia	62,49	≥60	top	no
2	Île-de-France (Paris)	Francia	61,94	≥60	top	no
3	Oberbayern (München)	Germania	61,21	≥60	top	no
38	Lombardia	Italia	47,76	(40, 50]	inseguitrice	no
58	Veneto	Italia	44,59	(40, 50]	inseguitrice	no
62	Lazio	Italia	44,38	(40, 50]	inseguitrice	no
63	Emilia-Romagna	Italia	43,92	(40, 50]	inseguitrice	no
69	Friuli Venezia Giulia	Italia	43,41	(40, 50]	inseguitrice	sì
72	Provincia Aut. di Trento	Italia	43,28	(40, 50]	inseguitrice	no
76	Piemonte	Italia	42,92	(40, 50]	inseguitrice	sì
89	Liguria	Italia	41,66	(40, 50]	inseguitrice	sì
99	Umbria	Italia	40,39	(40, 50]	inseguitrice	sì
104	Toscana	Italia	39,90	(30, 40]	in cerca di attrattività	no
118	Marche	Italia	39,03	(30, 40]	in cerca di attrattività	sì
154	Provincia Aut. di Bolzano	Italia	35,55	(30, 40]	in cerca di attrattività	no
157	Abruzzo	Italia	35,02	(30, 40]	in cerca di attrattività	sì
175	Molise	Italia	32,38	(30, 40]	in cerca di attrattività	sì
182	Sardegna	Italia	31,54	(30, 40]	in cerca di attrattività	sì
186	Basilicata	Italia	31,02	(30, 40]	in cerca di attrattività	sì
190	Puglia	Italia	30,39	(30, 40]	in cerca di attrattività	sì
197	Valle d'Aosta	Italia	29,68	¡30	meno attrattiva	sì
207	Campania	Italia	28,05	¡30	meno attrattiva	sì
211	Sicilia	Italia	27,20	¡30	meno attrattiva	sì
222	Calabria	Italia	25,84	¡30	meno attrattiva	sì
236	Åland	Finlandia	17,02	¡30	meno attrattiva	no
237	Ciudad de Ceuta	Spagna	16,95	¡30	meno attrattiva	sì
230	Guyane	Francia	16,74	¡30	meno attrattiva	no

Source: rielaborazione dei dati in Fano e Toschi (2023a) e (2023b)⁶ e Commissione Europea 6 (2023b). L'ultima colonna della tabella, denominata TDT, riporta la situazione rispetto alla "trappola di sviluppo dei talenti": "sì" significa che la regione è incorsa in tale situazione.

Dai risultati appena illustrati, emerge che il FVG, pur trovandosi in una posizione relativamente buona nel contesto nazionale, mostra una significativa distanza dalla regione top di maggiore attrazione per i talenti pari a circa 19 punti RAI, ossia del quasi 31%, risultando al pari delle altre regioni del Nord Est deficitaria nella dimensione GKS, in particolare per il basso numero di laureati rispetto alla media europea. Se a questo risultato si associa la dinamica della riduzione demografica, l'analisi diventa più completa, ma il FVG mostra una situazione ancor più precaria. Infatti, la Commissione Europea (2023a) ha individuato ben 46 regioni cadute nella "trappola dello sviluppo dei talenti", ossia regioni che, a fronte di un'accelerazione della riduzione delle forze lavoro, presentano un basso e stagnante numero di persone che hanno conseguito un 7 titolo di istruzione terziaria tra il 2015 e il

6 Mentre per le prime venti posizioni si può ricorrere direttamente alla tabella 3 del lavoro di Fano e Toschi (2023a), per quanto riguarda le sole posizioni delle regioni italiane è necessario fare riferimento alla tabella presente in Fano e Toschi (2023b). Le ultime tre posizioni, non pubblicate, sono state fornite direttamente dagli stessi autori.

2020⁷. La stessa Commissione riconosce tale “trappola” come un possibile rischio per la coesione territoriale dell’Unione, in termini di resilienza e competitività (De Keersmaecker & Favalli 2023), ma l’aspetto più preoccupante, per quanto riguarda il caso di studio qui proposto, consiste nel fatto che il FVG è l’unica regione del Nord-Est a trovarsi in questa situazione, mettendo a rischio le sue prospettive di crescita.

Alla luce di queste constatazioni, appare fondamentale monitorare costantemente le intenzioni all’espatrio dei laureandi di questa regione.

2 Metodologia e caratteristiche dell’indagine sui laureandi

Nel 2017, all’interno del progetto di ateneo denominato *Cantiere Friuli*⁸, è stata progettata una rilevazione sui laureandi dell’Università degli Studi di Udine che è entrata a regime l’anno successivo. L’obiettivo scientifico cardine di questo studio era soprattutto quello di misurare, e analizzare, la *Propensione all’Espatrio* (PaE) dei laureandi di un ateneo situato in una regione con una storica tradizione migratoria e dai confini permeabili. Accanto a tale propensione, si è indagata anche la durata ipotizzata del soggiorno all’estero, il problema delle barriere linguistiche e i paesi-destinazione ambiti da coloro che si sono espressi a favore dell’espatrio.

È essenziale sottolineare sin da subito che il termine “laureando” riguarda studenti che si trovano nella fase finale di diverse tipologie di corsi di studio come quelli a ciclo unico, oppure quelli del nuovo ordinamento universitario introdotto dal D.M. 509/99 suddiviso in una laurea triennale di primo livello, eventualmente seguita da una laurea biennale di secondo livello.

Il sistema “3+2” delle lauree di nuovo ordinamento comporta la presenza di una duplicazione nella compilazione del questionario da parte di uno studente che completa l’intero ciclo di studio: si tratta di un aspetto che riguarda un numero non trascurabile di studenti “regolari” che dovrà essere risolto ai fini della modellizzazione statistica.

Per quanto riguarda gli aspetti metodologici della rilevazione, prima di tutto va specificato che si basa su un questionario elettronico somministrato al momento della presentazione della domanda di laurea attraverso il *Sistema Informatico di Gestione della Didattica* (ESSE3). Sin da subito si è preferito scegliere un approccio censuario onde evitare problemi legati alla sua rappresentatività statistica, in particolare quello dell’autoselezione alla risposta. Contestualmente, si è anche prestata particolare attenzione sia nella progettazione del questionario, sia nella sua integrazione nella procedura amministrativa, al fine di ridurre gli errori non campionari.

Agli inizi del 2018, per testare la funzionalità dello strumento di rilevazione, è stata portata a termine una fase pilota i cui esiti positivi, discussi in Zaccomer (2019), hanno fornito il necessario fondamento per l’implementazione definitiva dell’indagine sui laurean-

⁷ La selezione di queste regioni è avvenuta in base al declino della popolazione in età lavorativa 25-64 anni, al livello di istruzione terziaria della popolazione di 25-64 anni e all’emigrazione netta di persone 25-64. Per i criteri utilizzati si rimanda direttamente alla Commissione Europea (2023b). Nonostante il RAI utilizzi ben 26 indicatori, considerando solo l’Italia, esiste una certa concordanza con il suo ordinamento poiché quasi tutte le regioni d’Italia in tabella 1, a partire dal Friuli Venezia Giulia e a eccezione delle province autonome e della Toscana, ricadono in questa trappola o vi ricadranno in futuro (Campania).

⁸ Per ogni dettaglio si veda il sito ufficiale del progetto <https://cantiere-friuli.uniud.it>.

di all'interno del sistema gestionale della didattica come parte integrante della procedura della domanda di laurea. In questo modo, per uno studente di qualsiasi corso non è possibile laurearsi senza rispondere al questionario, garantendo di fatto la completa copertura dell'indagine negli anni di rilevazione per l'ateneo friulano.

È interessante notare che, in sede di ideazione, questa indagine era stata concepita per essere un progetto della durata di circa due anni, ma lo scoppio della pandemia, seguito dal conflitto russo-ucraino, ha di fatto trasformato il progetto in un'indagine continua tuttora in corso. Nel periodo 2018-2022, sono stati raccolti oltre sedicimila questionari validi, ossia completamente compilati in ogni loro parte. Una prima disamina dei dati raccolti nel quinquennio è stata presentata in Zaccomer (2023), 9 limitatamente alla PaE e agli aspetti geografici delle destinazioni⁹.

2.1 La sottopopolazione indagata e la struttura del dataset

Prima di tutto, è fondamentale sottolineare che la popolazione intervistata può essere vista come un campione (Deming *et al.*, 1941) estratto da una *superpopolazione* di dimensioni sconosciute, che comprende tutti i laureandi passati e futuri dell'Università di Udine. Questa prospettiva consente l'uso degli strumenti della statistica inferenziale, soprattutto quando le dimensioni del campione sono elevate (Frosini *et al.*, 1999). Inoltre, l'esercizio di modellizzazione statistica qui proposto non riguarda l'intera popolazione rilevata nel quinquennio, ma solo la sua sottopopolazione più cospicua. Infatti, si è già accennato che un numero piuttosto congruo di studenti¹⁰, iscritti al nuovo ordinamento universitario nel quinquennio considerato, ha avuto l'opportunità di conseguire sia la laurea triennale che quella biennale: questo implica che uno stesso individuo potrebbe aver risposto al medesimo questionario in anni differenti.

Onde evitare questo tipo di problematica, è stato deciso che in questo lavoro si concentrerà l'attenzione unicamente sugli studenti delle lauree triennali che costituiscono la maggioranza della popolazione intervistata nel periodo 2018-22: rispetto ai 16.480 questionari totali, i questionari dei laureandi di triennale sono 10.559, che rappresentano circa il 64,1%. In realtà, si è cercato di raffinare ulteriormente il *dataset* poiché può capitare – in condizioni “normali” in modo piuttosto limitato – che uno studente decida di cambiare il docente di riferimento ricompilando la domanda di laurea. Questo tipo di problematica si è acuita per via delle difficoltà indotte dalla pandemia, in particolar modo quando per quelle tesi legate a *stage* aziendali o ad altri progetti “sul campo”. Per questo, si è chiesto all'amministrazione di indicare i casi di duplicazione: sono stati individuati 233 casi, di cui il 92,3% ha consegnato la prima domanda nel biennio 2020-21, ripresentandola poi nel 2022. Solo con questa operazione di pulizia preliminare è possibile affermare che il *dataset*

9 Vale pena sottolineare che Oliva e Marini (2023) segnalano che, presto, questi risultati potranno essere confrontati con quella di una rilevazione in itinere svolta dalla Fondazione Nord Est, in collaborazione con la Regione Veneto, che sta rilevando duemila giovani italiani, tra i 18 e i 35 anni, residenti nelle regioni norddestine nell'intenzione proprio di stimare la PaE e le motivazioni all'espatrio.

10 Per via dell'anonimato del questionario non è possibile quantificare direttamente la percentuale di rispondenti che si sono laureati sia alla triennale che alla biennale nel quinquennio considerato, ma come sarà esplicitato nel prossimo paragrafo la maggioranza dei laureandi triennali intervistati intende continuare a studiare, al limite anche lavorando.

costruito coinvolge 10.326 studenti diversi che hanno presentato domanda di laurea in un corso triennale nel quinquennio considerato.

Le variabili inserite nel dataset sono diverse e relative: i) alle *caratteristiche anagrafiche* del laureando (come il genere del rispondente, l'età in anni compiuti al momento della compilazione della domanda, la cittadinanza italiana e la residenza in Italia); ii) alle *intenzioni post-laurea* triennale (l'intenzione di continuare a studiare e/o lavorare, l'intenzione ad espatriare dopo aver conseguito la laurea triennale e la durata della permanenza prevista); iii) al *profilo della carriera scolastica e universitaria* (la macroarea scientifica a cui appartiene il corso di laurea seguito, lo status di studente “in corso” o “fuori corso”, l'aver fatto un'esperienza di mobilità internazionale all'estero durante la propria carriera universitaria e il possesso di un diploma di maturità o equivalente italiano). Completano il dataset l'anno di compilazione del questionario e due variabili dummy indicanti, nel caso di duplicazione, il questionario compilato per primo e per secondo.

2.2 La profilazione dei laureandi triennali

Prima di procedere alla fase di modellizzazione, è possibile fornire un breve profilo anagrafico dei laureandi triennali censiti nel 2018-22. Le statistiche descrittive fornite di seguito prendono in esame solo il primo dei questionari compilati nel caso di duplicazione, in quanto questo è stato quello utilizzato anche per la successiva modellizzazione statistica, ma è facile intuire che 233 casi su più di diecimila non incidono significativamente sui risultati di queste statistiche.

La popolazione dei laureandi triennali censiti è composta dal 53,8% di femmine e 46,2% di maschi mentre, per quanto riguarda l'età, non sorprende che la mediana sia di soli 22 anni e che i 24 anni coprono già l'81,5% dell'intera distribuzione, nonostante l'età massima superi i 70 anni tra i laureandi più anziani. Il 99,3% degli intervistati risiede in Italia, il 98,2% ha conseguito un diploma rilasciato nel suo territorio, ma solo il 95,2% ha la cittadinanza italiana.

Per quanto riguarda le macroaree di riferimento dei rispettivi corsi di laurea, in ordine crescente, si trovano le discipline scientifiche con il 39,6%, quelle umanistiche con il 26,9%, le giuridiche ed economiche con il 17,7% e, infine, le discipline mediche con il 15,8%. Queste ultime, come noto, anche per le recenti difficoltà nel reperire personale medico e infermieristico, sono limitate per legge vista la presenza di corsi di laurea a numero chiuso.

Venendo alla mobilità studentesca, solo l'8,9% degli studenti ha trascorso un periodo all'estero con una durata media di 5,4 mesi e mediana di 5 mesi. Guardando invece al voto medio in 30mi al momento della compilazione, la sua media è di 25,3, mentre il primo quartile è 23,7, la mediana 25,2 e, infine, il terzo quartile 26,9. L'analisi della distribuzione ha fatto anche emergere un caso con un dato mancante, per cui la successiva modellizzazione considererà un totale di 10.325 laureandi triennali.

Considerando le intenzioni dei laureandi dopo il conseguimento del titolo, la maggior parte di essi desidera proseguire il proprio percorso formativo: il 27,4% intende continuare a studiare, mentre il 35,3% prevede di farlo parallelamente al lavoro. Solo il 19,8% ha già deciso di dedicarsi esclusivamente alla carriera lavorativa, mentre il restante 17,6% al mo-

mento della compilazione del questionario non ha ancora preso una decisione, rimandando la scelta a dopo la laurea.

Infine, calcolando la PaE come percentuale dei laureandi triennali che hanno dichiarato di considerare l'espatrio come valida alternativa per il proprio futuro, si ottiene un risultato in linea con quello già riscontrato per l'intera popolazione (Zaccomer, 2023), ossia si rende manifesto l'effetto del periodo di incertezza, iniziato con l'arrivo in Europa della pandemia seguito dallo scoppio del conflitto nella sua parte orientale. Se nel biennio 2018-19 la propensione all'espatrio si attestava al 42,7%, nel triennio 2020-22 questa è scesa al 35,7%. Quindi, per quanto riguarda i soli laureandi triennali, il gap pandemico in termini di PaE si assesta al 7%. Proprio per la presenza di questo forte divario si è deciso di inserire nel modello una variabile dicotomica con il compito di indicare se il questionario è stato compilato nel periodo pre-pandemico (biennio 2018-19) o in quello pandemico (triennio 2020-22): il primo periodo riguarda il 45,5% dei questionari raccolti, mentre il secondo il 54,5%.

3 L'intenzione di espatriare e le sue determinanti

In questo paragrafo vengono indagati gli aspetti, individuali e di contesto, che influenzano sull'intenzione di espatriare dei laureandi triennali dell'Università di Udine. A tale scopo si prende in considerazione la domanda del questionario elettronico *“Indipendentemente dalla tua volontà di lavorare o continuare l'università, hai preso in considerazione la possibilità di trasferirti all'estero dopo aver conseguito il titolo presso questo Ateneo?”*. Questa prevede tre categorie di risposta: “sì”, “no” e “non lo so ancora, ci penso dopo la laurea”. Ai fini delle analisi successive viene definita la variabile dipendente “Intenzione di espatriare” che assume valore unitario se la risposta alla domanda del questionario è affermativa, valore nullo nel caso la risposta sia negativa oppure la scelta venga rinviata a dopo il perseguimento del titolo¹¹. questa variabile dipendente è di tipo dicotomico, in questo lavoro viene utilizzato un *modello di regressione logistica*: considerato il rapporto, detto anche *odd*, tra la probabilità di espatriare e quella di non espatriare – per scelta o per indecisione – del singolo laureando, la trasformazione logaritmica dell'*odd*, detta *log-odd* o *logit*, è una funzione lineare delle variabili esplicative osservate che riguardano, come anticipato, sia le caratteristiche individuali del laureando che quelle del contesto in cui si muove.

Dall'insieme iniziale di variabili esplicative, prima descritte a livello univariato, attraverso la procedura *backward stepwise* gerarchica, basata sul test di Wald con un valore soglia di 0,05 (Hosmer & Lemeshow, 2000), si è proceduto a selezionarne un sottoinsieme secondo la loro rilevanza in relazione a tutte le altre. In particolare, se per una certa variabile il livello di significatività del corrispondente parametro risulta minore del valore soglia la variabile rimane nel modello, mentre se risulta superiore la variabile viene esclusa dal modello.

¹¹ In una fase preliminare dell'analisi, è stato anche preso in considerazione un *modello logit multinomiale* che prevedeva tutte le tre categorie di risposta per la variabile dipendente. Tuttavia, i risultati ottenuti non sono apprezzabilmente diversi da quelli del modello *logit* qui proposto che ha, tra l'altro, il vantaggio di essere più facilmente interpretabile.

Il modello di partenza è quello completo che comprende: sesso, età, voto medio (ponderato per i CFU) alla fine del percorso universitario, partecipazione ad un programma di mobilità internazionale durante gli studi universitari, residenza italiana o straniera, cittadinanza italiana o straniera, maturità conseguita in Italia o all'estero, intenzioni dopo la laurea triennale, regolarità degli studi, macroarea disciplinare del corso di studi e periodo in cui è stato compilato il questionario (2018-19 o 2020-22) come *proxy* dell'effetto della pandemia sull'intenzione di espatriare.

La tabella 2 mostra i risultati del modello finale con le variabili che influenzano significativamente (in positivo o in negativo) la probabilità di espatriare. La colonna COEFF. contiene le stime dei parametri della regressione logistica. La loro interpretazione è simile a quella della regressione lineare: rappresentano la variazione nel *logit* della probabilità di espatriare data una variazione unitaria della corrispondente variabile esplicativa, fisse restando tutte le altre variabili. Tuttavia, la loro interpretazione dipende dalla natura della variabile, ossia se dicotomica, categorica o continua. Se il valore della stima è positivo significa che la variabile corrispondente, fisse restando tutte le altre variabili, ha un impatto positivo sul *logit* e quindi sulla probabilità di espatriare, viceversa se è negativo. Si osservi che nella tabella non sono presenti le stime dei coefficienti delle categorie di riferimento poiché queste vengono posti, per costruzione, pari a 0.

La colonna STD. ERR. riguarda le stime degli *standard error* dei parametri della regressione logistica, mentre livello di significatività è indicato nella colonna P. Nell'ultima colonna vengono presentati gli ODDS RATIO, cioè gli esponenziali dei coefficienti della regressione logistica, che esprimono, in corrispondenza di una variabile esplicativa, la propensione relativa di un laureando ad espatriare come il rapporto tra l'*odd* della probabilità di espatriare in corrispondenza di:

- una certa modalità e quella presa come riferimento, se la variabile esplicativa è dicotomica o categorica,
- un incremento unitario se la variabile è quantitativa, ferme restando le altre variabili.

Gli *odds ratio* delle categorie di riferimento sono pari a 1. Un valore dell'*odds ratio* maggiore di 1 indica una maggiore propensione relativa del laureando ad espatriare rispetto alla modalità presa come riferimento (se la variabile è dicotomica o categorica) o in corrispondenza di una variazione unitaria (se la variabile è quantitativa), viceversa se è minore di uno. Più l'*odds ratio* si avvicina a 1, minore è l'effetto della variabile sulla propensione relativa del laureando ad espatriare. Infine, il valore $(\text{ODDS RATIO} - 1) \times 100$ rappresenta la variazione in termini percentuali. Dal punto di vista dell'interpretazione dei risultati, mentre le stime dei parametri della regressione forniscono una misura della variazione (positiva o negativa) dei *logit* della probabilità di espatriare, gli *odds ratio* permettono un'interpretazione dei risultati più intuitiva e forniscono una misura relativa in grado di quantificare anche l'intensità della variazione.

Passando all'analisi numerica, sempre osservando i risultati della tabella 2, si può affermare che il sesso influenza significativamente la probabilità di espatriare: il segno del parametro è positivo quindi, fisse restando le altre variabili, un laureando ha una maggiore propensione ad espatriare rispetto ad una laureanda. Inoltre, dato che il valore dell'*odds ratio* è 1,257 possiamo dire che la propensione relativa ad espatriare dei laureandi è 1,257 volte quella delle laureande oppure, in termini percentuali, si può dire che i laureandi maschi

Tabella 2. Le determinanti dell'intenzione di espatriare

Variabile dipendente: Intenzione di espatriare “sì”	STD. ERR.	P	ODDS RATIO
<i>Caratteristiche individuali</i>			
Sesso (rif. “femmina”)			
- maschio	0,228	0,046 ***	1,257
Età (rif. “superiore a 24 anni”)			
- fino a 24 anni	0,318	0,056 ***	1,374
Voto medio in 30mi	-0,023	0,011 *	0,978
Mobilità internazionale (rif. “no”)			
- Sì	1,728	0,082 ***	5,632
Cittadinanza (rif. “straniera”)			
- italiana	-0,232	0,113 *	0,793
Maturità (rif. “conseguita all'estero”)			
- conseguita in Italia	0,469	0,189 *	1,599
<i>Caratteristiche di contesto</i>			
Macroarea del corso di laurea (rif. “Medica”)			
- Economico-giuridica	-0,031	0,077	0,969
- Scientifica	0,313	0,066 ***	1,368
- Umanistica	0,442	0,069 ***	1,555
Compilazione del questionario (rif. “prima della pandemia”)			
- durante la pandemia	-0,246	0,042 ***	0,782
Costante	-0,751	0,311 *	0,472
Numero di osservazioni = 10.325			
* p<0,05; ** p<0,01; *** p<0,001			

Source:elaborazione degli autori su software Stata 17.0

hanno una propensione all'espatrio del 25,7% superiore a quello delle colleghe femmine. Tutti gli altri parametri e *odds ratio* possono essere interpretati in modo analogo.

Le caratteristiche individuali e di contesto che influenzano positivamente la propensione all'espatrio sono: il sesso, l'età, la partecipazione a programmi di mobilità internazionale, l'aver conseguito la maturità in Italia e l'aver frequentato un corso universitario triennale di area scientifica o umanistica, mentre quelle che la influenzano negativamente sono: il voto medio, avere la cittadinanza italiana, aver frequentato un corso di area economico-giuridica e l'aver compilato il questionario durante il periodo pandemico (2020-2022).

Considerando le determinanti più significative, ossia con un p-value inferiore a 0,001, e fermo restando le altre variabili, la propensione relativa all'espatrio:

- per un laureando maschio è del 25,7% superiore a quella di una laureanda;
- per chi ha un'età inferiore o uguale a 24 anni è del 37,4% superiore a chi ha più di 24 anni;
- per chi ha frequentato un corso di area umanistica è del 55,5% superiore a chi ha

frequentato un corso di area medica;

- per chi ha frequentato un corso di area scientifica è del 36,8% a chi ha frequentato un corso di area medica;

- per chi ha compilato di questionario durante la pandemia (anni 2020-22) è del 21,8% inferiore a chi l'ha compilato prima della pandemia (anni 2018-19);

- per chi ha partecipato ad un programma di mobilità internazionale è del 463,2% superiore a chi non ha partecipato.

4 Discussione dei risultati

L'analisi statistica appena proposta permette di fare – prendendo sempre in esame le determinanti più significative appena elencate – alcune considerazioni di carattere generale. Partendo dagli aspetti demografici, si è visto come il sesso e l'età del rispondente influenzano significativamente l'intenzione individuale di espatriare, con i laureandi maschi o i più giovani che dichiarano di aver preso in maggior considerazione la possibilità di trasferirsi all'estero dopo la laurea.

La differenza legata al sesso può essere letta da più punti di vista. Se storicamente la mobilità internazionale antecedente alla terza fase migratoria ha sempre visto un ruolo prevalente dei maschi, dove le donne di solito seguivano il marito e la famiglia, in quest'ultima fase vi è un riequilibrio che vedere le donne partire da sole per soddisfare le proprie aspettative di carriera (Pugliese, 2018), anche se ancora con qualche problema in più rispetto ai colleghi maschi (Saint-Blancat, 2017). È più probabile che la differenza riscontrata rifletta una varietà di fattori quali l'ambito di studio, le aspettative di carriera, le pressioni sociali e i legami familiari che possono influenzare in modo differente la scelta di espatriare. In uno studio comparabile a questo, basato su dati campionari ISTAT, Giacalone et al. (2019) ottengono un risultato del tutto simile suggerendo che la differenza di genere riscontrata dipenda dalla particolare struttura della società italiana, in particolare modo dalla divisione dei ruoli sia nella famiglia, sia nel mercato del lavoro.

La differenza tra laureandi più giovani (fino a 24) e quelli più anziani rispecchia sicuramente una maggiore apertura mentale alle novità e al cambiamento nella propria vita – anche per via del maggior tempo a disposizione per esplorare diverse opportunità senza compromettere la stabilità professionale o familiare nel lungo periodo – ma soprattutto la minor presenza di vincoli preesistenti del medesimo tipo.

Per quanto riguarda l'ambito di studio, si è osservato come i laureandi delle macroaree scientifica e umanistica mostrano un'intenzione all'espatrio superiore a quella delle altre aree. Sembra immediato immaginare che questo risultato venga fortemente influenzato dalla percezione dei laureandi sulle opportunità professionali presenti, o supposte tali, in contesti internazionali e dell'apprezzamento del proprio campo di studi all'estero. È abbastanza noto come i laureati in materie STEM sono particolarmente ricercati nei paesi con economie tecnologicamente più avanzate dell'Italia. Non va però dimenticato che in Zaccomer (2023) si è già sottolineato come vi sia un'influenza del sesso nella composizione strutturale dei laureandi per macroarea, poiché si registra un forte sbilanciamento proprio in quella scientifica (dove prevalgono i maschi) e in quella umanistica (dove al contrario prevalgono le femmine). Inoltre, è altresì presente la problematica delle barriere linguisti-

che, ormai le uniche all'interno dell'Unione Europea, che sicuramente vede una buona parte degli studenti di area umanistica avvantaggiata da questo punto di vista.

Si è già osservato come la compilazione del questionario durante il triennio pandemico (2020-22) ha prodotto un impatto negativo sulla PaE. Il modello ha coerentemente stimato l'effetto depressivo sulla propensione relativa che mostra come l'infezione globale, e poi il vicino conflitto, abbiano inciso sin da subito sulle percezioni e sulle intenzioni dei laureandi in merito alla mobilità internazionale, a seguito delle preoccupazioni per la salute (Zaccomer & Laperchia, 2020) e delle maggiori incertezze economiche (Pagani & Zaccomer, 2021).

Infine, l'effetto relativo alla partecipazione ad un programma di mobilità internazionale durante il proprio ciclo di studi universitari è piuttosto marcato visto che i laureandi che lo hanno fatto vedono aumentare la propria propensione relativa a considerare l'espatrio del 463,2% rispetto a chi non ha voluto usufruire di tale opportunità. Anche per questo risultato l'interpretazione non è univoca, giacché un'esperienza estera durante i propri studi universitari non solo arricchisce dal punto di vista formativo, professionale e personale, ma rende anche più sicuri di sé, anche dal punto di vista linguistico, ed amplia la percezione delle opportunità al di fuori del proprio contesto regionale e nazionale. Ancora Giacalone et al. (2019) trovano, limitatamente al programma Erasmus, un risultato in linea con quello appena discusso e nella scia di precedenti studi quali Paray e Waldinger (2011) e Di Pietro (2012). Si può quindi affermare che l'evidenza empirica di questo studio supporta, anche per l'Ateneo friulano, l'ipotesi che le esperienze internazionali pregresse influenzano positivamente la disponibilità dei laureandi ad emigrare successivamente, confermando di fatto il principio sulla mobilità enunciato in AlmaLaurea (2017).

Con la terza fase dell'emigrazione italiana innescata dalla crisi finanziaria del 2007-08, il fenomeno della mobilità internazionale dei laureati ha ricevuto una crescente attenzione sia nel contesto dei mass media sia in quello accademico, assumendo anche un ruolo di indicatore delle dinamiche globali del mercato del lavoro (Beltrame, 2008; Moretti, 2014).

Questo studio si è preoccupato prima di tutto di modellizzare le determinanti della futura decisione di espatriare dei laureandi triennali dell'Università di Udine, ponendo particolare enfasi su come i fattori individuali e contestuali influenzino le loro intenzioni. Tra questi, il sesso, l'età, la macroarea di studio, il periodo di crisi indotto dalla pandemia e dal conflitto russo-ucraino e, infine, la partecipazione a programmi di mobilità internazionale durante il percorso di studi triennale emergono dal modello di regressione logistica come le determinanti più significative tra quelle presenti nel dataset. Il lavoro ha quindi permesso di avvalorare il principio "mobilità richiama mobilità", inserendosi nel più ampio dibattito corrente sul brain drain e arricchendolo con nuove evidenze – ottenute dall'analisi di un'ampia raccolta di dati mai osservata per una singola istituzione di formazione terziaria – relative ai laureandi di un ateneo situato in una regione storicamente caratterizzata dall'emigrazione.

Già nella discussione dei risultati sono emerse alcune limitazioni dell'analisi che offrono già validi spunti per successivi approfondimenti. Infatti, una di queste è legata alle motivazioni dell'intenzione all'espatrio o di voler restare in Italia. Il questionario

5 Elementi di conclusione e di ricerca futura

Con la terza fase dell'emigrazione italiana innescata dalla crisi finanziaria del 2007-08, il fenomeno della mobilità internazionale dei laureati ha ricevuto una crescente attenzione sia nel contesto dei mass media sia in quello accademico, assumendo anche un ruolo di indicatore delle dinamiche globali del mercato del lavoro (Beltrame, 2008; Moretti, 2014).

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Research paper

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EDUCATIONALLY HETEROGAMOUS UNIONS AND COUNTRY LEVEL INEQUALITIES IN EUROPE BEFORE AND AFTER 1990

Abstract

Scholars are interested in the association between partnership formation and socioeconomic status due to the link with the reproduction of socioeconomic inequalities. Previous findings showed that highly educated individuals are less likely than low educated to form heterogamous unions, i.e., when partners hold different levels of education. The educational gradient in heterogamy has been linked to the level of societal openness in a country. Still, it is not clear-cut to what extent these findings are generalizable across periods and countries. Using Generations and Gender Surveys (GGS) data of 15 European countries, we analyse the association between the educational gradient in heterogamous union formation and country level indicators of socioeconomic inequalities before and after 1990, applying a two-stage regression approach. We found that people with a low level of education are more prone to form heterogamous unions relatively to the highly educated. The Gini Index mildly explains the variation across countries of the gradient in heterogamy. For unions formed after 1990, we found that an increase in economic inequality is associated with a less steep negative educational gradient in heterogamy. Our study highlights the complexity of studying country level variation in educational assortative mating, all the more that it may entail differences related to the meaning of education in each country.

Keywords: Educational assortative mating; union formation; social inequality; East- West divide; two-stage regression.

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1 Introduction

Trends of educational assortative mating, i.e., the sorting of couples according to partners' level of education, have important societal implications because of the links with changes in social inequality and levels of intergenerational social mobility (Frémeaux & Lefranc, 2020; Mare, 2011; Schwartz, 2009). Changes in educational assortative mating are the result of modernization, the level of societal openness, and development of individuals' preferences on the mating markets (Blossfeld, 2009; Kalmijn, 1998; Trimarchi, 2022).

At the individual-level, past evidence has shown that more educated individuals have the tendency to form homogamous unions more often, relative to the less educated (Blossfeld, 2009; Blossfeld & Timm, 2003; Kalmijn, 1998). To what extent these patterns are observed generally, i.e., for different sexes, or across periods and contexts, is still unclear. In Europe, starting from the 1990s, the growing participation of women in tertiary education, and ensuing increasing women's educational attainment, has led to increasing gender inequality in education in favour of women (i.e., more highly educated women than men) (Van Bavel, 2012; Vincent-Lancrin, 2008). These trends have had consequences on patterns of educational assortative mating. Many European countries have experienced a rise of educationally hypogamous unions, i.e., unions where the woman has a higher level of education than the man, relative to hypergamous ones, where the man is more educated than the woman, while educational homogamy is still considered the most frequent type of educational pairing (Esteve et al., 2012; Grow & Van Bavel, 2015).

European countries, because of their historical background and the changing trends in educational assortative mating, represent an insightful set of contexts to investigate changes of the educational gradient in heterogamous versus homogamous union formation across time. This is especially because of the variation of countries, in terms of both western and post-socialist countries. Given this contextual variation, we contribute to previous work on the association between educational assortative mating and social inequalities in two ways. First, we aim to investigate the educational gradient in heterogamous versus homogamous union formation explicitly differentiating between unions that have been formed before and after 1990. In such a way, we can examine whether there has been a change in this gradient across countries in a period of societal changes. Secondly, we examine whether the variation of the educational gradient in heterogamous union formation can be explained by contextual changes related to increasing economic inequality across European countries after 1990 (Bandelj & Mahutga, 2010).

To this aim, benefiting from rich harmonized survey data coming from Wave 1 of the Generations and Gender Surveys (GGS) of 15 countries, we link these individual-level data to harmonized, comparable, aggregate data based on external sources, i.e., the Standardized World Income Inequality Database (Solt, 2016), and the educational distribution provided by the International Institute for Applied Systems Analysis/Vienna Institute of Demography (IIASA/VID) (Kc et al., 2010; Lutz, 2007). Next, to explore the effect of contextual factors on the individual-level patterns of the educational gradient in heterogamous unions, we apply a two-stage regression approach because, due to the low number of units on the aggregate-level, we cannot apply robust multilevel random effect models (Bryan & Jenkins,

2016). Results showed that low educated individuals are more likely to form heterogamous unions relatively to the highly educated. Next, we found that for unions formed after 1990, stronger economic inequality, indicated by the Gini Index, is associated with a less negative educational gradient in heterogamy.

2 Background

2.1 Educational assortative mating patterns

Education has several dimensions, such as enrolment, level of attainment, field of study (Lappegård & Rønsen, 2005). The dimension of interest in this study is the level of educational attainment, which represents a good proxy for the level of socioeconomic resources of an individual, based on the theory of human capital accumulation. A higher level of educational attainment is associated, in the long-term, with higher earning potential and better economic prospects in terms of occupation and job stability (Becker, 1964; 1985). Moreover, education represents an engine for status enhancement: inequalities in completion of tertiary education drive differentials in employment, income and well-being, since highly educated individuals perform better in terms of labor-market outcomes and healthy lifestyles (OECD, 2017; 2018).

On the individual level, education is one of the main attributes that can make an individual more or less desirable on the mating market (Buss et al., 1990). Assortative mating by educational level has different implications for the individual and for society at large. At the individual level, people with more education tend to form stable unions after a longer search for a suitable partner, which can be an outcome of the years spent accumulating human capital (Oppenheimer, 1988). This could lead to more stable couples, less prone to separation, and a normalization of the dual-earner type of family model (Goldscheider et al., 2015). This is in contrast with what could happen at lower levels of educational homogamy, where couples may be more inclined to a traditional family model, i.e., the male-breadwinner model, more likely spread among families with a low socioeconomic status (Blossfeld & Drobnic, 2001; Esping-Andersen, 2009; Esping-Andersen & Billari, 2015).

At the societal level, individuals mating with partners having the same level of education (i.e., positive assortative mating) would imply an accumulation of advantages or disadvantages endowed in the level of education (Becker, 1991), with ensuing consequences for the reproduction of educational inequalities (Blossfeld, 2009; Boertien & Permanyer, 2019; Schwartz 2009, 2013). Generally, homogamy is facilitated when people come from a similar social background, or have attended the same schools, or were involved in the same religious community (Blossfeld, 2009; Blossfeld & Timm, 2003; Kalmijn, 1991). One way to avoid the accumulation of disadvantages, derived from a low educational level, would be to find a partner with a higher level of education (Blossfeld, 2009; Blossfeld & Timm, 2003). According to the stratification thesis, a more stratified and closed society will offer fewer opportunities to the low educated to improve their social status (Blossfeld, 2009; Kalmijn, 1991).

In fact, homogamy in education is the most typical mating pattern across countries and indicates the level of accumulation of resources within the couple (Boertien & Permanyer,

2019). Heterogamous couples, who are the focus of this study, instead, tend to be less typical in a society relatively to educationally homogamous couples. In the last decades, the distribution of heterogamous couples has been changing due to fact that more highly educated women are on the mating market relatively to the highly educated men (Van Bavel, 2012). This reversal of gender inequality in tertiary education has affected patterns of educational assortative mating, inducing an increase of hypogamous relative to hypergamous couples (De Hauw et al., 2017; Esteve et al., 2012; Grow & Van Bavel, 2015), still homogamy remains the most common pattern.

2.2 Education in the European context

In general, the more educated have better prospects on the labor market. In Europe, the earning advantage of the better educated strongly depends on developments occurring after the Second World War. By the end of the war, European countries were separated in two blocks, with different economic and political systems. The Western block was characterized by a capitalist political and economic system, while Central and Eastern European countries were maintaining a socialist regime.

After the fall of the Soviet Union, centralized socialist regimes were substituted by democracies and free-market economies. This societal transition brought important consequences for the economies of Central and Eastern European countries, since individuals had to cope with challenges such as competition on the labor market, job and housing uncertainty. As a result, in these countries, the value of higher education rapidly increased, due to increasing competition on the labor market (Frejka, 2008).

Despite the adoption of European policies, which aimed at socioeconomic convergence across European countries, socioeconomic inequalities in education persist across Europe. In the last decades, the socioeconomic divide across European countries increased (OECD, 2017), due to differences rooted in institutional and social factors, including “within-country” disparities (Fredriksen, 2012). As scholars have recently pointed out, differential demographic behavior by socioeconomic status may also represent a key factor that drives social inequalities across countries (Choi et al., 2020; European Commission, 2015).

The gender dimension should also be addressed in respect of educational inequalities, and how they have developed across European countries. As already mentioned, in all European countries it has been observed that tertiary educated women have outnumbered tertiary educated men, hence a reversal of gender inequality in higher education (Vincent-Lancrin, 2008), given that in the past men were more educated than women. This novel trend occurred at different timing in Europe. In the Baltic countries, in some Nordic countries, and Central and Eastern countries (e.g., Bulgaria, Poland), the sex ratio (men/women) for tertiary educated people aged 25-29 years old was below one already in the 1970s, while in German-speaking countries, this trend occurred in the first decade of the 2000s (Van Bavel, 2012:9).

This trend has contributed to the increase in hypogamous unions relative to hypergamous ones (Bouchet-Valat, 2015; De Hauw et al., 2017), hence a specific pattern of heterogamous type of union. It remains unclear to what extent it can be associated with variation across countries of the educational gradient in heterogamous versus homogamous union

formation more generally. Social inequalities measured in terms of gender gap in tertiary education cannot explain variation in the educational gradient in heterogamy but are rather associated with differences between hypogamy and hypergamy, which is not the focus of this study (see e.g., De Hauw et al., 2017).

The reversal of gender inequalities in education could be considered an indicator of decreasing social inequalities, given that in the past, men were more likely than women to earn a tertiary degree. Decreasing social barriers to access tertiary education for women could imply more generally decreasing social barriers between highly and low educated. To the extent that the reversed gender gap in education implies a facilitation for the low educated to mix-up with the highly educated, heterogamy levels could be affected too. In the next sub-section, we formulate hypotheses at the individual- and contextual-level, focusing on the educational gradient in heterogamy and the role of socioeconomic inequalities.

2.3 Hypotheses

Based on the argument that low educated individuals may improve their social- status by partnering up, then, low-educated may be more prone to enter heterogamous unions relative to homogamous ones. The more educated, instead, put higher value on partners who are at least as educated as they are (Oppenheimer, 1988). Moreover, the environment where low educated people socialize is more heterogenous in terms of individuals' educational achievement relatively to the highly educated, who meet more often at universities (Esping-Andersen, 2009; Kalmijn, 1998; Schwartz & Mare, 2005). Thus, we formulate the first hypothesis (H1), according to which there is a negative educational gradient in heterogamy. Hence, we expect that low educated individuals are more likely to enter educationally heterogamous unions compared to their highly educated peers. We expect this finding to be generalizable across countries.

The second part of this study aims to explore more in depth the variation of the educational gradient in heterogamous union formation, across periods and countries. In doing so, we consider contextual factors that may contribute to explain country-level variation in the educational gradient in heterogamy. Focusing on the time dimension, we look at differences by union-formation period, and we test whether the educational gradient in heterogamy changed for unions formed before or after 1990. The choice of 1990 as cut-off period is justified by the fact that, with the disruption of the Soviet Union, the 1990 marks a period of societal and economic changes in Europe. Moreover, as an ancillary reason, for many European countries the reversal of gender inequalities in education occurred around 1990 (Van Bavel, 2012). Following this rationale for the cut-off year, we test whether the level of economic inequality, and gender inequalities in education, explain variation in the educational gradient in heterogamy across European countries.

Economic inequalities in Europe have increased since the 1990s, and the effect on the educational gradient in heterogamy could take different directions. On the one hand, with stronger inequalities, we could expect that the pressure to improve own social status via partnering becomes stronger for the low educated, as a result the negative educational gradient in heterogamy would become steeper (H2a). On the other hand, when economic inequalities rise, low educated have more difficulties to access social environments of the

more privileged, thus, being somewhat forced to form homogamous unions. This process could flatten the educational gradient in heterogamy (H2b).

The association between the reversal of gender equality in education and the educational gradient in heterogamy is also ambiguous. While low and medium educated men may be more likely to mate with highly educated women, low and medium educated women may have more difficulties to find a highly educated man (Bouchet- Valat, 2015; De Hauw et al., 2017). Thus, social inequalities measured in terms of gender gap in tertiary education would not explain variation in the educational gradient in heterogamy. Still, decreasing social barriers to access tertiary education for women could be interpreted as a more general sign of societal openness. Hence, to the extent that the reversed gender gap in education also implies further opportunities for low educated to mix-up with the higher educated, heterogamy levels among the low educated could increase. Then, we would expect that an increasing gender-gap in education, in favor of women, is associated with a steeper negative educational gradient in heterogamy (H3). The rationale for this would be that decreasing social barriers to access tertiary education for women is related to higher levels of societal openness and, hence, more possibilities for the low educated to form heterogamous unions.

3 Data and methods

3.1 Data and sample selection

We used Wave 1 of Generation and Gender Surveys (GGS) – Round I of 15 countries (Austria, Belgium, Bulgaria, Czechia, Estonia, France, Germany, Hungary, Italy, Lithuania, the Netherlands, Norway, Poland, Romania, and Sweden) with available information necessary to the aim of the paper (<http://www.ggp-i.org/>). The surveys include individuals between 18 and 79 years old, and deal with different topics: fertility and partnership histories, economic activity, attitudes, etc. The GGS are the most recent high quality family surveys available to date, widely used for international comparisons (Gauthier et al., 2018; Vikat et al., 2007). The surveys took place in different years across countries, between 2002 and 2011 (see Table 1 for details).

Since we are interested in the educational gradient in heterogamy, the sample only includes partnered individuals at the time of interview ($n=113770$). To limit reporting bias due to old-age, we focus on a sample of individuals born after 1945 ($n = 92803$), also according to previous studies information from cohort born after 1945 is more reliable (Vergauwen et al., 2015). Furthermore, to minimize endogeneity issues between education and union formation processes, we exclude individuals who are too young, and we select individuals who, at interview, are 30 years old or older ($n=75910$). Still, this choice of the cut-off point for age may introduce selectivity issues, especially for the lower educated people, or for respondents in Eastern European countries, who tend to form unions at younger ages. Hence, I have run robustness checks using 25 years old as cut-off point for age, and results were not affected. Finally, we have dropped individuals in case of missing information about their level of education ($n=292$), and partners' level of education ($n=3501$). Overall, the sample totalled of 72117 individuals born between 1945 and 1983.

Partnerships have been classified in two different periods according to the year of union

formation, i.e., if the couple formed before 1990, or from 1990 onwards ($t=1990$). If the year of union formation was missing (about 2% of cases), we have used the year of marriage if available for half of missing cases. For the other half of missing cases, we have imputed the year of union formation using the mean year of union formation for a specific combination of birth cohort, sex and country. In this latter case, the majority of units that were imputed was in Hungary, which had the highest rate of missing information about the year of union formation (13%).

3.2 Measures

Table 1 shows a description of the dependent and independent variables in our sample. The educational pairing variable is defined as the combination of both partners' levels of educational attainment. The dependent variable is dichotomic and it indicates whether partners have the same level of education, i.e., (0) "homogamy", or they have a different level of education, i.e., (1) "heterogamy".

The main independent variable is respondents' level of education. The level of education was harmonized across countries using the International Standard Classification of Education (ISCED, 1997). We have operationalized educational attainment in three categories (low, medium, high). The first category includes individuals who completed primary plus lower secondary school (ISCED 0, 1, 2). The medium category consists of individuals who attained the upper-secondary and post-secondary level (ISCED 3, 4). Highly educated respondents were categorized as such if they received at least a bachelor's degree (ISCED 5, 6). Additionally, we controlled for respondents' age at survey, age squared, sex, and cohort.

Next, we have accounted for two macro-level variables. These variables are (1) the Gini coefficient, which is an indicator of the level of economic inequality in the country and (2) the gender-gap in tertiary education, which is an indicator of the reversal of gender inequalities in education. Both our independent variables are not yearly specific, but period specific. The Gini Index derives from the Standardized World Income Inequality Database Version 8.2 (Solt, 2016) and it has been averaged for the years before 1990, and after 1990 till 2010.

The gender gap in education for the two periods, before and after 1990, derives from the reconstructions (1970-1995) and projections (2000-2010) of educational distribution provided by the International Institute for Applied Systems Analysis/Vienna Institute of Demography (IIASA/VID) (Kc et al. 2010; Lutz 2007). The gender-gap in tertiary education is measured as the difference in the proportion of highly educated women and highly educated men aged 20-64 years old, before and after 1990. For this indicator, we also have averaged the information available to have one value relative to each period. The latest information used was relative to 2010 since very few unions in our dataset have occurred after 2010. Figure 1 shows scatterplots for the two contextual variables. The x-axis indicates the value of the variables before 1990, and the y-axis, values referring to the period after 1990. The gray dashed lines highlight the linear association between values before and after 1990. Regarding the gender-gap in education, we observe that, generally, a smaller gender-gap in education in favor of men (negative values) before the 1990, result in a less negative or even positive gap (in favor of women) after 1990. Concerning the Gini-Index, the association

is less evident: we observe that economic inequality has worsened after 1990 especially in Central and Eastern European countries, while in Western European countries, economic inequality remained mostly similar to levels observed before 1990.

3.3 Methods

To test our hypotheses, we apply a two-step regression approach (Achen, 2005; Gelman, 2005). This approach is useful to examine the role of macro-level factors when multilevel-random effect models cannot be applied because the number of units of analysis is too small (in practice ; 30, see e.g. (Bryan & Jenkins 2016)). The first step consists in the estimation of individual-level coefficients of interest. In our case, since our dependent variable is dichotomous (heterogamous union = 1, homogamous = 0), we apply a logistic regression, separately by period of union formation and country, for the likelihood to be in a heterogamous versus homogamous union. Formally, the model can be written in the following way:

$$\begin{aligned} \text{logit}(P_{\text{heterogamy, period, country}}) = & \alpha + \beta_1(\text{age}) + \beta_2(\text{age}^2) \\ & + \beta_3(\text{medium education}) + \beta_4(\text{high education}) + \beta_5(\text{female}) + \beta_6(\text{cohort}) . \end{aligned} \quad (1)$$

The second step consists in running standard and weighted OLS regressions, separately by period, i.e., before and after 1990. We use as dependent variables the beta coefficients β_4 obtained in the previous stage, which indicates the relative difference in the likelihood to be in a heterogamous union for a highly educated compared to a low educated respondent (the reference category) in each country and period. As weights we have used estimated standard errors of the beta coefficients of interest. Note that there is no major difference in the results if we apply weighted, or standard OLS regression. The independent variables included are the Gini Index and the gender-gap in tertiary education. Formally, we write:

$$\begin{aligned} y(\beta_4 \text{ from step 1}) = & \alpha + \beta_1(\text{Gini Index}) \\ & + \beta_2(\% \text{ Females Highly Educated} - \% \text{ Males Highly Educated}) + \varepsilon . \end{aligned} \quad (2)$$

Table 1. Description of the sample

	Austria (2008-2009)	Belgium (2008-2010)	Bulgaria (2004)	Czechia (2005)	Estonia (2004-2005)	France (2005)	Germany (2005)
Union Type (%)							
Homogamy	63.7	59.1	72.2	71.3	58.5	58.0	64.2
Heterogamy	36.3	40.9	27.8	28.7	41.5	42.0	35.8
Period of union (%)							
Before 1990	19.4	47.7	64.9	56.6	60.6	52.6	53.5
After 1990	80.6	52.3	35.1	43.4	39.4	47.4	46.5
Sex (%)							
Male	38.6	49.0	43.6	47.9	39.2	45.3	43.2
Female	61.4	51.0	56.4	52.1	60.8	54.7	56.8
Education (%)							
Low	11.5	26.8	20.7	13.5	11.5	25.8	8.3
Medium	67.3	32.9	55.7	69.3	54.2	43.8	60.5
High	21.1	40.4	23.6	17.2	34.3	30.4	31.2
Age (mean)	37.9	46.6	42.4	44.1	44.1	44.7	44.3
Cohort (mean)	1970	1962	1962	1960	1960	1960	1960
N	2695	3757	5877	3655	3199	4452	4378

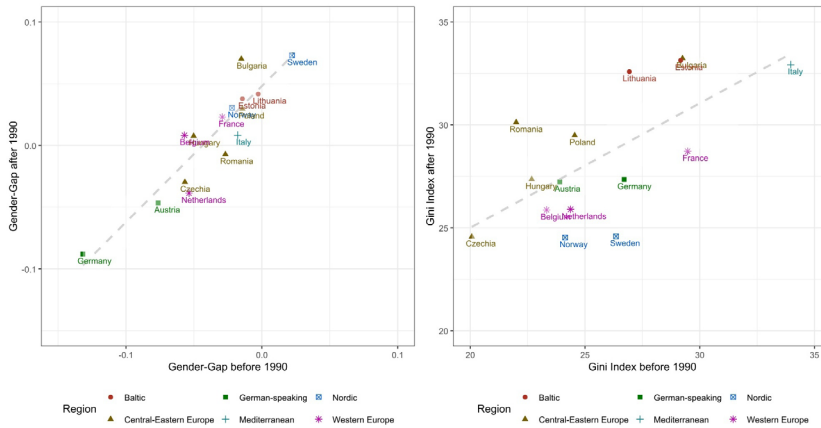
Source: Own elaborations on GGS data. Years of survey are indicated in parentheses for each country.

Table 1. Continued

	Hungary (2004-2005)	Italy (2003)	Lithuania (2006)	Netherlands (2002-2003)	Norway (2007-2008)	Poland (2010-2011)	Romania (2005)	Sweden (2012-2013)
Union Type (%)								
Homogamy	68.3	65.0	69.0	54.7	55.0	72.6	71.5	56.8
Heterogamy	31.7	35.0	31.0	45.3	45.0	27.4	28.5	43.2
Period of union (%)								
Before 1990	68.8	64.6	58.2	59.0	49.2	56.8	64.3	42.4
After 1990	31.2	35.4	41.8	41.0	50.8	43.2	35.7	57.6
Sex (%)								
Male	46.9	46.6	55.8	36.0	49.0	45.9	52.4	48.5
Female	53.1	53.4	44.2	64.0	51.0	54.1	47.6	51.5
Education (%)								
Low	18.1	50.7	9.8	32.0	14.4	11.7	28.5	9.2
Medium	64.1	38.5	65.4	32.8	46.4	68.4	60.2	50.6
High	17.8	10.8	24.7	35.2	39.2	19.9	11.3	40.2
Age (mean)	44.8	44.6	44.4	43.2	45.8	48.1	44.8	48.8
Cohort (mean)	1959	1958	1961	1959	1961	1962	1960	1963
N	5618	4656	3774	3440	6953	9125	5948	4590

Source: Own elaborations on GGS data. Years of survey are indicated in parentheses for each country.

Figure 1. Description of contextual variables, averages before 1990 (years 1970-1989) and after (1990-2009))



Source: Own elaborations on IIASA/VID education database (plot on the left); and Standardized World Income Inequality Database Version 8.2 (plot on the right)

4 Results

4.1 First step results

We first discuss results of the logistic regression models fitted in the first step, which modeled the effect of education on the likelihood to enter a heterogamous union. We estimated each model separately by country and period of union formation, controlling for age (and its square), cohort, and sex of the respondent. In all models, the reference category are low educated individuals. To facilitate interpretation, and comparability of logit models (Mood, 2010), in Figure 2 we show average marginal effects of education, and not regression coefficients (note that full logit models, and goodness-of-fit statistics are available in Appendix A, Table A1 and Table A2).

According to our first hypothesis H1, we expected a negative educational gradient in heterogamy, relatively to homogamy. With few exceptions, results are generally in line with this expectation for both periods considered. We found a negative educational gradient in heterogamy for unions formed before the 1990, in all countries, except for Italy. In this latter case, we found that both highly and medium educated individuals were more likely to enter heterogamous unions than their low educated peers. This exception could be due to the educational distribution within the country. In fact, in Italy, low educated individuals are the biggest group, hence medium and highly educated individuals have more difficulties

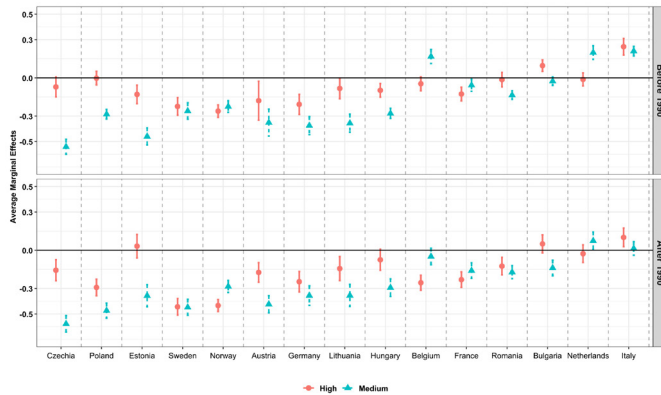
to find a partner with the same level of education.

In Belgium and in the Netherlands, instead, only medium educated are more likely to form heterogamous unions relatively to their low educated counterpart. In Bulgaria, highly educated individuals showed higher rates of heterogamous unions, than their lower educated counterpart. In general, individuals pertaining to the largest educational group are more likely to form homogamous unions. Thus, we observe that in several countries, the educational gradient in heterogamy is U-shaped, being the medium educated group the largest, and having the lower likelihood to form heterogamous unions.

For unions formed in the 1990s, or later, we found that in many European countries, the negative educational gradient in heterogamy remained stable, or became steeper, except for Estonia and Hungary. This implies that low educated individuals were even more likely to form heterogamous unions relatively to the more educated in the period after 1990. This pattern would be in line with our hypothesis H2a, according to which, with stronger inequalities, low educated feel higher pressure to partnering up, so to improve their social status. Still, from a mere structural perspective, increasing rates of participation in tertiary education across all countries might have facilitated the formation of homogamous unions among the more educated. As a result, the propensity of the low educated to form heterogamous unions can be interpreted also as the effort to avoid remaining single. In more recent years, low educated, both men and women, are considered those with higher risk of singlehood (Bouchet-Valat, 2015; De Hauw et al., 2017; Trimarchi & Van Bavel, 2017).

In Estonia and Hungary results go in the direction of the competing hypothesis H2b, according to which when economic inequalities rise, low educated have more difficulties to access social environments of the more privileged, thus, being somewhat forced to form homogamous unions. This process could flatten the educational gradient in heterogamy.

Figure 2. Average marginal effects of education for the probability to form heterogamous versus homogamous union before (upper panel) and after (bottom panel) 1990, reference category: Low education



Source: Own elaborations on GGS data of 15 countries (Wave 1)

4.2 Second step results

The second part of the analyses is mostly exploratory, investigating whether variation in the educational gradient in heterogamy observed in the first step can be explained by country-level socioeconomic factors. To synthetize, we focus on the difference between the extremes of the educational distribution, the high and low educated. Figure 3 and Figure 4 simply show the association between the estimated educational coefficients (high vs. low), the Gini Index, and the gender-gap in education, respectively, before and after 1990.

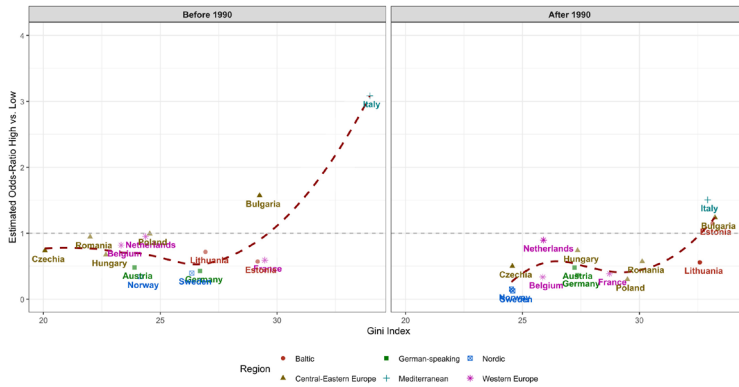


Figure 3. Association between estimated odds-ratio in heterogamy (high vs. low educated) and Gini Index before and after 1990

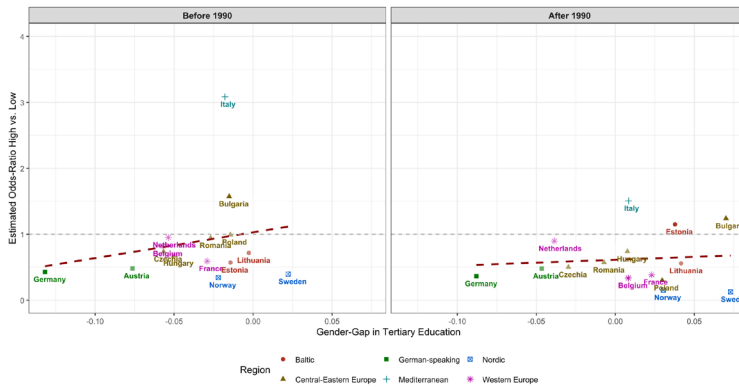


Figure 4. Association between estimated odds-ratio in heterogamy (high vs. low educated) and the gender-gap in education before and after 1990

2 shows the results of the OLS regressions, using as response variable the estimated coefficients of the logistic regressions, indicating the difference in the likelihood to be in a heterogamous union relative to homogamous between high and low educated, separately by period, and as independent variables the Gini Index, and the gender-gap in tertiary education (see Appendix B for the regression diagnostics). Results using the other contrast (medium vs. low), do not show any statistically significant effect, and generally go in the same direction as those presented here (see Table C3 in Appendix C).

According to the OLS regression, the economic aspect of inequality does not seem to be strongly associated with variation in the educational gradient in heterogamy across countries. After 1990, income inequality increased in most European countries, we would expect, then, according to H2a, a strengthening in the negative educational gradient in heterogamy. While we do observe that generally the gradient became steeper within country, as already discussed above, we find that variation across countries cannot be explained by the effect of specific economic indicators of income inequality, such as the Gini Index. The Gini Index turns out to be positively associated with the beta coefficients of the difference between high and low educated in the likelihood of heterogamy. A unit increase in the Gini Index is associated with an increase in the estimated logistic regression coefficients of 0.18. In other words, where income inequality increased, the educational gradient tended to flatten, i.e., became less negative. A finding which is in line with hypothesis H2b, according to which when economic inequalities rise the educational gradient in heterogamy flattens, possibly because social barriers become stronger. This relationship holds even if we drop from the OLS regression Italy and Bulgaria, where highly educated are more likely to be in a heterogamous union than the low educated.

It could be that we do not observe any statistically significant effect of the Gini Index before 1990, because its effect could be non-linear, as suggested by Figure 3. Hence, we have alternatively specified the model by including a second-order term for the Gini Index. Results of this model specification are shown in Table C1 of Appendix C. Indeed, the results show a statistically significant effect of the squared term, and the fit surely improves, especially for the period before 1990. However, the inclusion of the squared term is not robust to the exclusion of Italy and Bulgaria. As shown in Table C2 of Appendix C, when running regressions without those two countries' estimates, the non-linear effect is not statistically significant anymore. Non-linear effects are mainly driven by these two data points.

Table 2. OLS regression results

Before 1990	Estimate	Std. Error	Pr(t > x)
Intercept	-1.91	1.16	
Gini Index	0.06	0.04	
Gender-Gap Education	1.35	4.17	
$R^2 = 0.20$			
After 1990			
Intercept	-5.82	1.20	***
Gini Index	0.18	0.04	**
Gender-Gap Education	-6.07	3.10	.
$R^2 = 0.61$			

Notes: Significance codes: <0.001 '***', <0.01 '**', <0.05 '*', <0.1 '.'

Concerning the effect of the gender-gap in tertiary education, the association is not statistically significant (at 0.05 level) in both periods considered, results are also robust to the exclusion of Italy and Bulgaria, and non-linearity effects were not detected. The lack of a strong linear relationship could be because the changing gender-gap in tertiary education affects the availability of potential mates with a tertiary degree in a different way for men and women. With an increasing gender-gap in education in favor of women, tertiary educated women become more numerous, hence opportunities for low and medium educated men to form a heterogamous union increase. The same does not necessarily hold for the low and medium educated women, who wish to partner with a highly educated man.

Interestingly, we observe that the sign of the association between the educational gradient in heterogamy and the gender-gap in education changes between periods. Before 1990, a gap in favor of women would be associated positively with the estimated coefficients, meaning that countries with a higher proportion of tertiary educated women than men would have a less negative educational gradient in heterogamy. In the period after 1990, instead, the coefficient is negatively associated to the estimated coefficients in heterogamy. This finding is in line with H3, according to which a - more - positive gender-gap in education is associated with a steeper negative educational gradient in heterogamy. In sum, while increasing income inequality, as indicated by the Gini Index, could somehow represent a barrier for the lower educated to be socially mobile by partnering with someone more educated than themselves, the recent reversal of the gender-gap in education works in the other direction.

5 Conclusions

Patterns of educational assortative mating are of scholarly interest because of their relationship with the reproduction of socioeconomic inequalities in a society. This is due to the ambivalent meaning of education, entailing good economic prospects and valuable cultural resources. Partners with tertiary levels of education who mate homogamously have bigger societal and economic advantages, relatively to partners who mate homogamously at lower levels of education (Blossfeld, 2009; Esping-Andersen, 2009). The level of heterogamy in union formation is an indicator of societal openness in a society: the higher the level of heterogamy, the fewer barriers exist across social groups. Hence, a society promoting heterogamy encourages social cohesion.

After the fall of the Soviet Union, economic inequalities have increased across European countries, and the new setting has also contributed to changes in educational assortative mating, together with the reversal of gender inequality in education. Still, studies addressing differences across countries and periods in the propensity to form heterogamous unions are rare due to the lack of comparable cross-country data, at both micro- and macro-level. In this study, we have filled this gap, by applying a two-stage regression approach to GGS data of 15 European countries.

At first, we examined the educational gradient in heterogamy versus homogamy by period of union formation, before and after 1990. We chose this cut-off year because it represents a mark of socioeconomic transformation in Europe. As expected, we found that medium and highly educated individuals are less likely to enter heterogamous unions, relatively to the low educated counterpart. We found only few exceptions to this pattern,

which holds across all the 15 countries considered. The most striking result is the case of Italy, where both medium and highly educated are more likely to form heterogamous unions than the low educated, a result driven by the fact that the low educated group in Italy is the most numerous. Moreover, in line with the expectations, we found that the negative educational gradient became steeper for unions formed after 1990.

Next, we have explored the association between country-level factors and the educational gradient in heterogamy. In line with our expectations, in the period after 1990, when economic inequalities increased, we found that the Gini Index is positively associated with the educational gradient in heterogamy, meaning that with increasing income inequality the educational gradient became less negative. Regarding the same period, we also found that a gender-gap in tertiary education, favoring women, is associated with a steeper negative educational gradient in heterogamy. This finding implies that in countries with an increasing gap in tertiary education in favour of women, low educated would show an increasing propensity to form heterogamous unions.

Despite the exploratory nature of this analysis, the merit of this study consists in the original exploitation of different contexts characterizing Europe, in terms of space and time. A limitation of this study, however, relates to the fact that it only focuses on the level of education. In fact, with educational expansion, even if partners hold a similar level of education, their life course could be different. For instance, the field of study for a given level of education, implies different career choices for each partner (Esping- Andersen, 2009). The earning potential of each partner is also affected by the field of study, as also indicated by the gender wage gap (Blau & Kahn, 2016). All of this is inherently linked to differences across contexts in the meaning and value of education itself, and how it has been changing over time.

Future studies should focus more in depth on a specific context, to identify the determinants of societal openness and how they are related to mating-market opportunities. When accounting for mating-market opportunities, it would be particularly interesting to also examine gender differences in the educational gradient in union formation, given that preferences and structural constraints differ between genders.

This study also emphasizes the challenge to consider both micro and macro levels of analysis when data availability is a problem to apply sophisticated multilevel analyses. The study of assortative mating, which entails the study of opportunity and constraints in the availability of partners on the mating-market, would be better addressed when focusing on a sub-national level. This is even more so when contextual determinants of assortative mating are considered, such as socioeconomic inequality. In fact, while the period after 1990 has marked a convergence across European countries in terms of socioeconomic indicators, due to structural policies of the European Union, regional disparities within countries have increased (Fredriksen, 2012; Heidenreich & Wunder, 2008).

Finally, with the future round of family surveys this study can be adapted to analyze the effect of more recent events, in particular the Covid-19 pandemic, on the role of mating patterns in the reproduction of social and economic inequalities, and ensuing consequences on social cohesion.

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A Appendix A: First step model results and diagnostics

Table A1. Full first-step logit results and goodness-of-fit models' statistics for the period before 1990.

Variable	Bulgaria	Germany	France	Hungary	Italy	Netherlands	Romania
Age	0.99	0.08	0.76	1.52	-0.08	-1.11	-0.02
Age squared	-0.03	0.02	0.04	-0.14	-0.03	0.14	0.07
Sex (Ref.: Male)							
Female	0.06	0.12	0.09	-0.04	-0.06	-0.15	-0.12
Year of birth	0.08	0.00	0.07	0.09	(omitted)	-0.10	0.02
Education							
Medium	-0.14	-1.60***	-0.24*	-1.24***	0.98***	0.81***	-0.65***
High	0.45***	-0.85***	-0.53***	-0.40***	1.13***	-0.05	-0.06
_cons	-1.83	0.37	-0.96	-1.28	-1.06***	0.37	-0.52
N	3817	2341	2342	3865	3007	2029	3824
Log-Lik Full Model	-2195	-1445	-1586	-2309	-1778	-1359	-2274
Log-Lik Intercept Only	-2221	-1515	-1601	-2436	-1865	-1397	-2312
Log-Lik Chi-square	51.6	140.6	30.7	255.6	174.5	76.9	77.0
AIC	4404	2903	3186	4631	3568	2732	4562

Notes: Signif. codes: < 0.001 '***', < 0.01 '**', < 0.05 '*', < 0.1 '.' Year of birth is omitted in the model for Italy because it is fully collinear with the age variable.

Table A1. Continued

Variable	Norway	Austria	Estonia	Belgium	Lithuania	Poland	Czechia	Sweden
Age	1.00	-4.03	-0.80	-0.22	-0.28	1.68	1.69	0.28
Age squared	-0.01	1.38	-0.06	0.02	-0.10	0.10	-0.05	-0.19
Sex (Ref.: Male)								
Female	-0.05	0.25	0.19	0.04	0.19	-0.05	0.01	0.27**
Year of birth	0.10	-0.29	-0.11	-0.02	-0.05	0.20	0.13	-0.06
Education								
Medium	-0.93***	-1.50***	-2.01***	0.68***	-1.65***	-1.36***	-2.63***	-1.08***
High	-1.08***	-0.73*	-0.56***	-0.20	-0.33*	-0.01	-0.31	-0.93***
_cons	-0.35	1.21	1.45	-0.35	0.48	-2.48	-0.87	0.45
N	3419	523	1940	1791	2195	5185	2070	1946
Log-Lik Full Model	-2305	-318	-1162	-1190	-1214	-2801	-954	-1305
Log-Lik Intercept Only	-2361	-344	-1311	-1221	-1319	-3008	-1225	-1340
Log-Lik Chi-square	112.9	51.5	296.9	62.1	211.1	413.7	541.6	68.6
AIC	4624	650	2339	2394	2442	5617	1922	2625

Notes: Signif. codes: < 0.001 '***', < 0.01 '**', < 0.05 '*', < 0.1 '.' Year of birth is omitted in the model for Italy because it is fully collinear with the age variable.

Table A2. Full first-step logit results and goodness-of-fit models' statistics for the period after 1990

Variable	Bulgaria	Germany	France	Hungary	Italy	Netherlands	Romania
Age	-1.20	1.43	-0.98	2.45	0.15	-0.65	0.30
Age squared	0.06	-0.02	-0.06	0.08	-0.14	0.35**	-0.06
Sex (Ref.: Male)							
Female	0.10	-0.04	-0.03	-0.08	0.07	-0.15	-0.10
Year of birth	-0.11	0.13	-0.12	0.23	(omitted)	-0.03	0.00
Education							
Medium	-0.69***	-1.49***	-0.65***	-1.35***	0.06	0.30*	-0.82***
High	0.21	-1.01***	-0.95***	-0.30	0.41**	-0.11	-0.56***
_cons	0.14	-0.59	1.39	-2.24	-0.44***	0.01	-0.42
N	2060	2037	2110	1753	1649	1411	2124
Log-Lik Full Model	-1209	-1295	-1393	-1003	-1116	-960	-1216
Log-Lik Intercept Only	-1250	-1340	-1426	-1070	-1121	-972	-1243
Log-Lik Chi-square	81.9	90.5	66.7	133.2	10.3	23.7	55.2
AIC	2432	2604	2800	2021	2244	1934	2445

Notes: Signif. codes: <0.001 '***' <0.01 '**' <0.05 '*' <0.1 '.' Year of birth is omitted in the model for Italy because it is fully collinear with the age variable.

Table A2. Continued

Variable	Norway	Austria	Estonia	Belgium	Lithuania	Poland	Czechia	Sweden
Age	1.26*	-0.04	-1.12	-1.39**	-0.04	0.10	0.68	-0.72
Age squared	-0.06	0.72**	0.16	0.01	0.00	0.03	0.17	-0.09
Sex (Ref.: Male)								
Female	0.21**	-0.13	0.00	0.23*	0.14	0.06	-0.16	0.07
Year of birth	0.11	0.00	-0.09	-0.14**	0.00	0.01	0.06	-0.10
Education								
Medium	-1.24***	-1.83***	-1.52***	-0.20	-1.52***	-2.12***	-2.79***	-2.10***
High	-1.88***	-0.74***	0.14	-1.10***	-0.58**	-1.21***	-0.70***	-2.08***
_cons	-0.20	0.72	1.30	1.62**	0.38	0.57	0.35	2.91*
N	3534	2172	1259	1966	1579	3940	1585	2644
Log-Lik Full Model	-2269	-1313	-765	-1260	-958	-2189	-751	-1728
Log-Lik Intercept Only	-2421	-1422	-860	-1319	-1012	-2352	-964	-1798
Log-Lik Chi-square	303.6	216.2	190.4	118.6	106.3	326.8	427.4	140.1
AIC	4552	2641	1543	2534	1931	4391	1515	3469

Notes: Signif. codes: <0.001 '***' <0.01 '**' <0.05 '*' <0.1 '.' Year of birth is omitted in the model for Italy because it is fully collinear with the age variable.

B Appendix B: Second step linear regression diagnostics

Table B1. OLS regression diagnostics tests for the assumptions of homoscedasticity and normality.

Period before 1990	Period after 1990
Breusch Pagan Test for Heteroskedasticity	Breusch Pagan Test for Heteroskedasticity
Ho: Variance is constant	Ho: Variance is constant
Ha: Variance is not constant	Ha: Variance is not constant
Chi2 = 2.0795	Chi2 = 0.00027664
Prob > Chi2 = 0.1492872	Prob > Chi2 = 0.9867298
Shapiro-Wilk normality test	Shapiro-Wilk normality test
Ho: Regression residuals are normally distributed	Ho: Regression residuals are normally distributed
Ha: Regression residuals are not normally distributed	Ha: Regression residuals are not normally distributed
W = 0.92917, p-value = 0.2652	W = 0.95929, p-value = 0.68

Based on the results showed in B1, the assumptions of normality and homoscedasticity are not violated, and the linear regression model can be considered adequate to fit these data.

C Appendix C: Further second step model specifications and results

Table C1. OLS regression results, including a second-order term for the Gini Index, to test non-linear effects.

Before 1990	Estimate	Std. Error	
Intercept	12,89	5,32	*
Gini Index	-1,06	0,40	*
Gini Index (squared term)	0,02	0,01	*
Gender-Gap Education	1,57	3,32	
$R^2 = 0.53$			
After 1990	Estimate	Std. Error	
Intercept	12,61	15,12	
Gini Index	-1,11	1,06	
Gini Index (squared term)	0,02	0,02	
Gender-Gap Education	-8,09	3,46	
$R^2 = 0.53$			

Notes: Signif. codes: <0.001 '***' <0.01 '**' <0.05 '*' <0.1 '.'

Table C2. OLS regression results, same model specification as in Table C2, but excluding Italy and Bulgaria.

Before 1990	Estimate	Std. Error
Intercept	4,08	8,23
Gini Index	-0,31	0,66
Gini Index (squared term)	0,01	0,01
Gender-Gap Education	1,29	2,87
$R^2 = 0.15$		
After 1990		
Intercept	6,41	17,17
Gini Index	-0,65	1,21
Gini Index (squared term)	0,01	0,02
Gender-Gap Education	-8,03	3,79
$R^2 = 0.54$		

Table C3. OLS regression results, using as dependent variable the estimated coefficients β_3 from first step logistic regression (medium vs. low).

Before 1990	Estimate	Std. Error
Intercept	-3.83	2.27
Gini Index	0.12	0.08
Gender-Gap Education	-0.31	8.15
$R^2 = 0.15$		
After 1990		
Intercept	-3.35	2.23
Gini Index	0.08	0.08
Gender-Gap Education	-2.34	5.77
$R^2 = 0.1$		

Notes: Signif. codes: <0.001 '***' <0.01 '**' <0.05 '*' <0.1 '.'



Research Paper

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SETTLEMENT IN THE RECLAIMED PONTINE MARSHES DURING FASCISM IN ITALY: EVIDENCE FROM AN UNEXPLORED ARCHIVE

Abstract

An unexplored dataset has been utilized to analyse the colonists who settled in southern Lazio during the Integral Land Reclamation carried out by the fascist regime in the 1930s. The farm records, known as Schede Poderali, encompass the contracts through which selected families were allocated portions of land reclaimed from the marshes. The documents enabled us to delineate the population trends in the decades following marsh reclamation and immigration from other Italian regions. This new piece of information enriches scientific research on the area providing an empirical validation of the interplay between population dynamics and political action.

Keywords: Marsh reclamation; immigrant families; Schede Poderali; Agro Pontino; fascism

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1 Introduction

The Agro Pontino is a geographical area located near the city of Latina, in southern Lazio, a region of central Italy (NUTS 2). Eighty years ago, the province of Latina was conceived following the extensive reclamation of the marshes that were prevalent in this area. As a result, the Agro Pontino represents an exceptional research environment, a key historical, demographic and anthropological case study.

The aim of this work is to enrich our knowledge of the families that settled in the geographical areas that now make up the province of Latina (NUTS 3). It also aims to shed light on the evolving population dynamics resulting from the land distribution programme that began in the 1930s and was completed in the following decades (Protasi & Sonnino, 2003; Caprotti, 2008).

We use an unexplored source of data, the *Schede Poderali*, the contracts by which reclaimed land was allocated to peasant families during the Fascist era. These records are unique and original documents. They are the only surviving testimony of the immigrant families who arrived in the area in the 1930s, encouraged or forced by colonisation programmes from other Italian regions. Originally collected and kept by the former O.N.C. (Opera Nazionale Combattenti/ National Combatants Organisation) – the institution that led most of the recovery of the Agro Pontino – these records are now part of the heritage of the *Museo della Terra Pontina in Latina*. Beyond detailing the size and nature of the allotted farms, these contracts comprehensively documented the demographic characteristics and composition of the recipient families. This documentation not only records the initial status of the settlers, but also any subsequent changes over the following years. Thus, the *Schede Poderali* database emerges as an invaluable resource for scrutinizing the demographic dynamics and distinctive social and economic facets of this newly established society.

This paper is intended as an introductory demonstration of the research potential that lies within this little-known historical archive. It proposes basic analyses of the demographic conditions and household structures in the area from the 1930s to the 1960s. The focus is on the southern regions of the Latina province, notably the geographic expanse known as the “Golden Triangle” of the Agro Pontino, bounded by three villages: Borgo Vodice, Borgo Hermada, and Borgo Montenero.

The paper unfolds as follows: Section 2 delves into the historical background encompassing the pontine land and its reclamation. Section 3 presents the hitherto unpublished database. Section 4 examines the demographics of the farming families settled within the “Golden Triangle” region. Finally, Section 5 discusses the results, namely in the light of the prevailing political climate at the time.

2 Background

The Agro Pontino, a vast area of about 80,000 hectares, lies between the Tyrrhenian Sea from Anzio to Terracina in the west and is bordered by the Lepini Mountains in the east, the Agro Romano in the north and the Agro of Fondi in the south. For many centuries it was largely uninhabited and characterised by swampy and unhygienic conditions, consist-

ing mainly of extensive dunes and stagnant water formations separating the sea from the mountains.

The historical narrative of the Pontine territory revolves around the concerted effort to reclaim the marshes, a saga that began more than two millennia ago with the ancient Volsci and culminated in the so-called “integral land reclamation” at the beginning of the 20th century (Caprotti, 2007).

Remarkable historical accounts from 404 B.C. by Tito Livio in the fourth book of his “Annals” provide insights into the first marshlands inhabited by the Volsci. Traces of their drainage systems, consisting of networks of tunnels that transformed the marshes into smaller “ponds” for fishing and agriculture, can still be seen today. However, the abandonment of these Volscian drainage systems after Roman domination in 328 B.C. led to a resurgence of the marshes.

During the period of Roman expansion, the Agro Pontino was seen primarily as a transit challenge to reach southern Italy. The vastness, sparse population and rampant malaria made the area largely inhospitable. The construction of the Via Appia in 300- 200 B.C. marked the first attempts at reclamation: a canal, known as the Rio Martino, was built alongside the road to alleviate flooding. Despite these efforts, the area was neglected in subsequent historical periods, with swamps overtaking fertile land, rendering the Via Appia impassable and contributing to an unhealthy atmosphere in the surrounding areas.

The efforts of Gaius Julius Caesar in 59 B.C. to oversee the rebuilding of the Via Appia were partially successful, but the region remained devastated.

For centuries, the Pontine land was again abandoned until the arrival of Theodorico in the 5th century, when some drainage work was carried out on the marshy land. After Theodorico’s brief initiatives, maintenance work was abandoned due to the disasters that followed.

In the 8th century, the Roman Church took control of the entire area. Although various popes during this period either donated or sold lagoons for fishing, they made minimal investment in land reclamation. It was only under the leadership of Pope Boniface VIII, from 1294 onwards, that significant efforts were made to reclaim the marshy lands that still belonged to the dukedom of Sermoneta, then acquired by the pope’s nephews, the Caetani family. However, with the transfer of the Papal See to Avignon in 1309, the area was once again abandoned.

It was not until Pope Pius VI (Giovanni Braschi, 1775-1799) that a comprehensive plan for the reclamation of the Pontine marshes was launched. This effort involved the temporary expropriation of all marshy land and lasted for about twenty years. More than 29,000 hectares were successfully reclaimed and returned to cultivation. Even before the reclamation work was completed, the drained land was leased to landowners. The high cost of cultivating and maintaining the land necessitated several privileges granted by Pius VI to the leaseholders, including exemption from various taxes, freedom to trade in grain, and the right to produce bread and sell wine.

In 1861, Pius IX created the Consortium of Landowners and Proprietors, which took over responsibility for the maintenance of reclamation works.

The first governments of unified Italy never seriously tackled the problem of land reclamation. It was only after the First World War that the government began to deal system-

atically with the problem of the Pontine territories. In 1918, the State Civil Engineers carried out extensive studies and launched the “Integral Reclamation”. This huge undertaking involved systematic interventions that included hydraulic works, malaria control, public health initiatives and land reform.

Hydraulic reclamation began in 1923 and involved the construction of an extensive network of roads and bridges, the digging of collecting canals, the installation of various water pumps to drain the subsoil and the creation of lakes on the coast. It was an impressive job: between 1926 and 1937, 18,548,000 person-days were spent on the work of fifty thousand workers recruited from all over the country, especially from the poor and overpopulated regions corresponding to the current areas of Veneto, Friuli Venezia Giulia, and Emilia-Romagna (Scarzanella, 1977; Caprotti, 2008). Intensive deforestation and the construction of new villages and towns took place alongside the swamps draining and canals building (Caprotti, 2007).

Significant progress has also been made in the area of sanitation (Snowden, 2006; Pro-tasi, 2016; 2017). First the Italian Red Cross, and then the Pontine Anti-Malaria Institute, waged a real battle against the *Anopheles* mosquito, using a variety of methods: draining the swamps, inventing mosquito nets for windows, introducing bats into the swamps and fishes into the water (because they feed on mosquitoes), introducing a poison called “Paris Green” into the watercourses.

The fascist legislation of 1928 marked the onset of land reform, also allocating financial resources for completing the reclamation. The subsequent decree in 1931 expropriated 18,000 hectares of land in favor of the Opera Nazionale Combattenti (O.N.C.), an association of First World War veterans. The reclaimed territory was divided into small estates (“*poderi*”), each consisting of an agricultural plot and a farmhouse. They were allocated to the families who had settled in the area, on condition that the head of the family – or at least one of the members of the household – was a former soldier from the First World War.

To provide technical and financial assistance to the settlers, a commercial and service centre was created for every hundred farmhouses, then forming a village (“*borgo*” in Italian), with a similar urban structure, including the church, the government office (“*casa del fascio*”), the agricultural credit, the school. The first 5 villages were given the name of the main battle sites of the First World War: Borgo Podgora, Borgo Sabotino, Borgo Grappa, Borgo San Michele, Doganella; eventually, a total of 18 villages were settled in the region. This marked the inception of larger towns such as Littoria (now Latina) in 1932; Sabaudia in 1934; Pontinia in 1935; Aprilia in 1937; Pomezia (in the province of Roma) in 1939.

Towards the end of the Second World War, the scourge of war was unexpectedly unleashed on the region. Shortly before the landing of Allied troops in Nettuno, the German troops had blown up the dams that collected, contained and distributed the water in the reclamation canals. As a result, a large area was completely flooded. The whole of the Agro was hit by artillery, which destroyed many farmhouses, destroyed crops, set fire to and burnt all the plantations and killed the remaining livestock.

After the war, the O.N.C. led a reconstruction effort that focused on rebuilding structures, draining flooded areas and rebuilding destroyed agricultural units. The O.N.C. continued its activities until the end of the 1960s and it was finally dissolved by Decree 616 in 1977.

3 The *Schede Poderali*

The study proposes an analysis of the information contained in the *Schede Poderali*, i.e. the documents used by the O.N.C. to register the contracts by which farms were allocated to peasant families.

The expropriated and reclaimed land of the Agro Pontino became state property. Through the O.N.C., they were divided up and allocated by means of specific contracts to the peasant families settling in the area, mainly from other regions of Italy. Each family was given a share of the land through a sharecropping system based on their skills and labour capacity. The state provided not only land and housing, but also basic livestock and agricultural tools. Settlers also had the opportunity to buy back the land and become small landowners.

Contract A: Involved a sales agreement with instalment payments.

Contract B: Consisted of a purchase agreement with initial interest-only payments, with the price being amortized for future payments.

Contract C: Consisted of an improvement lease with a conditional sale agreement for the future.

In 1942, due to the difficult wartime political climate, the O.N.C. moved from the sharecropping system to the final allocation of ransom farms throughout the region.

The two eligibility criteria for families to secure a farm allotment were:

- 1) The head of the family had to be an ex-soldier of the First World War, or at least member of the family had served in the war.
- 2) A minimum number of labour units: The total number of family members could not fall below a certain threshold based on the size of the land allocated.

Family work units were set by the O.N.C. and calculated on the basis of the age and gender of each member. An adult male aged between 18 and 65 was considered as a full labour unit (1). A woman of the same age was valued at 0.55, slightly more than half a man. Children aged 8 to 13 contributed 0.25 units, while those aged 14 to 17 contributed 0.50 if male and 0.25 if female. Older persons aged 65 and over were valued at 0.20 units, irrespective of their gender. The sum of these coefficients represented the total labour force of the family at the time the holding was allocated. Cultivation requirements dictated that each hectare of land had to have at least 0.25 working units; if this was not the case, the productivity of the farm was compromised. Larger plots required a minimum of four able-bodied men and two women. Family members under the age of 8 or unable to work were considered dependent. Excess labour would increase management costs, with the O.N.C. supplementing the family's income based on active units. This explains why the families selected for the Agro Pontino generally had an average of ten members, including relatives or cohabitants of the head of the family. The family included ascendants, descendants, collaterals, and in-laws, while the cohabitants included individuals linked to the head of the family by bonds of solidarity and friendship.

While families of ten were not uncommon in Italy in the 1930s, especially in regions such as Veneto and Emilia-Romagna with high rural demographic pressure, few met the working capacity requirements of the Agro Pontino. In order to meet the O.N.C. criteria, families were often merged or restructured. As a result, beyond the simple "household nucleus", that is the family formed by a married couple with or without children, many

farm records show quite complex household types, such as those with several cohabiting nuclei, (“multiple households”) or “extended households”, including a family nucleus with cohabitants. The Schede Poderali faithfully recorded all this information, both in terms of the characteristics of the land entrusted, the size of the farmhouse and the equipment provided, as well as the composition of the household and the value of the work units. An example of the original card is reported in Figure 1 and in Figure 2. Figure 1 at the top shows information on the contract holder and the extent of the allocated land. The first page then lists all the initial equipment provided in terms of livestock and farming implements. In the second page, all the information about the household composition, with name and date of birth, and relationship with the family head of each member. These records were regularly updated to reflect changes in family and demographic events and thus they meticulously document not only the structural characteristics of families and individual members at the time of farm allocation, including the economic characteristics of the farms themselves, but also the ongoing dynamic changes that occurred in subsequent years, in a longitudinal perspective. This includes details such as marriages, births, deaths, and possible migrations.

As a result, these records serve as a genuine population register that was carefully updated until the early 1960s. Transcribing the paper registers into processable data was a challenge because of the handwritten nature of the cards, which were sometimes incomplete, indecipherable, or worn over time, as the one in Figure 1 and Figure 2.

Figure 1. Example of farm record: Scheda Poderale – page 1

OPERA NAZIONALE PER I COMBATTENTI - ISPettorato AGRO PONTINO

ZONA *Velletri* PODERE N. *136* COMUNE DI *Pozzetto* Foglio di mappa N. *331* Zona *pedagogica* *Scienze* *Scienze*

Contratto tipo *A* Prezzo annuo *L. 1000* Contatti *L. 1000* (Registrazione a *Scienze*) *10.10.48* N. *1000* Vol. *100*

INTESTATARI *Giuseppe e Maria*

CONDUTTORI

Data della registrazione	Variazione successiva di contratto	Superficie attuale in <i>ha</i>	BOVINI										CANTINE		STRUTTORI		IRRIGAZIONI	
			Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>
			10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10

MIGLIORIE

Data della registrazione	Superficie attuale in <i>ha</i>	MIGLIORIE		MIGLIORIE		MIGLIORIE		MIGLIORIE		MIGLIORIE		MIGLIORIE		MIGLIORIE	
		Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>
		10	10	10	10	10	10	10	10	10	10	10	10	10	10

ATTREZZI

Data della registrazione	Superficie attuale in <i>ha</i>	ATTREZZI		ATTREZZI		ATTREZZI		ATTREZZI		ATTREZZI		ATTREZZI		ATTREZZI	
		Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>	Capre in <i>ha</i>
		10	10	10	10	10	10	10	10	10	10	10	10	10	10

NOTE: *10.10.48*

Source: Scheda Poderali archive

Figure 2. Example of farm record: Scheda Poderale – page 2

SITUAZIONE DI FAMIGLIA: *Preesistente* Data di immisione nell'attuale podere: *1934*

data di arrivo in Agro Pontino

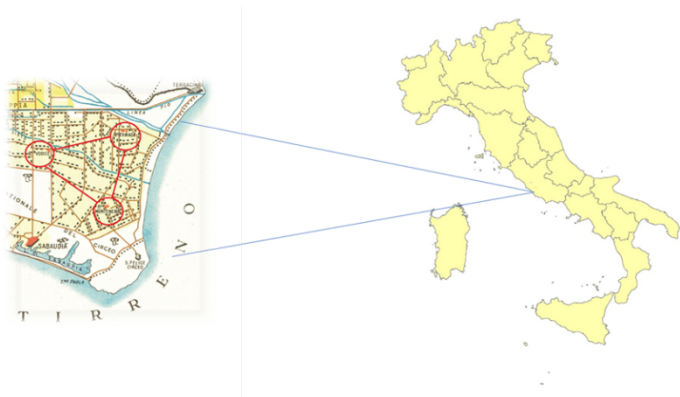
N.	COGNOME E NOME	Patronato	Data di nascita	Grado di parentela	Unità lavorative	ANNOTAZIONI
1	Giuseppe	Padronato	6.10.1888	Capo famiglia	1	Podere 10.10.1934
2	Francesca	Padronato	21.12.1891	conjugale	1	
3	Angela	Padronato	24.12.1892	figlia	1	Podere 10.10.1934
4	Stefano	"	11.11.1894	"	1	
5	Luigi	"	17.11.1894	"	1	Podere 10.10.1934
6	Antonio	"	24.12.1894	"	1	Podere 10.10.1934
7	Francesca	Padronato	24.12.1894	conjugale	1	
8	Stefano	"	11.11.1894	"	1	
9	Luigi	"	17.11.1894	"	1	
10	Antonio	"	24.12.1894	"	1	
11	Francesca	Padronato	24.12.1894	conjugale	1	
12	Stefano	"	11.11.1894	"	1	
13	Luigi	"	17.11.1894	"	1	
14	Antonio	"	24.12.1894	"	1	
15	Francesca	Padronato	24.12.1894	conjugale	1	
16	Stefano	"	11.11.1894	"	1	
17	Luigi	"	17.11.1894	"	1	
18	Antonio	"	24.12.1894	"	1	
19	Francesca	Padronato	24.12.1894	conjugale	1	
20	Stefano	"	11.11.1894	"	1	
21	Luigi	"	17.11.1894	"	1	
22	Antonio	"	24.12.1894	"	1	
23	Francesca	Padronato	24.12.1894	conjugale	1	
24	Stefano	"	11.11.1894	"	1	
25	Luigi	"	17.11.1894	"	1	
26	Antonio	"	24.12.1894	"	1	
27	Francesca	Padronato	24.12.1894	conjugale	1	
28	Stefano	"	11.11.1894	"	1	
29	Luigi	"	17.11.1894	"	1	
30	Antonio	"	24.12.1894	"	1	
31	Francesca	Padronato	24.12.1894	conjugale	1	
32	Stefano	"	11.11.1894	"	1	
33	Luigi	"	17.11.1894	"	1	
34	Antonio	"	24.12.1894	"	1	
35	Francesca	Padronato	24.12.1894	conjugale	1	
36	Stefano	"	11.11.1894	"	1	
37	Luigi	"	17.11.1894	"	1	
38	Antonio	"	24.12.1894	"	1	
39	Francesca	Padronato	24.12.1894	conjugale	1	
40	Stefano	"	11.11.1894	"	1	
41	Luigi	"	17.11.1894	"	1	
42	Antonio	"	24.12.1894	"	1	
43	Francesca	Padronato	24.12.1894	conjugale	1	
44	Stefano	"	11.11.1894	"	1	
45	Luigi	"	17.11.1894	"	1	
46	Antonio	"	24.12.1894	"	1	
47	Francesca	Padronato	24.12.1894	conjugale	1	
48	Stefano	"	11.11.1894	"	1	
49	Luigi	"	17.11.1894	"	1	
50	Antonio	"	24.12.1894	"	1	

Source: Schede Poderali archive

4 Population dynamics and families in the “Golden Triangle”

In this paper, we present some descriptive analyses of data obtained from the previously described archive (Section 3), focusing on three villages: Borgo Vodice, Borgo Hermada, and Borgo Montenero, which currently fall under the municipalities of Sabaudia, San Felice Circeo and Terracina, respectively (Figure3). The territory enclosed between the three villages constitutes what is called the “Golden Triangle” of Agro Pontino.

Figure 3. The “Golden Triangle” of Agro Pontino



Source: Pisano (2014)

Table 1. Settled families by village and place of origin

Region of origin (NUTS 2)	Province (NUTS 3)	Borgo Vodice	Borgo Hermada	Borgo Montenero	Total
Friuli Venezia Giulia Veneto	Udine	16	47	19	82
	Padova	3	4	9	16
	Rovigo	5		5	10
	Treviso	33	4	41	78
	Venezia		16	6	22
	Verona	9	19	17	45
	Vicenza	13	8	31	52
	Belluno	7	4		11
Emilia Romagna	Ferrara	24	58	1	83
	Reggio Emilia			9	9
	Modena			2	2
Lazio	Latina	34	14	26	74
	Other	6			6
Other regions		5	1	6	12
TOTAL		155	175	172	502

Source: Schede Pederali archive

The “Golden Triangle” constitutes a remarkably fertile and lush area. Renowned for its agricultural productivity, this land remains a vital source of Pontine wealth, contributing significantly to the export of wine, oil, vegetables, and fruits.

Our research file includes approximately 500 families, for a total of 7,632 individuals.

Families settled in this area came mainly from the provinces of Veneto, but the presence of people from Udine and Ferrara was also significant (Table1). It is also noteworthy that 10% of the families came from areas bordering the Agro Pontino itself.

According to the O.N.C. requirements, the average size of families was high, with a fairly large number of work units (Table2). Complexity and average size tended to increase rather than decrease over time, with the multi-nucleus households increasing from around 34% in the 1930s to over 70% in the 1950s (Table 3).

The explanation for this evolution in family structures is closely linked to the size of the family labour force, expressed in terms of work units, and the urge to increase the average size in order to meet the requirements for the subsequent redemption of the allocated land (Table3). To this end, many nuclear families merged. It is worth noting, however, that only a slight correlation (around 0.4 value) has been estimated between family size, number of working units and farm size at the time of redemption.

Table 2. Average size of settled families by village

	N. Families	Average size	Average work units
Borgo Vodice	155	17.2	4.2
Borgo Hermada	175	14.8	4.2
Borgo Montenero	172	13.9	3.5
Total Triangle	502	15.2	4.0

Source: Schede Poderali archive

Table 3. Settled families by typology over time (a.v. and %)

Family type	Years					
	30s	%	40s	%	50s	%
Nuclear households	220	43.8	134	26.7	66	13.1
Extended households	110	21.9	98	19.5	79	15.7
Multiple households	170	33.9	269	53.6	356	70.9

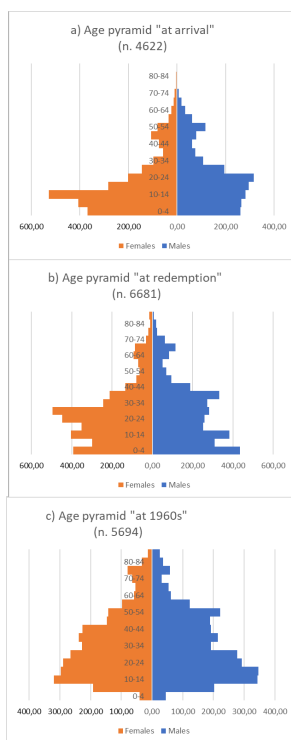
Source: Schede Poderali archive

The distribution of farms by size was heterogeneous in the area and also related to the predominant origin of the settlers: in Borgo Montenero, where the Venetians predominated, there was a high frequency of small farms with a maximum of 10 hectares of land, while in Borgo Hermada, where mainly families from Udine and Ferrara settled, the main size of the land was between 11 and 20 hectares. The type of contract also changed, although everywhere the “C” contract prevailed, i.e. a lease with a conditional agreement for a future sale.

An analysis by age and gender of the population structure (Figure 4) shows that the

settled farm families were composed of relatively young individuals, with a slight predominance of women, what ensured that the population initially grew quite rapidly – then slowed down after the Second World War – to almost 6,000 units in the mid- 1950s. As expected, population structure gradually aged. At the beginning of the 1930s, the initial population that settled in the three villages of Borgo Vodice, Borgo Hermada and Borgo Montenero consisted of a total of 4,622 units, of which 2,186 were male and 2,436 were female. The age pyramid shows that the population was very young in the early 1930s, at the time of arrival (4a). In the following decade, notwithstanding the Second World War, the total population increased to 5,860 units, including 2,910 males and 2,950 females, although with a slightly ageing structure (Figure 4b).

Figure 4. The “Golden Triangle” population structure at: a) average 1930s “arrival”; b) average 1940s “redemption”; c) average 1960s



Source: Schede Poderali archive

At the end of the 1950s, beginning 1960s, the population of the area under consideration reached 5,917 units, of which 3,061 were males and 2,856 females. The age pyramid

(Figure 4c) refers to the year 1959, one of the last dates for which the data registered in the small farm records are available and reliable: the process of closing the O.N.C. had already begun at the end of the 1950s. The indicators shown in Table 4 summarize the evolution of the age structure of the population of the “Golden Triangle”, which can be observed by comparing the three key moments of the period analyzed. The male/female ratio increased notable from less than 90 men for every 100 women on arrival to more than 104 /100 at the beginning of the 1960s. At the same time, both the dependency ratio and the number of children per woman were falling, reflecting the fact that the presence of adult male workers consolidated, the reproductive behaviours of families was declining, although the elderly component of the population remained small.

Table 4. Population gender and age structure indicators (x100)

	At arrival	At redemption	1960s
Male/female ratio P^M / P^F	89.74	93.93	104.31
Dependency ratio $(P_{65+} + P_{0-14}) / P_{15-64}$	88.58	64.19	38.88
Children/women $(P_{0-4}) / P_{15-49}^f$	65.28	42.17	5.08

Source: Schede Poderali archive

We also calculated the crude birth and death rates for the period 1940-1959. As expected, with around 2,500 births and 430 deaths, the corresponding rates – 21.1 and 3.6 (x 1000) – are further evidence of the very young population living in the Agro Pontino at that time.

It may be useful to place the evolution of this population in the context of the Italian demographic transition and to compare the natural dynamics (birth and death rates) in the period concerned and in the whole of Lazio with those recorded in the regions of main origin of the settlers (Table5).

Throughout the period, Latina had a higher birth rate and a lower death rate than the other regions considered, thus indicating a younger and rapidly growing population.

Table 5. Death and birth rates (x 1000) – Latina province and various regions (1935-1955)

	Latina		Lazio		Veneto		Emilia Romagna	
Year	Date	Birth	Date	Birth	Date	Birth	Date	Birth
1935	11.1	30.2	12.8	23.9	11.8	24.4	11.9	20.2
1939	9.7	30.0	11.4	24.2	11.5	24.3	11.7	19.4
1942	10.5	25.6	11.9	20.8	11.7	21.7	11.8	16.4
1947	8.8	29.3	9.6	22.2	10.6	21.7	10.9	17.8
1955	6.3	21.3	7.9	18.6	8.9	17.0	9.0	13.3

Source: Our elaboration on ISTAT data, Population and demographic dynamics (1862-2014)
<https://seriestoriche.istat.it/>.

From the end of the 1950s, the compilation of farm records became less accurate and progressively the registration of events – in particular births and deaths – passed through the municipal registry offices. In 1977, the O.N.C. was definitively suppressed.

5 Discussion and conclusions

The data presented in this study reveal a unique narrative that portrays the families who settled in the Agro Pontino in the 1930s. This area, south of Roma, had previously been characterized by inhospitable environmental conditions, minimal economic progress, and depopulation (Protasi, 2013). The “Integral Reclamation” of the Agro Pontino represented a monumental commitment of financial and human resources and offered a chance of redemption to numerous families who settled in these “new lands”, coming from social and economic backgrounds that were, if anything, even more precarious (De Rose, Strangio, & Corà, 2012). Beyond any historical judgement on the political origins of this colossal operation (Treves, 1976; Ipsen, 1996), the territory honors its heritage with deep respect and pride, as shown by the invaluable archive of *Schede Poderali kept at the Museo della Terra Pontina*.

For the first time we have delved into this unpublished archive, focusing on three villages in the southern Pontine region, forming the so-called “Golden Triangle”. This title derives from their geographical position and the variety of agricultural products that the settlers were able to cultivate on the land wrestled from the marshes. By analysing this archive, our aim was to contribute to the description of the demographic characteristics of the region during the Fascist period and the following decades. This newly discovered documentation could contribute significantly to our understanding of the history of reclamation and the settlers who participated in this process.

The allocation of land to settlers, based on the size of the family and its capacity to grow and improve the labor unit, is in line with the well-documented demographic policies of the Fascist regime. To integrate more individuals into families, the government and the *Fascist Chamber* implemented several measures to boost the birth rate, offering cash bonuses to prolific families, tax concessions for real estate purchases, and direct tax benefits such as exemptions and deductions for dependent children. Spouses and fathers of large offspring were granted career advancement and salary integration, accompanied by interest-free loans.

Families within the “Golden Triangle” skilfully navigated these policies to their advantage. To secure larger plots of land, several family nuclei often merged, sometimes reaching sizes of over 20 members, with a recorded maximum of 39 members in Borgo Vodice.

An analysis of the age structure shows an increasingly balanced and young population, with the average age of new settlers on the farms being around 20. Demographic indicators confirm a young population invested in offspring and a quite slow ageing process.

The farm records offer insights into both departures from and entries into the original family, including aspects such as deaths, births, and migrations, all of which warrant further study. An initial look at the data suggests that mobility was limited, with a small number of people leaving the family farm to emigrate abroad or return to their place of origin, and a larger number of young brides leaving their parental homes to join their husbands’

households. There are also cases of renouncers who, for religious or personal reasons, choose to distance themselves from their original family unit.

Subsequent research could also explore issues such as the family formations pattern prevailing in that area during the period analysed, namely how two contrasting systems – northern and southern – merged within the Agro Pontino, as a consequence of the forced migrations of peasants from the northern regions. Indeed, still at the dawn of the 20th century, the family formation model prevailing in the agricultural society of north-eastern Italy – where the sharecropping-type agrarian contract prevailed – was characterised by late and not universal marriage, and frequent patrilocal arrangement of the new couple, with several cohabiting nuclei in the same household. In contrast, in southern Italy, a massive presence of labourers employed in larger landholdings was usually associated with lower ages at marriage for both men and women and an almost universal access to marriage, as well as the neo-locality of new nuclei remaining of small size (Barbagli & Kertzer, 1992; Cocchi et al., 1996).

Overall, the first insights into the dataset used in this study suggest that the *Schede Poderali* archive is of great value for demographic research and the empirical validation of the interplay between population dynamics, political intervention, and the socio-economic development of the region.

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Data availability

The *Schede Ponderali* data underlying this article were provided by “Museo delle Terre Pontine” in the city of Latina. Data will be shared on request to the corresponding author with the permission of the museum.

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Research Paper

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Marco Nocente*

TRA DOMINIO E AFFETTO. CANI DI RAZZA E UMANI NELLE AREE CANI

Abstract

This article contributes to animal geographies through a specific analysis of human-animal relations. It explores the intricate relationship of dominance and affection between humans and purebred dogs. Drawing on ethnographic research conducted in dog areas, the article examines how humans construct social representations out of their dogs in these restricted, self-regulated spaces. After presenting a critical reading of the production of purebred dogs, I discuss humans' representations of their dogs, often seen as extensions of their personality. This relationship, within dog areas, manifests itself in the discourses that circulate, where the dog is often anthropomorphised and used to reinforce gender stereotypes rooted in common sense. For example, female dogs are often described as jealous and dogs as "Latin lovers". In this context, affection makes people desire the dog as a mirror of their personality, a social facilitator, or a protective figure. This research contributes to a deeper understanding of the multifaceted nature of the human-animal relationship and the nature-culture dichotomy, with particular attention given to their implications in urban spaces beyond the majority of research conducted in animal geography which usually focuses on case studies located in the UK or US.

Keywords: affection, dominance, human-purebred dog.

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1 Introduzione

Nella cultura popolare, il cane è spesso ritenuto il “migliore amico degli umani”. Questa rappresentazione, pur evidenziando il profondo legame che unisce le due specie, nasconde una complessità intrinseca. Cani e umani, sebbene condividano una lunga storia evolutiva e affettiva (Haraway, 2019; 2003), sono legati da un rapporto di potere asimmetrico. Esso non si esprime solo in termini di dominio o sottomissione (Power, 2008), ma anche da un crescente affetto che condiziona le traiettorie del loro co-divenire (Tuan, 1984).

Il cane, da guardiano della casa o supporto alla caccia, si ritrova oggi nei piccoli spazi domestici degli appartamenti o nelle aree cani delle città, conquistando sempre più affetto, intimità e coesistendo con gli umani in questi spazi ristretti (Philo, 1995). Tra i ruoli che hanno anticipato il suo ingresso nelle mura domestiche, figura quello del cane come oggetto dell’“agiatezza vistosa”, dettata dalla moda delle classi aristocratiche, fino al tramonto del codice d’etichetta e alla seguente massificazione dei consumi e degli stili di vita, con l’arrivo di migliori condizioni economiche della società (Veblen, 2011). Anche Baudrillard, nella sua descrizione del significato degli oggetti, definisce gli animali domestici “una specie intermedia tra gli uomini e gli oggetti” (Baudrillard, 1972, p. 73). Come gli oggetti da collezione, gli animali sono (de)tenuti all’interno di un “universo domestico narcisistico”, senza sesso (spesso sterilizzati), volti a esaltare al massimo la persona senza mai frustrarla. Il cane-oggetto sembra quindi uno specchio perfetto, perché non riflette immagini reali, ma desiderate (Baudrillard, 1972, p. 73).

Il *pet* assume un ruolo centrale per l’umano, divenendo a tutti gli effetti un membro della famiglia (Power, 2007), proprio come il “bambino” (Arluke & Sanders, 1996). In alcuni casi si considera il cane a un grado superiore a quest’ultimo, a causa della sua maggiore mobilità, del suo ruolo di facilitatore sociale, e della sua disponibilità (Nast, 2006). Il cane compensa le carenze emotive, familiari e di compagnia che caratterizzano l’individualizzazione e l’insicurezza sociale del nostro tempo.

La ricerca si colloca all’interno del filone di studio “animal geographies” (Buller, 2016) all’interno della geografia umana, o per meglio dire della geografia più che umana (Whatmore, 2002). L’articolo contribuisce ad arricchire le geografie animali, che sono principalmente esaminate nei contesti anglo-americani (Hovorka, 2017), offrendo una comprensione delle relazioni tra cani e umani in una città dell’Italia settentrionale. Attraverso l’etnografia, in questo articolo ho ricostruito un discorso comune tra i frequentatori delle aree cani, un sistema di rappresentazioni condivise tra gli esseri umani a partire dal rapporto specifico con i loro *pet* di razza.

La figura del cane domestico, in particolare in ambito urbano, riflette la complessità del rapporto tra cultura e natura (Tuan, 1984). Indica un legame con la natura, resa innocua, controllata e plasmata sui bisogni degli umani, divenendo fragile e bisognosa di protezione. Per lo stesso motivo, i proprietari preferiscono la sterilizzazione, l’imposizione di un collare ed un guinzaglio in uno spazio relegato come l’area cani. La domesticazione ha ancora molto a che fare con il dominio (McHugh, 2004). Anche Perkins Gilman (1911) includendo il discorso sull’antivivisezione nel suo femminismo considera il cane, la creatura che diciamo di amare, come uno schiavo senza alcuna industria che giustifichi la sua schiavitù; un prigioniero, senza alcuna colpa che giustifichi la sua prigionia. Questa distinzione tra natura

e cultura non è volta solo a distinguere, ma a marcare una gerarchia tra le specie (Gillespie & Collard, 2015).

Inoltre, le rappresentazioni dei cani di razza vanno anche iscritte nel sistema di mercato neoliberalista dove il cane viene mercificato, prodotto, venduto e mantenuto (Nast, 2006). Nel territorio e in svariati siti internet sono nate comunità *pet friendly*¹, dove vengono offerte esperienze sempre più complete per cani e padroni. Il discorso antivivisezione, che ha origine dalla fine dell'800 considerava i pet, in molte delle loro varietà, il prodotto di un allevamento spietatamente disgenico che sacrifica il vigore e la vitalità alla minuzia, alla pacchianeria e alla deliziosa bruttezza (Wells, 1928). Questo sottolinea l'importanza della dimensione etica e politica quando si mercifica o si detiene un essere vivente per volontà degli umani.

Le razze vengono allevate in accordo a precisi canoni estetici manipolati dalla volontà umana (Tuan, 1984). Oggi, il mercato offre razze standardizzate attraverso certificati che fanno in modo di ridurre al massimo la loro riproduzione incontrollata (Brown, 2015). In questo modo si garantiscono razze "perfette" o, come descritto da alcuni allevatori, "cani di qualità"² La purezza dovrebbe garantire inoltre un certo determinismo comportamentale, rendendo i cani più adatti a specifici compiti, come quelli richiesti nei cinodromi o nella caccia (Fletcher & Platt, 2018). La seguente ricerca non si sofferma su questo uso dei cani, ma osserva un certo determinismo in relazione alle aspettative sociali e personali, spesso affettive, delle persone che acquistano questo tipo di cani e del rapporto che instaurano con loro.

Esaminando il modo in cui il cane viene rappresentato nella cultura popolare, si può notare come sia spesso antropomorfizzato, classificato per genere o stereotipato (dell'Agnese, 2021). Questo avviene persino nel parlato comune, non è casuale l'utilizzo di certi giochi di parole che richiamano ai cani per parlare delle persone. Sia in termini generalmente positivi come 'tale cane, tale padrone' sia in termini negativi come "vita da cani". Ci sono espressioni linguistiche distinte in maniera discriminatoria tra uomini e donne, come cane e cagna, uno associato ad un significato di infamia e l'altro al fatto di prostituirsi. Cagnolino invece, vale solo per gli uomini ed indica un certo grado di "sottomissione" e fedeltà timorosa degli uomini per il proprio partner.

Oggi, il cane resta intrappolato in un rapporto di dipendenza, un dominio che prende specifiche forme sulla base dell'affetto di chi lo detiene. Viene naturalizzata la relazione servo-padrone, ma l'intimità del rapporto che li caratterizza mostra anche un co-divenire di cani e umani. Le rappresentazioni sociali che emergono dal rapporto tra cane e umano, le aspettative, i ruoli e le dinamiche di potere che caratterizzano questo legame riflettono strutture sociali più ampie che vengono riprodotte quotidianamente. La ricerca ricostruisce questo tipo di rappresentazioni intrinsecamente costituite all'interno della loro relazione.

L'articolo si compone di una prima parte metodologica in cui presento il campo di

1 Nel corso dell'articolo utilizzerò due termini che sono espressione del linguaggio del "dominio" sul cane di razza: "padrone" e "proprietario". Li utilizzo proprio perché sono gli stessi termini utilizzati dagli intervistati e racchiudono la dominazione che caratterizza il rapporto cani-umani.

2 La parola cane di qualità è ricorrente nel vocabolario di addestratori e allevatori di cani. <http://www.tipresentoilcane.com/2011/04/03/mille-euro-per-un-cucciolo-ma-e-un-furto-o-forse-no/>.

osservazione e il metodo etnografico con cui ho osservato il rapporto tra cani e umani. Nelle successive sezioni discuto in primis come, attraverso la scelta della razza, si possano cogliere alcuni bisogni dei proprietari, come quello di comunicare il proprio status. I proprietari si identificano nei propri cani e li personificano, attribuendo loro valori sulla base delle loro aspettative. Nella seconda parte, analizzo le rappresentazioni caratteristiche del rapporto tra cani e umani all'interno del contesto, ovvero nelle aree cani dei parchi cittadini, soffermandomi in particolare su quelle legate al genere e agli stereotipi su cui si basano.

2 L'area cani: note metodologiche

L'area cani è anche nota come area cani liberi, liberi perché in ogni area vale la prescrizione per cui i cani possono essere liberati dai propri guinzagli. Già nel nome, si lascia intendere un dato per scontato: solo in questo spazio relegato i cani possono assaporare un po' di libertà. Questo è già un aspetto configurativo significativo delle traiettorie di dominio e affetto nei confronti dei cani che vivono le aree urbane.

Per realizzare questa etnografia, ho frequentato per un mese alcune aree cani di Milano: Piazzale Insubria, Piazzale Martini e il Parco Formentano. Queste aree si trovano all'interno di parchi pubblici e sono delimitate da reti o palizzate, con accesso consentito solo tramite le porte di ingresso. Si tratta di spazi ristretti, regolati informalmente da chi li frequenta, in base al riconoscimento reciproco dei comportamenti assunti dai cani e dai loro padroni. Al momento dell'ingresso, può accadere che un umano chieda a chi sta entrando di non fermarsi o di non entrare, ad esempio chiedendo il sesso del cane, poiché talvolta alcuni cani mostrano comportamenti aggressivi nei confronti di altri dello stesso o dell'altro sesso.

Le aree cani che ho frequentato sono relativamente spoglie, terreni spesso senza erba, quadrati, dove è possibile vedere tutte le persone presenti perché non ci sono ostacoli alla visuale. Si trovano a volte delle panchine quasi sempre sottodimensionate rispetto al numero dei frequentatori. Nell'area cani si possono trovare persone da sole o gruppi di persone. Si tratta di frequentatori giornalieri che si distribuiscono nell'area, magari vicino ad una panchina dove possono parlare tra di loro mentre i loro cani stanno insieme in una situazione più sicura.

Proprio perché lo spazio è ristretto, tuttavia, è facile trovarsi a parlare, soprattutto perché sono i cani ad avvicinarsi per primi. Questa configurazione dello spazio, caratterizzata anche da un senso di abitudinarietà dovuto alla frequenza con cui le persone lo frequentano, facilita l'osservazione e l'ascolto di quei discorsi che spesso vengono dati per scontati, a partire dal rapporto tra cani e umani. Capita, per esempio, di sedersi sulla stessa panchina dove si trova il proprietario di un altro cane che sta parlando con un amico. Oppure, nelle piccole aree cani, può capitare di essere solo in due umani e sentirsi liberi di parlare con chi condivide casualmente un po' di tempo con te nello stesso spazio. Le aree cani sono spazi nei quali i proprietari socializzano il rapporto con i propri cani, una metafora micro-ecologica costituita da "sintesi e simboli iconici di configurazioni strutturali che i soggetti, lo vogliano o no" (Goffman, 2007, p. 73). Sono spazi pubblici unici nelle aree urbane, dove si manifestano diverse e situate forme di socializzazione (Graham e Glover, 2014).

La frequentazione delle aree cani è un fenomeno sociale diffusissimo e praticato quotidianamente in forme diverse. Tuttavia, la ricerca non sarebbe stata possibile senza il sup-

porto delle educatrici, che, grazie all'esperienza del loro lavoro, sono in grado di spiegare alcune dinamiche di questo rapporto. Fin dall'inizio della ricerca, ho coinvolto due educatrici cinofile e l'operatore di un canile, che si sono resi disponibili attraverso un'intervista individuale, al di fuori dei luoghi dove ho condotto il campo. Con una di queste educatrici, il confronto è proseguito per tutta la durata del campo, attraverso momenti di scambio informale. Da un punto di vista metodologico, queste figure sono definite come "*good representatives*" (Despret, 2008, p. 127; Colombino & Bruckner, 2023). Le educatrici hanno riconosciuto l'interesse per le mie domande di ricerca e mi hanno guidato nell'analisi del rapporto tra cani di razza e umani, attingendo alla loro esperienza professionale. Inoltre, il mio rapporto con loro è servito a controllare la tendenza ad "antropomorfizzare e romanticizzare le capacità cognitive" dei cani (Tomasello, 2005, p. 242). L'antropomorfizzazione è un meccanismo inevitabile per chiunque cerchi di spiegare i comportamenti animali. Oltre a me, anche i proprietari di cani lo attuano continuamente nell'osservare e spiegare i comportamenti dei loro animali (Daston & Mitman, 2005; Parkinson, 2019; Servais, 2018).

Nelle aree cani, per avvicinarsi ai padroni è sufficiente utilizzare il cane come ponte con il proprietario, facendo complimenti al cane è facile ottenere il benessere del proprietario. A questo proposito Graham & Glover (2014) descrivono come i cani possono facilitare il contatto, la fiducia, la conversazione e la confidenza tra persone che altrimenti non si sarebbero mai parlate. Qui emerge un primo punto che insieme ha valore a livello metodologico e analitico. Il cane è un ponte per l'interazione, un facilitatore sociale. A questo proposito risulta emblematica la domanda che precede ogni interazione nelle aree cani: "di che razza è?" oppure "è maschio o è femmina?" domande rituali che spesso portano ad un momento di incontro. La ricerca sul campo è stata condotta da solo o accompagnato da un'amica proprietaria di un cane amstaff. Nel corso di circa sei mesi, ho frequentato le aree cani, accompagnando la mia amica molte volte. Tuttavia, è stato solo quando ho deciso di avviare la ricerca che ho cominciato a prendere appunti, a condurre interviste con le figure precedentemente citate e a parlare con i diversi proprietari di cani. L'osservazione è proseguita per un mese, con frequenza di tre volte a settimana, in particolare presso l'area di piazza Martini. L'etnografia è stata condotta in maniera aperta: mi presentavo alle persone comunicando che stavo conducendo uno studio sul rapporto tra cani e umani. Non posso riportare il numero esatto delle persone osservate, ma si aggirano comunque sull'ordine delle decine. Spesso, l'osservazione non richiedeva uno scambio verbale con i proprietari; era sufficiente ascoltare le conversazioni in corso, poiché l'accesso all'area cani rappresenta un rituale collettivo, e le persone tendono a socializzare in uno spazio ristretto. Di conseguenza, è facile assistere alle conversazioni. In questi casi, a meno che non venissi interpellato, non ho ritenuto necessario interrompere il rituale per comunicare che stavo conducendo una ricerca. Sono invece circa una decina i proprietari di cani con cui ho interagito e presentato la ricerca. Con tre di loro, in particolare, lo scambio è avvenuto in più occasioni e per periodi di tempo prolungati.

3 La scelta del cane di razza tra moda, stereotipi e identificazione affettiva

Il seguente paragrafo ci offre delle chiavi di lettura per comprendere i processi di costruzione del senso intorno ai cani e del co-divenire tra cani e umani nelle aree cani. Sulla base dell'etnografia condotta ho svolto in primo luogo una analisi critica sulla scelta della razza da parte degli attuali proprietari di cani. In seguito, analizzo come i proprietari si identificano nel proprio cane creando un certo legame affettivo.

I risultati della mia ricerca hanno messo in luce che la scelta di un cane, in accordo con molti proprietari è principalmente affettiva. Tuttavia, la scelta della razza avviene a volte in maniera piuttosto metodica e razionale, e altre volte sembra che la scelta avvenga in modo meno consapevole, è frutto della cultura popolare, dello stile di vita e delle mode contemporanee. In generale molti sono consapevoli delle caratteristiche comportamentali e fisiche dei cani e di conseguenza ne scelgono uno in funzione del proprio gusto e dei propri desideri. Tuttavia, questa scelta non è slegata dall'esistenza di stereotipi. Nelle aree cani ne sono un esempio i pitbull e bull terrier che da molti vengono definiti il cane dei "palestrati" o degli "zarri" o i golden retriever, cani per famiglie affettuosi e dolci³. Negli anni è divenuto "di moda" un incrocio di molossi e terrier, l'amstaff che, grazie ad un manto particolare e la forma più elegante, si è esteso al pubblico cambiando in parte lo stereotipo dal quale proveniva.

Per comprendere il senso e i criteri dietro l'acquisto di un cane, riporto l'episodio che mi ha raccontato una educatrice di cani. Una famiglia preoccupata per il periodo difficile del proprio figlio ha pensato di regalargli un cane. La persona in questione era proprietario di un locale che aveva il lupo come simbolo della sua insegna. Di conseguenza la famiglia ha scelto per lui un lupo cecoslovacco poiché oltre alla compagnia, si "abbinava" al tema del locale. Un'altra persona a proposito del suo amstaff raccontava: "mio fratello lo ha scelto sicuramente per moda. Tutti i suoi amici e fratelli ne hanno uno." Dalla conversazione emergeva che il fratello non cercava un cane di razza specifico e quindi tra amici e familiari si è scelto così. Il fatto che fosse di moda quando lo ha preso fa riflettere sulla consapevolezza e l'inconsapevolezza nel repertorio di scelte indotte dal mercato e dall'immaginario di chi voleva fare il regalo (Edensor, 2008).

La moda nella storia ha diffuso un'idea di gusto costantemente sorvegliato dalle "leggi dell'agiatezza vistosa" e ha previsto "cambiamento e revisione" per poi arrivare ad una più stretta conformità (Veblen, 2011, p. 13). Questo processo sempre attuale rende fruibili alcuni cani piuttosto che altri e può influenzare i proprietari che sono meno certi della razza da comprare.

Nell'immaginario delle persone incontrate, per gli uomini, la muscolatura e lo slan-

3 Per zarro si intende una definizione che ho trovato coerente anche con il senso comune che circola su questa parola, che resta comunque imprecisa e condivido in parte: Giovane di bassa estrazione sociale e dai modi rozzi, che ostenta goffamente un modo di vestire appariscente e alla moda: http://www.grandidizionari.it/Dizionario_Italiano/parola/Z/zarro.aspx?query=zarro. Il Golden Retriever, come descritto sull'enciclopedia del sito di Royal canin, ha tutte le qualità per giustificare la sua notorietà mondiale: amabile ed affettuoso, ha una dolcezza proverbiale che spiega il suo successo come cane da famiglia. Vedi sito: <http://royalcanin.it/enciclopedia/razza/golden-retriever/12077>

cio del cane si sposa con un certo tipo di persona che intende esibire e comunicare forza. Per questo si sceglie un cane che nelle aree cani si distingue per la sua taglia e il suo fisico. Si gioca sulle rappresentazioni, sebbene ogni cane si comporta soprattutto sulla base dell'educazione ricevuta.

I proprietari scelgono anche la razza del loro cane per sfoggiare il proprio status. Già nelle mostre canine, il cane era ragione di vanto e di competizione tra umani. In queste pratiche emergeva la volontà dei padroni di sfoggiare il dominio sul proprio animale (Tuan, 1984).

Come mi diceva una proprietaria: "osservando i cani si intravede un'idea del padrone". I padroni comunicano un tipo di lifestyle immaginato. È così che, come raccontato nell'intervista ad una delle educatrici, un uomo sulla trentina di bell'aspetto, posato ed elegante ha pensato di ravvivare la sua immagine con un bracco ungherese di una fisicità agile ed elegante al suo pari. Ha scelto un cucciolo senza orecchie storte o qualunque altra deformazione fisica al di fuori di precisi canoni e lo ha fatto crescere curando la sua stessa immagine.

L'esempio evidenzia la tentazione di considerare i propri pets come dei simulacri, degli oggetti perfetti, ma senza vita propria (Tuan, 1984; Baudrillard, 1972). Tuttavia, il *pet* a differenza dell'oggetto ha un ritmo biologico e bisogni affettivi che devono essere seguiti al di là del volere dell'umano. Inoltre, l'essere cosciente impone un grado di imprevedibilità, che rende il cane meno perfetto di un oggetto inanimato (Tuan, 1984).

L'imposizione di questa immagine desiderata va a scontrarsi con la realtà di un essere "animato" rischiando di stressare sia il cane sia il padrone, come poi è avvenuto in questo caso, quando il secondo si è rivolto all'educatrice di cani intervistata.

Per comprendere il rapporto tra dominio e affetto tra cani e proprietari bisogna considerare anche che la domesticazione ha portato ad una progressiva e più totale dipendenza. Perkins Gilman sostiene che con il suo l'arrivo in città, il cane diviene sempre più un peso dovendo essere incatenato e imbavagliato per potere accedere agli spazi della vita quotidiana (Perkins Gilman, 1911). La domesticazione del cane impone un rapporto ambivalente facendo paradossalmente sentire i padroni di cani come 'schiavi', dovendo stare alle dipendenze dei loro tempi biologici, raccogliere le loro feci, nutrirli e persino imbellettarli, lavarli, pettinarli. Da un lato emerge un alto livello di intimità e di affetto, è innegabile la devozione dei padroni per i propri cani, dall'altro, emerge la dipendenza a cui il cane è sottoposto in questo rapporto volto al soddisfacimento individuale del proprietario.

Ci sono anche pratiche eccezionali o meno frequenti, come le vaccinazioni, le gare di esposizione canine e le pratiche ordinarie, oltre agli obblighi quotidiani che si ripetono giorno dopo giorno, riproducendo di volta in volta gesti abitudinari attraverso i quali si può decifrare la costruzione del senso intorno ai cani da parte dei proprietari. A caratterizzare tali situazioni è il contesto nel quale le pratiche sono routinizzate individualmente, come spazzolare il cane appena fuori casa, scegliere il posto della cuccia, il parco per il passeggio, ecc.

La cura del proprio cane diventa un impegno quotidiano che va oltre le pratiche meccaniche precedentemente descritte. Include, infatti, un'attenzione alle emozioni e alle dinamiche relazionali che si sviluppano tra umani e cani. In questo senso, cani e umani sono reciprocamente *caregivers*, poiché i cani contribuiscono emotivamente e relazionalmente alla vita degli esseri umani, come compagni di specie (Haraway, 2003). La cura

per il proprio animale, così come il senso di responsabilità dei proprietari nei confronti dei loro animali, varia notevolmente (Gruen, 2021). Nella ricerca, ho osservato questo aspetto, spesso sottolineato negli studi sulle *human-animal relations*, attraverso i modi in cui i proprietari si identificano nel proprio cane. Durante l'intervista, l'educatrice mi ha raccontato del bisogno di un cliente di avere il suo bracco ungherese elegante e in buona forma, proprio come lui. Questo episodio sottolinea una certa tendenza del proprietario a sopravvalutare gli aspetti estetici del cane, valori che richiamano quelli del collezionismo, come descritto nel paragrafo precedente (Baudrillard, 1972). Una ragazza intervistata sostiene di non identificarsi con il proprio cane, ma che lo "stile di reazione", ovvero i modi di fare del suo cane, sono più simili a quelli del fratello. I proprietari tendono ad associare al proprio cane una personalità umana, come un'altra proprietaria intervistata che si sente come una ragazza madre del proprio cane/figlio. In questi casi si manifesta "l'identificazione psicologica" nel proprio cane come i galli per i balinesi descritti da Geertz (1998, p. 405).

Dietro al processo di personificazione e identificazione ho riscontrato la tendenza di alcuni soggetti nel ricercare nel proprio cane qualcosa o qualcuno che li completasse. Nei casi di successo, di chi aveva un rapporto apparentemente armonico, un buon cane permetterebbe ai padroni di riscoprirsi nel proprio status, nelle proprie capacità sociali e individuali. Una signora di bassa statura con al guinzaglio tre mastini si considerava come una piccola domatrice di draghi. La stessa situazione può essere letta in un altro modo, la ricerca di completamento non va a ricercare una propria riscoperta, ma semplicemente un accompagnatore fedele che dà sicurezza personale. A questo proposito, una donna ha sottolineato che la scelta del suo lupo era dettata dalla sicurezza che le conferiva. Questo viene confermato anche da un'altra ragazza, che grazie al suo cane amstaff ora esce la notte senza preoccupazioni. Sembra quindi che il cane possa diventare un compagno con il quale mettersi a confronto sia in termini di uguaglianza che di differenza, per completarsi.

Per un'educatrice di cani quello che porta alla personificazione degli animali è un bisogno di amore, di attenzione da parte di essi, ma soprattutto di essere amati, in senso individualistico e a volte egoistico. Molti cani con i quali ha riscontrato problemi appartenevano a persone che hanno confidato di essere molto sole. Alla base della loro scelta, sempre secondo l'educatrice, c'è più esigenza di ricevere che di dare, perché attraverso i cani si ottiene piacere, sia per quello che danno senza chiedere sia perché "abbattono le barriere con gli umani".

A volte, tuttavia, i cani, pur opponendosi a certe aspettative, possono assumere un comportamento ostile, come ampiamente mostrato da Colling (2020), che offre una panoramica delle forme di resistenza animale agli ordini umani nel contesto del capitalismo, dell'addomesticamento e della colonizzazione. Nel caso della signora con i mastini che si era rivolta all'educatrice, i cani negli anni si sono stancati di essere sfoggiati per avere in cambio attenzione dagli altri e per questo sono diventati violenti. C'è una componente egoistica che ritengo accompagni tutte queste dinamiche, che giustificano la strumentalizzazione del proprio cane, anche se inconsapevolmente. È una tendenza nel concepire la socialità con le persone in forme autoreferenziali, di riconferma di sé, o per comunicare uno status, come 'la domatrice di draghi' e il proprietario del bracco ungherese citati prima.

In certe situazioni i padroni sviluppano un'empatia con il proprio cane che permette loro di comprendere meglio anche se stessi. Parlando con Sara, un'altra proprietaria, tra il

suo amico Toni e il suo bulldog Mario c'è una vera e propria identificazione. Toni ritiene di condividere con il proprio cane il pregio di avere una "grande capacità di sopportazione", allo stesso tempo anche lei si identifica con Nala, la sua rottweiler, con la quale condivide la capacità nei momenti di difficoltà di prendere le situazioni di petto e il carattere forte, che le garantisce allo stesso tempo sicurezza.

In questi casi si intravede un rapporto tra cani e umani dove la dialettica tra dominio e affetto non si esprime necessariamente in termini di abuso del potere, così come in altri contesti dove il rapporto è tra insegnante e alunno o tra genitore e figlio (Tuan, 1984). Portando diverse argomentazioni a riguardo, Sara afferma che il cane è veramente "lo specchio dell'uomo", intendendo un profondo livello di intimità e affetto che caratterizza il loro rapporto. La sua esperienza pregressa con un doberman è stata molto difficile poiché la condizione emotiva di quegli anni era molto più precaria rispetto ad oggi. Successivamente la possibilità di crescere il suo rottweiler ha permesso di plasmare la sua personalità sul cane e viceversa. Ammette di creare una sorta di personificazione con Nala, dice che la scelta del sesso è stata determinata dalla sensazione di sicurezza che le dava crescere una femmina, idealizzata come "l'amica forte che ti protegge nei momenti di difficoltà". Tuttavia, nelle pratiche quotidiane non ragiona su modelli comportamentali tipicamente umani, tende invece a ricercare un'empatia nei confronti di Nala. Sara ha un gruppo di amici che condividono lo stesso tipo di rapporto col cane. Non frequenta persone che scelgono il proprio cane per completarsi, ma ritiene che chi prende un cane per completare un bisogno di comunicazione con gli altri, spesso non è un buon padrone.

Il paragrafo ci ha fornito delle chiavi di lettura per comprendere il complesso rapporto tra cani e umani, attraverso l'approfondimento della scelta del cane di razza e di come i proprietari si identifichino nel proprio cane. Molti esempi riportati esplorano la dicotomia tra dominio e affetto, con geometrie variabili: a volte trattano i propri cani quasi come oggetti, altre volte come compagni di specie, sviluppando empatia e riconoscimento reciproco. Il prossimo paragrafo approfondisce come i meccanismi di antropomorfizzazione del proprio cane permettano di comprendere le rappresentazioni popolari e di senso comune. I cani diventano così un mezzo per riflettere sugli esseri umani che li possiedono.

4 Dal cane, all'umano e ritorno: rappresentazioni di genere nell'area cani

Il rapporto tra cani e proprietari, che emerge dalla mia etnografia, presenta analogie con la relazione tra i balinesi e i loro galli nel già citato studio di Geertz. Dai discorsi che circolano nelle aree cani, risulta che non solo il padrone si identifica con il proprio cane, ma tende anche a trasporre modelli comportamentali umani per descriverlo. In questo modo si sviluppa un gioco delle rappresentazioni, in cui il proprietario attinge ai riferimenti della cultura popolare, situati nel contesto specifico. Con trasposizione si intende che avviene una rappresentazione del carattere e delle pratiche canine, le quali vengono spesso classificate in modo stereotipato e per genere. A differenza del gallo di Geertz, che è esclusivamente un maschio o un "pene distaccabile" (1998, p. 405), il cane non è solo maschio, ma anche femmina, e viene descritto attraverso diversi stereotipi comportamentali umani. Nelle conversazioni ascoltate nell'area cani si riteneva scontato o prevedibile che un bulldog cercasse

costantemente di farsi accarezzare in quanto ruffiana o un'amstaff risultasse smorfiosa, proprio perché femmine. In una conversazione con la mia amica proprietaria di un'amstaff, è emersa una tendenza a generalizzare azioni compiute dai cani sulla base del loro sesso. Non si tratta di capire ora se il mondo dell'area cani sia sessista, ma di osservare come gli umani utilizzino un modello comportamentale trasposto ai cani per spiegarne i comportamenti e che queste rappresentazioni sono stereotipi della cultura popolare. Quando il cane di Lisa ha rifiutato le attenzioni che un cane maschio le stava porgendo allontanandolo, è seguito un commento del padrone del cane maschio volto a sottolineare che tutte le donne facessero come lei. Non mi stupirei che nel caso in cui il cane avesse avuto un rapporto con la cagna sarebbe diventato un latin lover, come è stato raccontato in altre situazioni. Un caposaldo tra le rappresentazioni sui propri cani è il seguente: le cagne sono gelose e i cani vogliono dominare sugli altri cani, più precisamente i maschi vogliono dominare perché in competizione e le femmine fanno lo stesso, ma per gelosia. Una ragazza mi raccontava persino di come tra lei e suo fratello si fossero spontaneamente divisi i compiti con il proprio cane: "io sono la parte affettiva del mio cane, lui quella del lavoro, fai questo, fai quello, seduto, in piedi ecc.". Come se provare emozioni fosse dominio femminile e lavorare dominio maschile. Come sosteneva un'educatrice, si tende a credere che esistano i cani alpha o la trasposizione dell'umano, l'uomo alpha, che deve distinguersi dal resto del branco e così nell'area cani. Tutti questi discorsi si riadattano di volta in volta per trovare un senso di quanto accade.

Nei discorsi ripetuti nelle aree cani quello sulla monta è tra i più interessanti per comprendere come gli umani rappresentano il comportamento dei propri cani. Come mi spiegava un'educatrice, la monta non è un comportamento sessuale per forza, ma di gioco e di controllo della situazione. Quando avviene nelle aree cani ci sono spesso commenti in riferimento al sesso e se a "dominare" sarà il maschio non mancheranno commenti sulla sua "conquista".

Si tratta di un dato per scontato che spesso quando lo si fa notare nelle conversazioni imbarazza. Ma effettivamente, la maggior parte dei proprietari con cui mi sono confrontato creano senso intorno alle azioni del proprio cane, considerandolo come un umano, capace per esempio, di innamorarsi. Ho notato una specie di ostinazione nella trasposizione dei modelli comportamentali umani; una intervistata, ad esempio, era disposta a fare ragionamenti molto complessi purché quadrassero in termini di prescrizione di genere, lo faceva per difendere i comportamenti del suo cane parlando di seduzione, riproducendo un'idea di flirt stereotipata nel quale i cani sono quelli che flirtano e le cagne sempre quelle che attraggono attenzione. Quando poi mi ha raccontato di un caso in cui è stata la sua cagna ad avvicinarsi per prima, si è giustificata sostenendo l'innamoramento del suo cane.

Perché la trasposizione è così importante? Perché come tutte le rappresentazioni popolari, come i libri di etichetta, ci permettono di consolidare una serie di prescrizioni per i modelli di uomo e di donna (Goffman, 2007, p 78). Rappresentazioni esagerate sui modelli di genere che restano sul fondo, nel senso comune e si saldano silenziosamente all'interno degli schemi mentali che molte persone danno per scontato o considerano innocue. Tuttavia, queste rappresentazioni hanno valore e si riproducono, suddividendo piccoli gesti in categorie che vengono applicate indiscriminatamente a tutti gli uomini e le donne. Ho osservato che queste prescrizioni vengono fatte valere e diffuse con estrema facilità anche

nell'area cani, quando i proprietari descrivono i propri cani come creature più animalesche. In altre parole, come per l'espressione "vita da cani", i loro comportamenti sono volti a soddisfare i propri bisogni immediati, viscerali, come giocare ed accoppiarsi, cose che gli stessi padroni potrebbero volere soddisfare altrettanto, ma non possono vista la complessità delle relazioni umane. Questo aspetto fa emergere una rappresentazione dei cani che in realtà non si allontana da quella sui galli di Geertz. I balinesi si identificavano nel proprio gallo senza risolvere mai l'ambivalenza tra l'esaltazione della personalità del loro possessore, l'ego narcisistico e in opposizione, "l'animalità", intesa negativamente e ragione per "la repulsione balinese per qualunque comportamento considerato animalesco" (1998, p. 408). Dalle riflessioni sul campo, l'esaltazione della personalità nel rapporto tra cani e padroni è verificabile, l'animalità non è invece un tabù, anzi, per loro i cani assumono comportamenti che seppure animaleschi risultano quasi liberatori e giustificati proprio perché sono cani. È come se alcuni proprietari di cani distinguessero dicotomicamente la cultura dalla natura, associando a sé stessi una posizione superiore di "eccezionalismo umano", nella gerarchia delle specie (Gillespie & Collard, 2015, p. 13). Questo eccezionalismo, per dirla con Elias, consente di appartenere alla società civilizzata, ma a costo di un prezzo: l'autocontrollo, che si traduce nella repressione degli istinti "animaleschi", istinti che i cani, invece, conservano (1983, p. 303). In questo senso, l'animalità del cane non è un tabù, come lo è per gli allevatori di galli da combattimento descritti da Geertz. Se da un lato questo concetto di animalità viene formalmente deprecata, dall'altro come nel racconto di una proprietaria intervistata diviene ragione d'orgoglio per quei proprietari che vedono il proprio cane cacciato dall'area cani perché troppo aggressivo, come se in fin dei conti si fosse sfogato di queste norme e tabù fisiche e sessuali che, tutto sommato, 'a volte sono troppo'.

In questo senso la rappresentazione che i padroni fanno dei propri cani mostra un rapporto ambiguo con il processo di civilizzazione. Il cane richiama all'animalesco come un rifiuto dell'autocontrollo imposto dalla società contemporanea, che tuttavia implica questioni problematiche di genere tra uomo e donna.

Per riassumere, il rapporto tra cani e padroni va riconsiderato nel mondo degli stereotipi che spazia tra il consapevole e l'inconsapevole. In primo luogo, il rapporto sempre più intimo con i cani scelti sulla base della propria personalità ha evidenziato meccanismi di identificazione psicologica e sociale, a volte per completamento, a volte in una sorta di trasposizione e riscoperta della propria persona attraverso il proprio cane. In secondo luogo, è evidente un meccanismo di trasposizione dei modelli comportamentali umani per comprendere il proprio cane che attinge a stereotipi di genere dati per scontati.

5 Conclusioni

Il legame tra cani di razza e umani è un fenomeno complesso dove si intrecciano dinamiche di potere e di affetto. La domesticazione ha portato alla creazione di una vasta gamma di razze canine, ciascuna con caratteristiche uniche, plasmate per rispondere ai bisogni e alle preferenze umane. Il pet oggi rappresenta l'evoluzione di questo rapporto, da un lato sempre più intimo, dall'altro sempre più di dipendenza del cane nei confronti dell'umano (Tuan, 1984).

L'articolo contribuisce non solo al dibattito scientifico sulle *animal geographies*, ma

anche alla comprensione delle trasformazioni sociali e culturali nelle relazioni tra umani e animali che presentano delle ricadute su temi più ampi.

Attraverso la ricerca etnografica condotta in aree cani cittadine, ho indagato come gli umani costruiscono significati e negoziano le proprie rappresentazioni sociali attraverso le loro interazioni. Il primo aspetto peculiare che emerso dalla ricerca etnografica è la tendenza a proiettare sui cani tratti la propria personalità e a identificarvi. Dai racconti dei proprietari, i cani divengono l'estensione del proprio padrone, proprio per questa nuova intimità che caratterizza il loro rapporto e per il bisogno di comunicare, e di sentirsi al sicuro.

Il secondo aspetto/tema emerso dall'etnografia condotta è come le rappresentazioni sociali giocano un ruolo fondamentale nel plasmare un discorso che parte dal rapporto con i propri cani e finisce nel riprodurre stereotipi di senso comune, come per quelli di genere, che tuttavia, nel contesto dell'area cani circola in maniera apparentemente innocua, seppure emblematica.

La selezione, la socializzazione e le rappresentazioni dei propri cani e quelli altrui sono profondamente intrecciati con rappresentazioni di genere e di status. Da questo punto di vista, l'area cani diviene un luogo privilegiato dove osservare discorsi della cultura popolare a partire dal rapporto tra cani e proprietari.

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Research Paper

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TRANSLATING EMPLOYMENT CONTRACTS: INSIGHTS FROM CORPUS LINGUISTICS

Abstract

This work shows how corpus-based studies can be applied to the field of specialised translation and, more precisely, to the legal translation of employment contracts. Legal language, given its complexity and cultural specificity, presents considerable challenges for translators, and reliance on bilingual dictionaries may not always result in high-quality translations. Corpus methodology applied to translation analysis can offer significant contributions both in terms of advanced linguistic analysis and as a didactic tool for the learning of specialised languages. The aim of this paper, therefore, is to create an ad hoc monolingual corpus of employment contracts to show how corpus analysis is beneficial to legal translation. This paper conducts a corpus-based translation analysis of an employment contract translated from Italian into English. The findings highlight how the use of the corpus helps translate the employment contract in a much more efficient and suitable way, especially in terms of spotting formulaic expressions, finding the correct collocations, and choosing the best translation candidate(s).

Keywords: corpus linguistics, corpus-based translation, ESP, legal English.

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1 Introduction

This study explores the application of corpus-based methodologies to specialised translation, with a particular focus on the legal translation of employment contracts. Legal language is notoriously complex, shaped by historical, cultural and jurisdictional influences that make it highly specialised and challenging for translators. Traditional translation tools such as bilingual dictionaries and glossaries, while valuable, often fall short of capturing the complexities of legal phraseology, especially when translating from one legal system into another. Consequently, achieving accuracy, precision, and idiomatic correctness in legal translation requires a more dynamic approach.

Corpus-based translation analysis offers significant advantages in addressing these challenges. A corpus, which is a structured collection of authentic texts, enables the translator to identify linguistic patterns, which are not easily evident through traditional methods. By allowing translators to explore the frequency and usage of specific terms and structures within a large dataset of comparable texts, corpus methodology facilitates a more informed decision-making process. This approach not only enhances the accuracy of translations but also aids in identifying culturally appropriate equivalents, ensuring that the target text (henceforth TT) adheres to the conventions of the target legal system.

The aim of this paper is to demonstrate the practical benefits of using corpus-based methods for legal translation, specifically in the context of employment contracts. To achieve this, an *ad hoc* monolingual corpus of employment contracts in English has been created, which will be used to perform a detailed analysis of an Italian employment contract translated into English. By drawing on this corpus, the analysis highlights how such methodologies can offer more accurate and contextually appropriate translations, ultimately resulting in improved translation quality and efficiency.

The structure of this paper is organised into five sections. Section 2 presents a concise literature review, beginning with an exploration of the features and complexities of legal language. The focus subsequently shifts to legal translation itself, examining the specific difficulties encountered when translating legal texts, particularly those related to linguistic and cultural asymmetries between legal systems. The final part of the literature review examines the role of corpora in specialised translation, offering insights into how corpus-based methodologies can enhance the translation of legal documents through advanced linguistic analysis. Section 3 outlines the methodological framework adopted for this study. This section explains the rationale behind the creation of an *ad hoc* monolingual corpus tailored specifically for the analysis of employment contracts. This section details the process of corpus creation, including the selection of texts, corpus design and the linguistic tools employed for analysis. It also highlights the benefits of using an *ad hoc* corpus as opposed to relying solely on generalised corpora, particularly when dealing with specialised legal texts, which require a higher level of accuracy and contextual awareness. Section 4 presents the results of the corpus-based analysis, offering a detailed examination and discussion of how the corpus was used to improve the translation of an Italian employment contract into English. This analysis addresses various challenging issues and instances of mistranslation, demonstrating how the corpus helps resolve these translation problems. Finally, Section 5 draws conclusions based on the findings of the analysis and it also considers potential future

directions for research.

2 Literature Review

Legal language is the special language of the law used by legal professionals. Legal language and its terminology may be very complex and, at times, obscure as they vary from one legal system to another. According to Winter (2013, p. 115): “The fundamental problem of ‘law and language’ is what we might characterize as ‘the illusion of transparency’. We use language continuously and, except when there is a misunderstanding, are unaware of the complexities that lurk beneath the surface of our comprehension. The illusion of transparency is particularly acute in legal language, both because the stakes are so high and because law is precisely that practice where the ambiguities and uncertainties that arise from language’s complexity are constantly tested.”

Winter’s statement perfectly encapsulates the complexity of using and translating legal language. There are mainly two causes underlying this consideration, namely its inherent lack of transparency and the general assumption that law is a cultural fact, thus bound to the tradition of a specific community. This inevitably implies the fact that, when faced with the need to regulate the same social phenomenon in different legal systems, different techniques and cognitive approaches are and should be adopted. While this is particularly evident among distant legal cultures, it also occurs among those that, for historical reasons, share common traits, such as the different European legal systems.

Most people might not be aware of the difficulties related to legal language as, at times, this type of language is “simply” defined as a specialised language, similarly to medical or business language. However, although legal language is one of the so-called languages for specific purposes (henceforth LSPs), whether it can be defined as a technical language or a specialised variety of the ordinary language is a matter of debate (Cao, 2007, p. 15). Caton (1963) considers legal language as a technical language and claims that “technical language is always an adjunct of ordinary language” (Caton, 1963, p. viii). As such, according to Caton, technical languages have the same syntax as ordinary languages and they only differ in terms of vocabulary. By contrast, Hart (1954, 1961/1994) believes that legal language differs from ordinary language for its distinctive features and, should be regarded as a *sui generis* and autonomous language. Moreover, according to Jackson (1985), legal language shares some common features with technical languages in terms of lexicon and structures but it is autonomous of the ordinary language due to the specificity of the legal system it refers to. In this respect, Jackson claims that legal language “having a lexicon constituted in a manner different from that of the ordinary language, and involving terms related to each other in ways different from those of the ordinary language, must be autonomous of the ordinary language” (Jackson, 1985, p. 47). It is worth noting, nevertheless, how Jackson considers the possibility of historical influence or a factual correspondence between ordinary and legal language. Legal language, as acknowledged by Cao (2007), should not only be considered in terms of lexicon but, as any other language, also as a register defined as “a variety according to use” or, in other words “what you are speaking at the time, depending on what you are doing and the nature of the activity in which the language is functioning” (Halliday & Hasan, 1985, p. 41). This means that registers differ from one another in terms

of vocabulary and grammatical structures used to express various meanings, reflecting the broader contextual factors that characterise different registers. This work supports Cao's claim that "legal language as a register is a variety of language use of the technical nature. It shares the common core of general language but is not identical to ordinary language. There are lexical, syntactical, textual and pragmatic features that are singular to legal language as a technical language" (Cao, 2007, p. 18).

Given the peculiarities and challenges of legal texts, it is argued that legal translators need both linguistic and legal expertise (Van Laer, 1999; Prieto Ramos, 2011). From a linguistic perspective, translation should be carried out into the translator's native language, although "there seems to be a trend towards a more realistic and open approach to translation into the L2 practice" (Vigier Moreno, 2019, p. 91). As far as legal expertise is concerned, translators should be acquainted with comparative law or should, at least, have a good knowledge of the subject matter they address (De Groot & Van Laer, 2008; Engberg, 2020; Prieto Ramos, 2021). According to Gotti (2016, p. 6), indeed, the complexity of legal translation compared to the translation of other specialised texts is largely due to their bilingual nature where translators are faced with the challenge of dealing with two legal systems and two linguistic systems. Although legal translation can be carried out both in bilingual and/or multilingual contexts, such as the European Union, this does not automatically imply that it is easy and possible to uniform different legal systems through translation. Legal concepts can be so system-specific that their terms lack direct translations into other languages (Brand, 2009). The variation in legal concepts across systems may make achieving exact translations difficult or impossible, often requiring approximation (McAuliffe, 2009; Engberg, 2013). This challenge is particularly common when translators work in non-native languages or are faced with unclear language from legal professionals (McAuliffe, 2009).

Among the various tools now available to legal professional and trainee translators, corpora are particularly valued (Vigier Moreno, 2016; 2019; Vigier Moreno & Sánchez Ramos, 2017; Biel, 2018). McEnery and Wilson (2001, p. 1), define corpus linguistics "as the study of language based on examples of 'real life' language use". Corpora, indeed, allow scholars and researchers to study and describe language in authentic contexts to derive rules of use based on these concrete analyses. They prove invaluable in language teaching and translation training for various reasons. Corpora provide learners with authentic examples, aiding the production of TTs adhering to conventions, especially crucial in translating into a foreign language or handling specialised translations (Zanettin, 1998; 2001).

Varantola (2002) notes how corpora help translators make informed decisions and enhance confidence in their translation strategies. Additionally, corpora assist in contextualizing information within authentic contexts (Varantola, 2003; Machniewski, 2006). Various scholars, including Kübler (2003), have explored the use of corpora in translating specialised texts, highlighting improvements in quality, accuracy, and authenticity. Research on corpus use in language teaching and translation exercises reveals their effectiveness in increasing awareness of translation equivalents, addressing lexical and grammatical issues, providing extralinguistic notions, highlighting idiomatic usages and connotations (Zanettin, 2001; Aston, 1999; Bernardini et al., 2006). Machniewski (2006) identifies three areas where corpora make a difference, namely analysing how professional translators handle problems through parallel corpora, improving translation in both native and foreign lan-

guages, and serving as valuable support for translators to revise and enhance their work.

Given the intricacy of legal language and translation, leveraging legal corpora is presumed to enhance translation quality, especially for terms absent in dictionaries or needing further context (Giampieri, 2020). Notably, previous literature observes an overrepresentation of legislation and court-related documents in legal corpora, while other genres like corporate documents are underrepresented (Biel, 2018; Pontrandolfo, 2019). The scarcity of comprehensive legal corpora complicates the translation of private documents, such as contracts, as publicly available resources often lack the necessary coverage. Furthermore, the European Union's legal corpora present certain limitations (Giampieri, 2016; Seracini, 2020). Specifically, these corpora primarily address EU law, which is not notably rooted in any specific legal system (Jacometti and Pozzo, 2018, p. 29). They may also employ terms and expressions that diverge from common law norms (Mattila, 2016, p. 36) or alternatively, utilise common law terminology but imbue it with meanings derived from continental legal systems (Mattila, 2016). For these reasons, EU-driven corpora are less suited for the accurate translation of corporate documents. Consequently, this paper aims to compile a monolingual ad hoc corpus of employment contracts for a corpus-based translation analysis. The ad hoc corpus was manually constructed and uploaded to the Sketch Engine platform (Kilgariff et al., 2004). The corpus analysis carried out in this paper may be replicated in translator's training.

3 Methodology

Before analysing the translation strategies employed in the English version of an employment agreement sourced from the SEC database (US Security and Exchange Commission)¹, a comprehensive corpus-based analysis was undertaken. Specifically, a corpus of employment agreements was constructed to assess the proposed translation options and evaluate to what extent they conform to the English drafting style and legal language conventions. Employing the semi-automatic functionality of the BootCaT software solution (Bernardini & Baroni, 2004), a balanced approach between manual and automated methods was chosen. Manual searches, though precise, were deemed time-consuming (Aston, 2009, pp. ix-x). The BootCaT semi-automatic search combined manual steps, like saving Google results pages as HTML files, with automatic processes, including corpus construction and conversion into TXT files.

The strings “employment contract” and “employment agreement” were searched on Google, targeting the onecle.com site. This platform contains contracts drafted by both native and non-native speakers of English. This choice was motivated by the extensive collection of legal documents of the site sourced from the SEC filings, ensuring unrestricted access and privacy compliance (Williams, 2023, p. 139). Onecl, in fact, provides a valuable collection reflecting English as a first and second language. This diversity strengthens the corpus by capturing the evolving use of English in legal contexts, especially as international law firms increasingly adopt an Anglo-American drafting style (Jacometti & Pozzo

¹ The employment contract analysed in this study was retrieved from: <https://www.sec.gov/Archives/edgar/data/1557939/000155793915000014/al019piccininiemploymentag.htm>.

2018, p. 59 and p. 198). The inclusion of contracts from various legal systems enriches the corpus, offering insights into how institutions and legal principles are expressed in English, beyond the common law system. Therefore, the corpus was constructed by searching the terms “employment contract” and “employment agreement” separately on Google, with the results limited to onecle.com. mentioning that, despite the common legal understanding that these terms are equivalent, with “contract” defined as “an agreement between two or more parties for the doing or not doing of some specified thing” (Black, 2008, p. 261), they are often used interchangeably in the language of common law (Williams, 2023, p. 137). Even without a consideration, both are treated as bailments (Jacometti & Pozzo, 2018, pp. 208-209). Thus, the dual search for both “employment contract” and “employment agreement” was essential to gather parallel and representative English texts. Additionally, the strings “employment contract” and “employment agreement” were chosen over “contract of employment” since the latter yielded no results in the onecle.com database, a pattern also observed with “contract for employment.” A Google search for “contract of/for employment” frequently led to references to either an “employment contract” or an “employment agreement.” Through these searches, the objective is to retrieve documents utilised and drafted globally by international businesses. Consequently, the contracts may have been drawn up by both native and non-native speakers of English. Terminological differences among the various countries were not explored as this was not the primary focus of the study. Furthermore, it was assumed that terminological nuances would not have affected the overall results of this analysis.

A search for “employment contract” yielded fewer results compared to “employment agreement” in the contract databases on onecle.com. It is worth mentioning that, despite the common legal understanding that these terms are equivalent, with “contract” defined as “an agreement between two or more parties for the doing or not doing of some specified thing” (Black, 2008, p. 261), they are often used interchangeably in the language of common law (Williams, 2023, p. 137). Even without a consideration, both are treated as bailments (Jacometti & Pozzo, 2018, pp. 208-209). Thus, the dual search for both “employment contract” and “employment agreement” was essential to gather parallel and representative English texts. Additionally, the strings “employment contract” and “employment agreement” were chosen over “contract of employment” since the latter yielded no results in the onecle.com database, a pattern also observed with “contract for employment.” A Google search for “contract of/for employment” frequently led to references to either an “employment contract” or an “employment agreement.” Through these searches, the objective is to retrieve documents utilised and drafted globally by international businesses. Consequently, the contracts may have been drawn up by both native and non-native speakers of English. Terminological differences among the various countries were not explored as this was not the primary focus of the study. Furthermore, it was assumed that terminological nuances would not have affected the overall results of this analysis.

The first ten Google results pages for each query were saved as html files. These files, comprising employment contracts and agreements, were then processed by the BootCaT software, resulting in 180 text files (900,000 words and 1,079,533 tokens). The semi-automatic approach of BootCaT was chosen over fully automated search to focus on the specific phrases relevant to the titles of the contracts. This method streamlined the search

process, avoiding the need for unnecessary keywords. The corpus was subsequently uploaded to the Sketch Engine platform for analysis.

The Sketch Engine platform, a fourth-generation concordancer, facilitates various actions, including corpus creation and analysis. Its user-friendly interface allows easy searching for words or phrases, wildcard-based lemmatised searches, and exploration of collocates, thesauri, and part-of-speech features. While the automatic search capabilities of Sketch Engine were not used initially due to concerns about result reliability, a test corpus created with Sketch Engine yielded significantly fewer words and tokens (22,259 words and 25,772 tokens) than the BootCaT-generated corpus. Therefore, the BootCaT corpus of employment contracts and agreements was deemed more comprehensive and suitable for analysis on the Sketch Engine platform.

4 Analysis

The translation analysis carried out in this study is based on the original translation of an Italian employment contract into English. It is important to note that, for privacy reasons, sensitive data, including the name of the individual who entered into the contract (a woman), were omitted from the text. This decision was made to protect confidentiality. Before starting to analyse the contract, it is essential to establish some preliminary observations regarding the English version provided. Firstly, the identity of the individual or team responsible for the translation of this contract from Italian into English remains unknown. Secondly, by reading the TT, several inaccuracies could be easily detected, leading to the hypotheses that 1) the translator may not have been a native English speaker, and/or 2) the translator may lack professional qualifications or specialised expertise in legal translation. Although the identification of the translator's profile falls outside the scope of this study, it may be reasonably inferred that the translator likely relied upon a dictionary which, probably, was neither suitable for legal purposes nor comprehensive in terms of legal terminology provided. As far as the quality of legal dictionaries is concerned, it is noteworthy that De Groot and Van Laer (2008, p. 1) highlight the pervasive issue of inadequate bilingual legal dictionaries within the European Union by asserting that:

“To translate between the different languages of the Member States of the European Union (EU) about one hundred seventy bilingual legal dictionaries are available. Regrettably, the quality of most of these dictionaries is poor to extremely bad. Only a few dictionaries are of good quality. It seems to us that many authors or compilers of bilingual legal dictionaries do not understand how legal translations should be made. They simply make a list of legal terms in the source language and give for each term one or more words from the target language as ‘translation’ without any further information on the legal context. Because of the system-specificity of legal terminology, this kind of dictionaries is practically useless.” In line with De Groot and Van Laer’s critique and based on the English translation of the employment contract analysed in this study, it is argued that conventional dictionaries often fail to meet the needs of translators, especially within the field of LSP. The limited number of illustrative examples typically provided in these dictionaries does not adequately represent how lemmas combine syntactically and lexically within specialised fields, particularly legal discourse. In contrast, linguistic corpora allow translators to find numerous

examples of the actual usage of a word to make up for the limitations of dictionaries. Furthermore, corpora provide translators with authentic language in context.

Consequently, this section will examine the extent to which the terms and phrases used in the English translation of the employment contract reflect native or near-native legal language. The objective is to determine whether the translation aligns with the English legal formulae and style. The subsequent analysis will identify instances of potential mistranslation or misinterpretation of the source text (henceforth ST). Specifically, it will focus on translated words or phrases that appear awkward or non-native, such as overly literal renderings from Italian or those that diverge from conventional English legal language. Evidence from the corpus will help understand whether the translation options proposed in TT are adequate and how, if that is the case, they can be improved.

4.1 Open ended employment agreement

The title of the contract, that is *contratto di lavoro subordinato a tempo indeterminato*, is translated as “open ended employment agreement”. The expression “open-ended” is not particularly frequent in the corpus (only one hit is retrieved with the phrase “open-ended employment agreement”). This expression is often understood to refer to an employment contract that remains in effect until terminated by either the employer or the employee. It is more commonly known as a contract of indefinite duration and is typically associated with a permanent job. The adjective “permanent” is frequently used in English to render the concept of “indefinite”. For example, in the United Kingdom, the Fixed-term Employees Regulations (2002) state that where employees have been employed through a series of fixed-term contracts for a continuous period equal to or exceeding four years, they will automatically be treated as permanent employees (that is, employed under a permanent contract), unless the continued use of a fixed-term contract can be objectively justified:

“The Regulations also provide that where a fixed-term employee who has been continuously employed on fixed-term contracts for four years or more is re-engaged on a fixed-term contract without his continuity being broken, the new contract has effect under the law as a permanent contract unless the renewal on a fixed-term basis was objectively justified” (Fixed-term Employees Regulations, 2002, p. 15). The expression “permanent contract” produced one hit in the corpus. The term “permanent” was also searched to find other relevant collocates and only 2 more hits were found, namely “permanent full-time employment” and “permanent employment”. Similarly, as previously mentioned, the term ‘open-ended’ was searched within the corpus, yielding only one occurrence. Such limited results, however, could be due to the variety of English(es) composing the corpus. For example, the Eur-Lex corpus on the Sketch Engine platform and the IATE multilanguage dictionary contain several instances of “open-ended employment contract” and “permanent contract”. Since the term *indeterminato* can also be translated as “indefinite” or “indeterminate”, the string “indefinite—indeterminate” was entered into the Sketch Engine search field and words such as “contract” and “agreement” were searched as collocates within a span of 10 words to the left and to the right. In particular, 16 hits were retrieved and the following phrases were noticed: “employment contract for an indefinite period of time” and “indefinite term employment agreement”. Both options may be used in this context. Additionally, the modifiers

preceding “employment contract” or “employment agreement” were queried. In this case, however, no other equivalents of *indeterminato* emerged. The phrase “*open-ended employment contract*” may be used, but it is likely a more colloquial or informal expression of the concept, whereas “*indefinite term*” or “*indeterminate*” are more precise and formal terms. Given that the search was focused on formal legal texts, the terms “*indefinite*” and “*indeterminate*” are more commonly found in such contexts, making them more appropriate for the analysis.

4.2 Contract commencement and duration

As far as the section dealing with the contract commencement and duration is concerned, it is worth noting how the Italian phrase *avrà inizio il [...] e proseguirà a tempo indeterminato* is translated into English as “shall start on [...] and shall continue on an open-ended basis”. As noted in the example above, this translation does not seem suitable in legal language. By searching for “this * shall” and listing all words in L1 position in alphabetical order in the specialised corpus, 1,086 hits were obtained, and it was possible to notice expressions such as “this agreement shall commence on the effective date and shall continue thereafter”. It is interesting to highlight that no results were found in the corpus by searching for either the term “start” or the expression “shall start” whereas there were 40 occurrences listing “shall commence”. The absence of occurrences for ‘shall start’ and the frequent use of ‘shall commence’ may be attributed to the preference in legal discourse for Latin-origin terms, which are often perceived as more formal and authoritative. This tendency reflects a broader pattern in English, where Latin-derived terms are favoured in official or formal contexts, thereby lending a higher register to the language used.

Another interesting observation was that if the word “shall” was queried along with the term “indefinite” within a span of 15 words to the left and to the right, 13 occurrences were listed and the following phrase was obtained: “and shall remain in force for an indefinite period of time”. Therefore, a more suitable translation of the above-mentioned Italian phrase might be “this employment agreement shall commence on [...] and shall remain in force for an indefinite period of time” (or “and shall be valid for an indefinite period of time”).

4.3 Contract position and duties

The expression “classification and duties” is used in the TT to translate the title of the third section of the Italian contract named *inquadramento e funzioni*. As far as the term “duties” is concerned, this translation is undoubtedly suitable in this context as it perfectly renders the Italian word *funzioni*. Nevertheless, the term “classification” found in the TT seems inappropriate as the Italian word *inquadramento* refers to the employee’s job title and, as such, a different translated option should be found. When the phrase “and duties” was queried in the corpus, 62 hits were obtained and expressions, such as “job title and duties” and, more frequently, “position and duties” came to the fore. On the basis of the corpus evidence, a more suitable translation for the above-mentioned Italian expression may be “position and duties”.

4.4 CCNL

In the ST, the Italian acronym CCNL stands for *contratto collettivo nazionale di lavoro*, which translates to “National Collective Labour Agreement”. In the TT, however, this acronym is neither translated nor an explanation of its meaning is provided. In line with Newmark (1988), it is rather inappropriate to leave it as such in the English version without providing an explanation or a descriptive term (Newmark 1988). From a translation perspective, the acronym CCNL should be either replaced by a corresponding acronym in English, if it exists, or explained to the target readers. By searching for the word “collective” in the corpus, 60 hits were retrieved and, more specifically, the expression “collective bargaining agreement” came to the fore. Therefore, a possibly suitable translation of the above-mentioned Italian acronym may be “CBA” (collective bargaining agreement), although not used in the corpus.

4.5 Salary

This section deals with the scale or rate of remuneration or method of calculating remuneration including the intervals at which it is paid (e.g. weekly or monthly). The Italian term used in this context is *trattamento retributivo*, which is translated as “salary” in the TT. The suitability of the term “salary” as a translation choice requires careful consideration, given that other terms, such as “remuneration”, “pay” and “compensation”, may also be appropriate within this context. Amongst others, indeed, the Sketch Engine Thesaurus function listed these synonyms. Therefore, the term “remuneration” was initially searched for in the corpus and 201 hits were obtained. It is also noteworthy that this term appeared in the title of a clause concerning the employee’s “salary”. The word “salary” was mentioned 1,735 times in the corpus but it was hardly ever used as a clause title. The term “pay” (as a noun) showed 291 hits, although many results were not strictly related, namely “severance pay” and “sick pay”, among others. Finally, by searching for the word “compensation” in the corpus, 1,634 hits were obtained and most of the times, this term was mentioned in clause titles addressing the employee’s salary. An alternative corpus-driven translation was obtained by searching for the “\$” or “£” symbols. In this way, expressions such as “base salary” and “annual salary” were retrieved. However, these terms were never used as a clause heading. Based on the corpus evidence, “compensation” seems to be the most suitable candidate to translate the Italian expression “trattamento retributivo” in this context.

4.6 Bonuses

The Italian term *superminimo assorbibile* is translated as “superminimum absorbable”. This English term appears to be a word-for-word translation, where the two components should ideally be inverted to form “absorbable superminimum”. However, even this rearrangement is not entirely suitable. While it conveys some aspects of the term, it lacks clarity and may not resonate with English-speaking audiences familiar with employment law. The Italian legal expression *superminimo assorbibile* refers to an additional amount paid to an employee above the base salary set by the applicable national collective bargaining agreement (*contratto collettivo nazionale di lavoro* or CCNL). This supplementary

amount is usually negotiated individually between the employer and the employee as a way to recognise skills, experience or particular responsibilities. The term *assorbibile* indicates that this extra payment can be absorbed, or offset, in the event of future salary increases established by the collective agreement. In other words, if the standard salary for the role is raised through collective bargaining, the employer may reduce the *superminimo* accordingly, so that the total salary remains aligned with new wage standards without additional cost to the employer. In other words, the Italian term refers to a benefit granted in addition to base salary. In English-speaking jurisdictions, there is no direct equivalent for *superminimo assorbibile* as the concept is unique to the Italian employment framework. Terms such as “salary supplement”, “premium pay” or “allowance over the minimum salary” partially convey the meaning but do not capture the specific adjustability aspect inherent in the Italian term. Although phrases like “absorbable allowance” or “adjustable salary supplement” might approximate the idea, they are not standard terms in English employment law and may still require further explanation for full clarity. Consulting corpora may help identify a more suitable translation candidate that accurately reflects both the meaning and context of this term.

By searching for the word “superminimum”, no hits were found, thus implying how this expression is not normally used in English. The Proz translators’ forum suggests “extra bonus to wage floor”², but this option is not present in the corpus. Given that the Italian term *superminimo* refers to a specific payment added to a base salary, the phrase “base salary” was searched in the corpus, yielding 979 hits. One notable concordance was “remuneration and benefits,” which states, “in addition to your base salary, you may earn a yearly performance bonus”. Therefore, it was inferred that a payment added to base salary can be referred to as a “bonus”. To corroborate this assumption, the word “benefit” was also analysed. By searching for the word “benefit*”, the corpus provided 2,850 hits and some contract clauses listing several benefits that an employee may obtain, such as “profit sharing plans, thrift plans, annual physical examinations, health insurance or healthcare plans, life insurance” among others. On the basis of these results, it was argued that the word “benefit” was not a suitable translation candidate. In the West’s Law and Commercial Dictionary (2012), the term *superminimo assorbibile* is translated as “monthly bonus”. This expression was then searched for in the corpus and 20 hits were found. Evidence from the corpus suggests that any monthly bonus is paid, if applicable, with the salary and its implementation can be cancelled at each new fiscal year. Therefore, the Italian phrase may be rendered as “monthly bonus”.

Later on, the contract document specifies how this bonus is calculated, namely *sarà calcolato tenendo anche in considerazione l’incidenza dello stesso sulle mensilità aggiuntive (tredicesima e quattordicesima)*, which is translated as “we will take into consideration its incidence on any additional monthly pay (thirteenth and fourteenth month salary)”. In this sentence, however, expressions such as “thirteenth and fourteenth month salary” are challenging, as they may not be used in an English-speaking context. The Italian terms, *tredicesima* and *quattordicesima*, are entrenched within the Italian labour system, where

² This suggestion was made on May 27, 2003 and can be found at the following link: <https://www.proz.com/kudoz/italian-to-english/bus-financial/444346-superminimo-assorbibile.html>.

they represent guaranteed additional payments that are uniformly mandated and typically distributed at the end of the year and in summer, respectively. These bonuses serve not only a remunerative function but also reflect a cultural norm, such as the historical intent behind the *tredicesima*, originally designed to provide financial support for holiday expenditures. In contrast, in English-speaking countries, particularly those adhering to common law, such additional monthly payments are not standardised components of employee contracts, nor are they legislated as fixed rights. Instead, any bonuses awarded are generally more variable, contingent upon employer discretion or performance metrics and are not necessarily tied to specific periods or cultural practices.

Consequently, the terms ‘thirteenth-month payment’ and ‘fourteenth-month payment’, while perhaps the closest linguistic approximations, do not convey the full weight and specificity of these Italian concepts within the English-speaking legal context. These English renderings may not fully resonate with the Anglo-Saxon legal tradition, where additional remuneration often falls under broader categories such as ‘discretionary bonuses’ or ‘performance incentives’. Therefore, the proposed translation attempts to strike a balance by providing approximate terms that maintain recognisability for an English-speaking audience, while recognising the absence of an exact equivalent in British or common law systems. Given these distinctions, it becomes evident that a direct translation risks oversimplifying the cultural and legal connotations attached to *tredicesima* and *quattordicesima* in Italian employment law. By selecting terms like ‘thirteenth-month payment’ and ‘fourteenth-month payment’, this translation aims to uphold the intended meaning within the limits of cross-cultural interpretation, while indicating that such payments are integral components of standard Italian employment packages—an aspect that may be absent or flexible in English-speaking legal systems.

In order to find suitable equivalents, the corpus was consulted. By searching for “calcolat*”, 207 hits were retrieved and it was possible to find three expressions such as “shall be calculated on a pro-rata basis”. When “be calculated” was queried, 51 occurrences appeared displaying the following interesting phrases: “shall be calculated pro-rata on the basis of” (three hits) and “be calculated in line with” (one hit).

As far as the terms *tredicesima* e *quattordicesima* are concerned, several general and specialised bilingual dictionaries provided the following definitions: 1) end-year bonus or thirteenth salary (*tredicesima*) and 2) summer bonus or fourteenth salary (*quattordicesima*). From the corpus, it was possible to retrieve expressions such as “thirteenth month payment” (two hits) and “thirteenth month allowance” (one hit), but no formulae with the word “fourteenth”. There were also no instances of “thirteenth and fourteenth month salary”. The Eur-Lex database, however, suggests “14th month payment” and “14th month pay” (9 hits). By searching for the word “bonus*” in the corpus, 274 occurrences were retrieved and a consistent term was found in L1 position, that is “year-end”. Nevertheless, no occurrences were found for “summer bonus”. By querying “bonus* or”, 37 hits were found together with the following sample phrases: “bonus or other benefits”; “bonus or other incentive awards/compensation”, and “bonus or other compensation”. On the basis of the corpus consultation, a possibly suitable translation of these Italian concepts might be: “such bonus shall be calculated pro-rata on the basis of additional remuneration in the form of year-end bonuses and other incentive awards/allowances”. However, it is important to consider that

the Italian text is more precise than the English one, as the *tredicesima e quattordicesima* are always awarded to employees, and the calculation of their salary takes those specific bonuses into account. By contrast, the translation proposal above could potentially include any bonuses awarded to the employee and not only the two actually mentioned in the ST. Therefore, one suitable translation option for these Italian terms might be: “such bonus shall be calculated pro-rata on the basis of additional remuneration in the form of thirteenth month payment/allowance and fourteenth month payment/pay”.

Furthermore, the phrase “we will take into consideration”, derived from the Italian “*tenendo anche in considerazione*”, is an “Italianised” expression that lacks idiomatic appropriateness in English, particularly in legal contexts. While the expression is understandable, it conveys a level of subjectivity that is not suitable for legal documents, which require precision and clarity. In legal terminology, a more definitive phrase such as “we shall consider” or “we will evaluate” better reflects the binding nature of contractual obligations. Moreover, the term “consideration” has specific legal connotations in contract law, which may create confusion if the phrase is interpreted as a less formal commitment. Using clearer alternatives not only aligns with the conventions of legal English but also enhances the document’s clarity and formality. Thus, it is crucial for legal translators to ensure that their choices maintain the intended meaning while adhering to the linguistic norms of the target language.

4.7 Working hours

In the section devoted to working hours, the Italian sentence *per quanto concerne le disposizioni in ordine all’orario di lavoro, si rinvia alle norme di cui al già richiamato CCNL* is translated into English as “as to working time regulations, we refer to the provisions of the already mentioned CCNL”. The verb phrase *si rinvia a* is a formulaic expression used to apply existing rules or specific laws by reference. The Italian phrase *già richiamato* is not only formulaic but also deictic as it refers back to something already mentioned in the text. Considering these remarks, it can be argued that the TT presents several inaccuracies. Firstly, the verb phrase “we refer to” is not the legal equivalent of the impersonal verb phrase *si rinvia a*. Secondly, “the already mentioned” is a particular phrase that is not used in legal contexts. As a matter of fact, both “we refer to” and “the already mentioned” generated no hits in the corpus. The corpus was, therefore, consulted to find suitable equivalents, if any. The lemma “refer” was searched for and 728 hits were found, along with many instances of “incorporated [...] by reference”. When “refer” was searched along with “regulation” only 4 hits were retrieved but they were not relevant to the context. The term “refer” was searched in conjunction with the word “provision” yielding several relevant results that support the interpretation of the phrase “incorporated [...] by reference”. This indicates that the term “provision” is commonly associated with contexts where references are made, reinforcing the validity of the earlier option. The search results confirm that “incorporated by reference” is a standard legal formulation, linking the two concepts effectively. Therefore, it may be inferred that a more suitable translation equivalent of *si rinvia a* is “be incorporated by reference”. As far as the Italian phrase *già richiamato* is concerned, if “mentioned” was searched for in the corpus, 47 occurrences were provided where the expressions “above

mentioned” and “above-mentioned” came to the fore.

4.8 Place of Work

Another debatable translation strategy concerns the place of work. The following sentence, for example, establishes the power of the company to move the employee to another place of work: (*SEDE DI LAVORO*) *Lei si impegna comunque ad accettare qualsiasi cambiamento e/o integrazione di territorio che si rendesse necessaria per comprovate ragioni tecnico-organizzative*, which is rendered as “(PLACE OF WORK) You undertake, however, to accept any change and/or territorial expansion which should be necessary for proved technical- organizational reasons”. The verb “undertake” may not be a suitable legal equivalent of the Italian expression *si impegna*, despite being its literal translation. This was verified by corpus evidence, which showed higher rates of the modal verb “shall” (11,850 hits against 163 for “undertake”). As a matter of fact, Williams (2023, p. 159) suggests other synonyms of “shall” (e.g., “must”, “will”, or “has to”), where “undertake” is not contemplated. In addition, it should be noticed that “shall” is a lexical unit of a different rank; hence, its frequency could be higher than the one of a verb such as “undertake”. Finally, synonyms of “shall” do not appear frequently in the corpus. For example, “must” produces 343 hits, and “have/has to” only 20.

Furthermore, the noun phrase “territorial expansion” that is used to translate *integrazione del territorio*, is not entirely appropriate or frequent in legal English contexts. *Integrazione del territorio* means that an employee is supposed to work at more locations at the same time. By searching for “place of work” in the corpus, 45 occurrences were obtained and many interesting and insightful clauses and sentences were found, containing, among others, the following phrases: 1) “the Company may require you to work at any place”, 2) “he shall also be required to work at such other location”, 3) “in order to fulfil his group duties” and 4) “as may be required by the Company”.

As far as the translation of the expression “proved technical-organizational reasons” is concerned, corpus evidence proves that it is not accurate in this context and a more suitable option was found, that is: “for organizational and operational reasons”.

Based on these findings, more suitable translations of the Italian phrase could be: “(PLACE OF WORK) The Company may require you to work at any place for the proper performance and exercise of your duties” or “To fulfil her duties, she shall be required to work at such other location as may be required by the Company for organizational and operational reasons”.

4.9 Confidentiality

Regarding confidentiality covenants between the company and the employee, the following sentence sets forth the prohibition for the employee to disclose any confidential information: *Lei si impegna a non rivelare a terzi, né in costanza del rapporto di lavoro né successivamente alla cessazione dello stesso, alcuna informazione riservata della Società*. The English translation reads as follows: “You undertake not to disclose to third parties, either while in the employ of the Company or after its termination, any confidential information of the Company”. The choice of the verb “undertake” is questionable as the corpus

showed a higher recurrence of “shall”, as also discussed above. The Italian expression in *costanza del rapporto di lavoro* is a formal equivalent of “during your employment” and the proposed translation “in the employ of the Company” is, therefore, highly debatable from both a grammatical and a formulaic perspective. Furthermore, it is worth noting that the word order in the TT may not align with the conventions of legal discourse, as the noun phrase “any confidential information” would typically be placed after “disclose to third parties”.

Finally, the prepositional phrase “of the Company” might be redundant. In order to corroborate these speculations, the lemma “disclose” was searched for in the corpus so as to determine all the concordances related to the disclosure of (confidential) information. When the word “disclose” was queried along with the terms “third”, “terminate” and “after” within a span of 10 words to the right and to the left, 51 hits were obtained and the following phrases were retrieved: “Employee will not during or after the term of his employment disclose the list of”, “Employee shall throughout the duration of the employment relationship and after termination [...] refrain from”, and “the Executive shall not [...] during his employment or after its termination”. These expressions can be used to translate the Italian sentence: *né in costanza del rapporto di lavoro né successivamente alla cessazione dello stesso*. Other interesting phrases were “not disclose confidential information under this Agreement” and “or disclose to any third party any information relating to [name of company]”. Therefore, on the basis of these results, there are, at least, three possible alternatives to translate the above-mentioned sentence into Italian: 1) “the Employee shall throughout the duration of the employment contract refrain from disclosing any and all confidential information to third parties”, 2) “the Employee shall not, during or after the term of her employment, disclose confidential information to any person” or 3) “the Employee shall not during her employment or after its termination disclose to any third party, any information relating to the Company”.

4.10 Non-solicitation

Similar to confidentiality covenants, non-solicitation clauses set forth the prohibition for an employee to induce other employees to leave their employment with the company. The ST, indeed, refers to the *divieto di storno di dipendenti: [...] con il fine di proporre loro la risoluzione del rapporto di lavoro esistente per instaurare un rapporto di lavoro di natura subordinata o autonoma con qualsiasi soggetto diverso*. This sentence is translated into English as: “non solicitation: [...] to leave employment with the Company in order to canvass them to enter into an employment subordinated or not, with another Company”. The English phrase “to canvass them to enter into an employment” is particularly problematic and, in back translation into Italian, is intended to mean *per instaurare un rapporto di lavoro*. The English word “canvass” means “to ask” as an attempt to discover information or opinions by asking people and, as such, it is not probably a suitable translation candidate. Furthermore, the phrase *un rapporto di lavoro di natura subordinata o autonoma* is rendered as “an employment subordinated or not”, which is inaccurate and fails to demonstrate native-like proficiency. This inaccuracy is further underscored by the observations made in the previous subsection, where the type of contract is clarified.

By searching for non-solicitation clauses, some related terminologies were found. For example, by querying “non solicitation” or “non-solicitation”, 120 hits were retrieved and the following phrases came to the fore: “solicit to employ any person who is employed by the Company”, “non-solicitation of employees and independent contractors” and “solicit or encourage any employee or independent contractor of the Company to leave such employment or engagement with the Company”. Furthermore, in order to find more suitable ways to render *un rapporto di lavoro di natura subordinata o autonoma* (literally: “an employment relationship either subordinated or autonomous”), the phrase “employee* or” was queried and 811 hits were obtained, along with the following sentences: “not take any action that may reasonably result in any of Employer’s employees going to work (as an employee or an independent contractor) for any business” and “accepts employment (as an employee or as an independent contractor) with another employer”. Therefore, the translation of the above-mentioned Italian sentence could be more suitably translated as: “non- solicitation [...] not to solicit or encourage any of the Company’s directors, employees or associates to leave such employment or engagement with the Company and accept employment as an employee or as an independent contractor with another employer”, or “in order not to take any action that may result in any of the Company’s directors, employees or associates employees going to work as employees or independent contractors for any other business”.

4.11 Warranties

Warranties are specific terms through which the parties mutually guarantee the fulfilment of certain obligations or the existence of specific conditions at the time of entering into the contract. In employment contracts, such warranties often take the form of explicit assurances exchanged by the parties. The clause title in the ST is *clausola di garanzia*, which is translated as “guarantee” in English. Although this translation may initially appear appropriate, it deserves further attention, as in legal English, the term “warranty” is more frequently employed in this context and is generally the preferred choice due to its higher register and long-standing association with formal legal language.

The term “warranty”, being of Latin origin, holds a more formal and precise connotation in legal English, distinguishing it from “guarantee”, which, despite being similar in meaning, is used less commonly in legal settings. English legal language often favours terms of Latin origin, as previously mentioned, as they are perceived to carry greater formality and specificity. Given this convention, “warranty” may serve as a more suitable translation for *clausola di garanzia*.

In order to corroborate or confute this assumption, it was useful to verify the number of occurrences of the lemmas “guarantee” and “warranty”. The former displayed 57 hits, although no clause title mentioned this word. The latter, by contrast, showed 80 hits and many clause titles included the term “warranties” or “warranty”. Therefore, a more suitable translation of *clausola di garanzia* is expected to be “warranties”.

Moreover, as far as warranties are concerned, the ST (section 13) states that *Lei garantisce altresì che adempirà ai suoi obblighi con la massima diligenza*, which is translated as “You assure that you will fulfil your obligations with utmost care”. The verb “assure” may not be suitable in legal contexts. In a warranty clause, indeed, the parties generally

“warrant” or “guarantee” the performance of their obligations. Furthermore, the expression “with utmost care”, although frequently used in general English, does not translate the Italian legal expression *con la massima diligenza*. In order to verify these assumptions, the word “care” was queried in the corpus, along with the words “obligation” and “obligations” within a span of 15 words to the left and to the right. In this way, it was possible to obtain clauses dealing with the employee’s expected care in the performance of her duties. The corpus provided 5 concordances such as “use due care” and “highest degree of care”. A sample sentence from the corpus reads as follows: “Employee warrants that he shall (i) devote his full and best efforts to the fulfilment of employment obligations [...]; (ii) exercise the highest degree of care in the performance of his duties”. When the expression “due care” was queried, 4 occurrences were obtained along with other interesting phrases, such as “shall perform his task with the highest possible standards of due care” and “shall be obliged to exercise due care in”. Therefore, on the basis of corpus evidence, more suitable translation options could be: “you will be obliged to exercise due care in the performance of the agreement/of your obligations” and “Employee warrants that she shall exercise the highest degree of care in the performance of her duties”.

4.12 Miscellaneous

Miscellaneous clauses generally tackle different topics, namely final covenants and/or boilerplate clauses, such as governing law and jurisdiction, and dispute resolution. As far as the ST clause title, *varie*, is concerned, it is evident that the English translation “miscellanea” is inaccurate. When the word “misc*” was queried in the corpus, no occurrences of “miscellanea” were found as compared to “miscellaneous”, which displayed 49 hits as clause titles. Furthermore, under the clause title *varie*, a typical entire agreement clause emerges, which is borrowed from the common law tradition (De Nova, 2007): *Il presente contratto costituisce atto ricognitivo dei termini dell'intero accordo intervenuto tra le Parti all'atto della costituzione del rapporto di lavoro*. This sentence is translated as: “This agreement acknowledges and incorporates the entire terms of the understandings reached by Parties upon establishing the employment relationship”. Entire agreement clauses set that the contract entered into represents the only understanding between the parties and no other agreement or covenant is valid and binding. This is a typical common law clause, which has gradually entered Italian contracts (De Nova, 2007). The TT translation appears literal (especially the phrases “incorporates the entire terms of the understandings” and “upon establishing the employment relationship”). The corpus was, therefore, consulted in order to find more suitable legal formulae. First of all, the lemma “incorporate” generated 49 hits, but it was only mentioned once in a clause similar to the ST (i.e. “the schedules to this agreement form part of (and are incorporated into) this agreement”). In all other cases, “incorporate” was used in different circumstances (e.g., “a company incorporated under the laws of The Netherlands”). Therefore, the term “entire” was queried and the corpus displayed 275 occurrences showing some revealing concordances, namely “This Agreement contains the entire agreement of the parties hereto with respect to the terms and conditions of the Executive’s employment” and “This Agreement contains the entire agreement of the parties with respect to the matters set forth herein”. Therefore, a more suitable translation

of the Italian sentence can be, for example, “This Agreement contains the entire agreement of the parties hereto with respect to the terms and conditions of the Employment”.

Finally, it was interesting to note that neither the *varie* clause nor the whole contract mention the governing law and jurisdiction. This can be considered a relevant flaw as the contract could be invalidated by a court of law. Nevertheless, exploring the possible legal consequences of this failure would go beyond the scope of this research paper. The absence of a clause setting the applicable law and jurisdiction is a major oversight as it is not possible to infer the legal institutions (or sets of rules) applied to the contract and the legal system of reference. From an overall overview of the contract, it can be assumed that the agreement is regulated by Italian law as references to the CCNL (or CBA) are often made and many Italian institutions are mentioned, such as *superminimo*. Nevertheless, the jurisdiction remains unknown. There is, indeed, no mention of the *foro competente* (back-translation: “competent court”). This means that in case of disputes, the parties would not know where to file their claims and which court to turn to.

5 Concluding Remarks

The language of law differs from other specialised languages because, while technical, it lacks universal validity, unlike the language of the natural sciences. Legal concepts are deeply rooted in specific cultural realities; as such, legal language is shaped by social, political, economic and historical factors unique to each jurisdiction, creating a distinct framework for interpretation. This results in a complex interplay between legal and extra-legal realities, which manifests both normatively, in its prescriptive function, and factually, in its reliance on cultural context. Legal terminology, therefore, consists of specialised, culturally constructed terms, making legal translation not only a technical task but also an act of cultural adaptation.

The use of corpora in translation studies enables direct comparison of original and translated texts, helping identify essential syntactic, grammatical and terminological features across languages. This study demonstrated the advantages of using legal corpora as valuable tools for examining and refining legal language in translation. Legal corpora offer a method for examining terminology, syntax, textual structures, and authentic usage contexts, making them beneficial resources for addressing translation challenges that arise from both linguistic and cultural differences. Through corpus analysis, this study illustrated how translators can improve both the accuracy and fluency of legal translations, yielding results that are both contextually and legally appropriate.

The corpus-based analysis undertaken in this work exposed several translation issues in the TT, including inaccuracies and instances of unnatural phrasing that would sound incongruent within English legal language. By consulting corpora, translators can resolve translation challenges more effectively, as corpora provide direct access to examples of authentic language in real-world contexts. The findings of this study indicate that corpora serve as valuable support tools for translators, particularly when facing complex linguistic problems, by providing evidence-based solutions grounded in authentic language usage.

While it is assumed that the TT was produced with significant reliance on dictionaries, further studies could explore whether dictionary-based translations could benefit from inte-

grating corpus consultation to improve the accuracy and naturalness of language choices in legal contexts.

This study highlights the potential of corpus linguistics as a methodology in linguistic research and translator training, particularly in the fields of specialised translation and LSP. Corpora are invaluable tools for linguistic investigation and serve as powerful resources in translation education, helping future translators gain insights into language structures, register and context. The scope of corpus linguistics in research and pedagogy is extensive and this work encourages further applications in LSP and specialised translation, especially in areas as complex and culturally embedded as legal language.

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CRITICAL REVIEWS



Critical review

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BRIDGING THEORETICAL ADVANCEMENTS AND EMPIRICAL PRACTICES IN ENVIRONMENTAL JUSTICE RESEARCH: TOWARDS A MIXED-METHODS APPROACH

Abstract

This critical review explores the evolution of environmental justice research, highlighting the transition from a primary focus on the distribution of environmental “goods” and “bads” to a multidimensional approach that includes recognition, participation, and socio-historical analysis. The review evaluates empirical studies, categorizing them into quantitative and qualitative methods, and assesses their strengths and limitations. While quantitative research has been instrumental in mapping spatial inequalities, it often fails to capture the socio-historical and structural processes that shape environmental injustices. On the other hand, while qualitative methods have added depth by capturing lived experiences and complex socio-political dynamics, they often lack the ability to address spatial patterns systematically. The separation of these approaches has limited the field’s ability to fully understand environmental justice. To bridge these gaps, the contribution proposes a framework for a new generation of environmental justice (EJ) scholars, advocating for mixed-methods research and the adoption of a critical geographical perspective. This integrated approach aims to offer a comprehensive understanding of environmental justice, encompassing distribution, recognition, participation, and other possible dimensions, thereby enhancing both academic insight and practical policy impact.

Keywords: environmental justice; mixed-methods; critical geography.

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1 Introduction

The growing interest in environmental issues in recent years has led to the need to examine environmental inequalities. Environmental justice (EJ) has emerged as a critical framework for understanding the unequal distribution of environmental “bads” (e.g., pollution, hazardous sites) across different populations, often focusing on marginalized communities that disproportionately bear the impacts of environmental hazards. It fundamentally redefined the scope of environmentalism, asserting that the environment encompasses everything: where we live, work, play, as well as the broader physical and natural world (Novotny, 2000). This perspective, underscoring the interconnectedness of social dynamics and ecological conditions, has increasingly attracted a wide range of scholars in various disciplines, including human and economic geography, sociology, economics, political ecology, and public health.

The early focus of environmental justice research was on documenting spatial inequalities, particularly within the United States. However, over the past few decades, the field has evolved significantly, expanding beyond merely identifying the locations of injustices and affected populations, to address the underlying socio-historical, political, and structural factors that shape these environmental injustices. Despite theoretical advancements, gaps remain in the application of broader conceptual frameworks to empirical research. Many studies, especially those employing quantitative methods, have primarily focused on mapping and statistical analysis, while failing to capture the socio-historical context underlying environmental injustices. Conversely, qualitative research has explored lived experiences and social dynamics but is often criticised for lacking methodological rigor and the ability to systematically address spatial patterns. The ongoing separation of these two approaches has limited the ability of the field to fully address the multidimensional nature of environmental justice.

This critical review seeks to connect the theoretical advancements in EJ theory with the current state of empirical research, assessing the strengths and limitations of both quantitative and qualitative approaches. However, it does not offer specific solutions for the inherent limitations of each individual methodology, which require separate, detailed discussions. Instead, it proposes a framework for a new generation of environmental justice scholars who use mixed or multimethods and adopt a critical geographical perspective. This framework aims to address existing gaps, ultimately providing a more comprehensive understanding of multidimensional environmental justice, encompassing issues of distribution, recognition, and participation, among other potential dimensions.

The literature search was conducted using databases such as Google Scholar, Scopus, and PubMed, ensuring a broad range of scholarly articles. Peer-reviewed journals such as *Environmental Justice*, *Local Environment*, *Geoforum*, *Environment and Planning E*, and *Antipode* were reviewed, and previous literature reviews were consulted (e.g., Agyeman et al., 2016; Banzhaf et al., 2019; Reed & George, 2011). In order to limit the scope to the most widely accessible research, this review drew predominantly from the English-language literature. Nevertheless, a significant body of research exists in other languages, particularly Spanish and Portuguese, and especially from Latin America, where environmental justice issues are deeply relevant.

The search terms included “environmental justice,” “environmental inequality,” “distributive justice,” “recognition justice,” “procedural justice,” “qualitative,” “quantitative,” “mixed-method,” “multimethod,” and “geography”. Empirical research from 2000 to 2024 was selected, and articles were filtered by reviewing titles and abstracts. Selected articles were then categorized based on methodology (quantitative, qualitative, mixed), analysis techniques, type of environmental outcome considered (e.g., waste sites, industrial facilities, green spaces, etc.), type of disadvantage/vulnerability (e.g., race, income, gender, etc.), and dimensions of environmental justice analyzed (distributive, procedural, recognition, and others). Approximately, 100 articles were included in the final review as well as a few books and book chapters. More details on the number of articles, the journals consulted, the geographical focus, and the concentration of articles over time can be found in the Appendix.

Far from being exhaustive, this review offers a focused overview identifying the main gaps and opportunities in current research on environmental justice. The paper is structured as follows. Section 2 sets up the discussion providing a brief overview of the theoretical evolution of environmental justice, while Section 3 explores the state of the current empirical research and identifies limitations and gaps. Section 4 proposes a new framework that bridges the conceptual and empirical approaches, drawing on critical geography and mixed methods.

2 Theoretical evolution: from distributional to multidimensional environmental justice

Environmental justice research has traditionally focused on the unequal distribution of environmental “bads” (e.g., pollution, hazardous sites) and “goods” (e.g., green spaces) across different demographic groups and communities (Reed & George, 2011; Schlosberg, 2007). This distributional approach, rooted in traditional geographical analysis, has been crucial in uncovering patterns of environmental racism and inequality, especially in the US (Walker, 2009). Numerous studies from various disciplines have shown that ethnic minorities and economically disadvantaged populations are disproportionately affected by environmental hazards such as industrial pollution and toxic waste (Bullard, 1990; Chakraborty et al., 2011).

However, while these distributional inequalities are significant, many scholars have argued that overemphasis on this aspect alone risks oversimplifying the complex and deeply embedded socio-historical, political, and structural processes that contribute to environmental injustice (Foster, 1998; Holifield, 2001; Pulido, 1996). Pulido (2000) and Holifield (2001), for instance, underscored the need for a socio-historical approach to analyse how institutional racism and white privilege shape environmental inequities over time, creating clean suburbs and polluted zones. Schlosberg (2004; 2007) encouraged the use of additional notions of justice, including “recognition” (i.e. whether certain communities are recognized in decision-making processes and how certain places are devalued or stigmatized), and “participation” (i.e. how decisions about exposure to hazards or access to resources are made and whether communities meaningfully participate). Within this framework, Walker and Bulkeley (2006) developed the theory of the plural “geographies of environmental justice,”

calling for a multidimensional approach that incorporates different aspects of justice. Additionally, it became increasingly clear that environmental justice issues do not conform to a strictly US-centric definition but vary significantly in different spatial and social contexts, necessitating a broader lens for analysis (Holifield et al., 2009).

The concept of “sacrifice zones” also emerged in environmental justice theory (Juskus, 2023), illustrating how specific areas are designated for environmental burden of pollution, chemical exposure, and toxic waste, sacrificing the well-being of marginalized communities in favor of economic or political gains (Bullard, 2011; Lerner, 2010). Armiero (2021) coined the term “Wasteocene” to describe an era where the economic and socio-political systems do not just generate physical waste but “wasting relationships” which deem certain geographies - often inhabited by less privileged populations – as “disposable,” turning them into sacrifice zones. The EJ framework has been further developed to include intersectional approaches, accounting for multiple axes of difference such as race, gender, age, and so on (Buckingham & Kulcur, 2009; Buckingham-Hatfield et al., 2005; Goodling, 2020). At the same time, Global EJ and Critical EJ have emerged as theoretical expansions, addressing global power imbalances and recognizing non-human entities within justice considerations (Pellow, 2017; Zeitoun, 2013).

These conceptual advancements in EJ research have underscored the importance of qualitative methodologies that are better suited for exploring the complex geographic processes that generate patterns of inequality (Holifield, 2001). According to some literature reviews (Agyeman et al., 2016; Das, 2021) this shift from quantitative to qualitative studies has characterized the second (e.g., Faber and McCarthy, 2003; Pellow & Park, 2003; Pulido 2000) and third generation of EJ scholars (e.g., Pellow, 2007; Schlosberg, 2007; Tschakert, 2009), although much of EJ research still seem to rely on quantitative methods.

3 Empirical evidence in environmental justice research: where do we stand?

3.1 Quantitative approaches in environmental justice research: mapping the *where* and *who*

Much empirical research on environmental justice has used quantitative methods, employing spatial analysis and geographic information systems (GIS) to map the unequal distribution of environmental “bads” or “goods” across different demographic groups. Quantitative studies have often analyzed large datasets to measure the relationships between environmental hazards and social factors, providing clear evidence of disparities. However, critical methodological choices influence findings and interpretations of such analyses, including geographic scale, the selection of exposed subpopulations, the environmental and social variables to be examined, and the statistical methods used (Chakraborty et al., 2011; Most et al., 2004).

One of the most critical aspects is determining the appropriate geographic scale. Different scales, from regional to municipal to census tracts, can yield varying results (cf. Modifiable Areal Unit Problem - MAUP). For example, municipal-level analysis tends to capture inequalities more precisely than larger scales, while smaller scales, such as census tracts

or neighborhoods, allow the detection of more granular disparities but may underestimate exposure if the units are too narrow (Baden et al., 2007; Chakraborty et al., 2011). This was evident in studies like Bowen et al. (1995), where a county-level analysis in Ohio linked environmental hazards to race, but smaller-scale analysis found income to be a more relevant factor. Similarly, initial signs of environmental justice in Brazilian cities were found to affect non-white, lower-income groups, but finer-scale analysis indicated similar risks for higher-income white residents (Carvalho et al., 2022). This issue, along with the ecological fallacies that arise when inferring individual behavior from group-level data (Banzhaf et al., 2019), complicates efforts to draw accurate conclusions about environmental injustices. Given the impact of scale, Agyeman et al. (2016) suggested to carefully select and justify the geographic units of analysis, ideally using a mix of scales to capture both macro and micro-level disparities.

Beyond scale, decisions about the exposed populations can also influence the results. Researchers use GIS to identify areas potentially exposed to environmental “bads” or “goods” and compare these to less-exposed or non-exposed groups (Chakraborty et al., 2011; Maantay, 2002). Two common methods are unit-hazard coincidence, which compares the characteristics of populations within specific geographic units near environmental hazards to those in areas without them, and distance-based analyses, which create buffers around hazards to identify impact areas (Chakraborty et al., 2011; Mohai & Saha, 2006). While unit-hazard coincidence is simple and intuitive, it may inaccurately locate residential populations near hazards by assuming that exposure is confined to predefined boundaries. Distance-based analyses address some of these limitations by considering proximity more directly, but they may still not fully capture the true distribution of risk due to complex dispersion patterns. Some researchers have improved these methods by incorporating distance-decay functions, wind directions, and toxicity-weighted emissions (Chakraborty & Maantay, 2011; Fisher et al., 2006), though they are often limited by incomplete data and imperfect modeling assumptions (Mohai et al., 2009). Despite these efforts, proximity measurements remain widely used. For assessing distributive injustice without focusing on health, buffer analyses that accounts for different types of hazards, such as assigning scores (Bernardini Papalia & Scognamiglio, 2023) offer a compromise to consider concerns beyond health such as noise, odors, traffic, visual blight, property values, and social stigma associated with hazardous facilities (Mohai et al., 2009).

The selection of environmental and population variables adds further complexity. Studies have analyzed a broad range of environmental bads, including air pollution (e.g., Germani et al., 2014; Schoolman & Ma, 2012; Xu et al., 2019; Zhang, Li, & Khanna, 2021), industrial facilities and sites (e.g., Basu & Chakraborty, 2016; Collins et al., 2016; Cushing et al., 2021; Gemmiti et al., 2022; Pasetto et al., 2022, 2023), hazardous waste sites (e.g., Basu & Chakraborty, 2016; Mohai & Saha, 2007; Bernardini Papalia & Scognamiglio, 2023), natural disasters (Chakraborty et al., 2019; Maldonado et al., 2016; Montgomery & Chakraborty, 2015), renewable energy and new technologies (Levenda et al., 2021, Tyree & Greenleaf, 2009), and climate change (e.g., White-Newsome et al., 2009). Measurements often focus on the number of hazardous sites rather than specific factors (e.g., size, typology, quantity of pollutants, regulatory regime etc.) mainly due to data limitations (Rosignoli, 2020). Recently, the scope of EJ studies has expanded to include not only en-

vironmental hazards, but also benefits and resources such as national parks (Laird et al., 2000), natural resources (Mutz et al., 2002; Schroeder, 2000), access to green spaces and outdoor opportunities (Certomà & Martellozzo, 2019; Suárez et al., 2020).

When it comes to characterizing populations, researchers have not agreed on a universal set of metrics. The variables used are context-specific and strongly dependent on data availability, and the rationale behind them is not always clearly articulated (Althor & Witt, 2020). Race and ethnicity have been central to US EJ research, largely because of the longstanding focus on environmental racism (Brulle & Pellow, 2006). By contrast, European studies tend to focus on social categories (Köckler et al., 2017; Laurent, 2011). Socioeconomic status is one of the most commonly used variables, particularly in the UK. It is measured through various indicators such as income, poverty rates, and deprivation indices, often depending on the definition of poverty/deprivation and the metrics used to measure it in each country. However, these broad and sometimes contentious measures can oversimplify complex social realities, which is why researchers prefer to use multiple indicators such as education, occupation and housing conditions (e.g., Collins et al., 2015; Chakraborty, 2024; Mennis, 2002; Mohai & Saha, 2006). Despite its relevance, gender has received relatively limited attention (e.g., Cannon, 2021; Germani et al., 2014). The same applies to age and disability (Chakraborty, 2020, 2022). Only a few studies have examined a broad set of social factors and intersectionality, considering multiple axes of differences (e.g., Cannon, 2021; Chakraborty, 2020; Chakraborty et al., 2016). I have not found studies that have collected data on contextual factors, such as social capital, amenities, institutional quality, crime, and political engagement, which could contribute to making communities more disadvantaged, more vulnerable, and less resilient.

In terms of statistical methods, the diversity and complexity of EJ research has led to the use of a wide range of analytical techniques, reflecting differences in study design and data availability. Multivariate regression is the most common method for measuring the relationship between environmental hazards and social factors (e.g., Fricker & Hengartner, 2001; Pastor et al. 2004). Univariate and bivariate methods such as linear regression, correlation, and t-test are used as well, but few studies rely entirely on them (e.g., Ash & Boyce, 2013; Chakraborty, 2024; Koester & Davis, 2018). Recently, spatial regression models have been used to account for spatial effects and autocorrelations (e.g., Grineski & Collins, 2008; Mennis & Heckert, 2017; Pastor et al., 2005). Geographically Weighted Regression (GWR) has also been applied in studies to capture local variations in environmental injustice patterns that global models like Ordinary Least Squares (OLS) and Spatial Autoregressive (SAR) may overlook (Chakraborty et al., 2022; Grineski, Collins & Olvera, 2015; Mennis & Jordan, 2005). Spatial Quantile Regression (SQR) is a newer approach, examining the uneven distribution of hazards across all values, not just the mean. Though not yet widely used, studies such as Lome-Hurtado et al. (2020) demonstrate its potential to reveal how the relationship between vulnerable groups and pollution intensifies as concentrations increase. Very few studies have directly compared these methods (e.g., Schoolman & Ma, 2012), making it unclear how the use of different methods can affect the results.

The inconsistency in the combination of variables and model types across studies complicates any attempt to compare findings as different approaches often yield varying insights into environmental injustice. This lack of standardization makes it challenging to draw

definitive conclusions or to synthesize results from the literature. Furthermore, quantitative studies often lack the ability to explain why these spatial patterns exist and fully capture the political, economic, and social forces that shape them (Chowkwanyun, 2023). Although some researchers recognize the influence of power dynamics and systemic inequalities, incorporating these concepts into quantitative research is often challenging or beyond the scope of the studies (Collins et al., 2016).

3.2 Qualitative approaches in environmental justice research: understanding the *why* and *how*

While much research continues to follow quantitative methodologies, quantitative research no longer completely dominates academic discourse on the subject. The predominant focus on quantitative approaches has been challenged by scholars who have recognized their limitations and the need for more qualitative research (Pulido, 1996; Weinberg, 1998). While quantitative methods are effective in mapping the spatial patterns of environmental injustice, they struggle in exploring more than distributive justice. In contrast, qualitative studies move beyond simply documenting the distribution of environmental hazards, addressing a wide range of topics, including historical processes and socio-ecological relationships (e.g., Flanquart, Hellequin & Vallet, 2013; Pellow, 2004; Privitera et al., 2023; Williams & Mawdsley, 2006), embodied geographies (e.g., Gay-Antaki, 2023; Iengo, 2022), procedural justice, recognition and marginalization (e.g., Bell, 2008; Deacon & Baxter, 2013; Gibson-Wood & Wakefield, 2013; Tschakert, 2009; Wan, 2014), alternative imaginations of places (e.g., Houston, 2013) as well as resistance and activism (e.g., Armiero & D'Alisa, 2012; Davies, 2006; Di Chiro, 2008). Although questions of environmental injustice have long been recognized as inherently spatial, relatively few geographers have explored the complex dynamics contributing to environmental inequalities (e.g., Davies, 2006; Deacon & Baxter, 2013; Gay-Antaki, 2023; Houston, 2013; Ma et al., 2017; Tschakert, 2009).

Many environmental justice researchers are positioning their work within broader cross-disciplinary discussions, employing a wider range of methodologies, such as interviews (e.g., Gibson-Wood & Wakefield, 2013; Iengo & Armiero, 2017), participant observation (e.g., Pellow, 2004), surveys (e.g., Flanquart et al., 2013; Wan, 2014), document analyses (e.g., Cutts et al., 2016; Schönach, 2016), toxic autobiographies (e.g., Armiero et al., 2019; Praseetha, 2015) and community-based participatory research (e.g., Tschakert, 2009; Sadd et al., 2014). These approaches, as noted by Chowkwanyun (2023), facilitate dialogue between researchers and communities, and give voice to those who are often marginalized in the environmental decision-making process.

However, qualitative EJ studies often lack clear explanations for why specific methods are chosen and how they are applied (Das, 2015; 2021). Despite being invaluable for shedding light on history, socio-ecological relationships, lived experiences and multiple dimensions of justice, they often do not provide empirical evidence on where and to whom environmental hazards are disproportionately allocated, neglecting the analysis of space, spatiality and distributional issues, with a few exceptions (e.g., Tschakert, 2009).

EJ studies that have adopted both qualitative and quantitative methods remain limited

(e.g., Collins et al., 2016; Lei et al., 2023; Ma et al., 2017; Mitchell & Rabassa, 2024). For instance, Collins et al. (2016) integrated quantitative exposure analysis with a conceptual approach to explore societal power dynamics. Mitchell and Rabassa (2024) combined spatial regression for analyzing poverty and environmental risk with qualitative methods like site visits and semi-structured interviews to show the impact of household participation in decision-making on outcomes.

Noteworthy is the recently emerged approach of “statistical political ecology” (Temper et al., 2015; 2020), which integrates quantitative methods into political ecology to examine socio-environmental conflicts. By employing large-scale datasets, often co-produced with activists, such as the Environmental Justice Atlas (EJAtlas), it identifies patterns across thousands of cases globally, providing an empirical basis to analyze power dynamics, resistance strategies, and outcomes (e.g., Martínez-Alier et al., 2016; Pérez-Rincón, 2019; Scheidel et al., 2020). By quantifying these trends, this approach provides empirical support for insights that have traditionally been explored qualitatively in political ecology, helping to explain why specific environmental outcomes and resistance forms emerge in particular contexts (Martínez-Alier et al., 2021).

4 Toward a new generation of environmental justice scholars: bridging methods and expanding geographical insights

Environmental justice theory has evolved significantly, moving from focusing solely on distribution to embracing multiple dimensions of justice, such as recognition and participation (Schlosberg, 2007; Walker, 2009). This shift offers critical opportunities to address not only “where” injustices occur and “who” are the affected populations, but also “why” and “how” these injustices are created and perpetuated. However, these theoretical advancements have not been adequately addressed in empirical research, creating a bias between theory and practice (Sze & London, 2008; Schlosberg, 2007; Walker & Bulkeley 2006).

Quantitative methods have been instrumental in illustrating how environmental “goods” and “bads” are distributed, but they often fail to address deeper socio-historical processes. Conversely, qualitative methods offer depth and context, but frequently lack spatial analysis, thereby providing an incomplete understanding of environmental injustice. This division between the two approaches constrains our ability to understand the complexity of socio-environmental relationships. Other factors also contribute to the gaps in EJ research. First, the lack of interdisciplinary integration has prevented the incorporation of broader pluralistic justice frameworks. Second, operationalizing multidimensional environmental justice in a way that can be systematically measured or studied remains a challenge. As a result, scholars tend to rely on more traditional, quantifiable aspects of justice, such as distribution, while neglecting other crucial dimensions, such as socio-historical processes and lived experiences. Third, addressing these broader aspects requires a critical approach that challenges dominant narratives and digs deeper into structural issues.

A critical geographical approach has the potential to connect the multiple dimensions of environmental justice, bridging the gap between theory and practice in EJ research. I agree with Walker (2009) on the urgent need for a “new, imaginative, methodologically diverse, and theoretically pluralized” approach in geographical scholarship to advance the

field. Drawing on critical geography theories, there are three key reasons why geographers should expand their engagement with environmental justice:

- 1) Space is not neutral; it is socially produced, and shaped by economic forces, social relations and power dynamics (Lefebvre, 1991; Massey, 2004; Smith, 2008; Soja, 2013). The disproportionate location of environmental hazards is thus not random, but results from social and political processes that make certain places “disposable” and expendable. The concept of “sacrifice zones” (Bullard, 2011; Lerner, 2010) is, therefore, a geographic notion about the production of space that encapsulates significant political, social, and historical connotations. Understanding environmental injustices as ongoing socio-historical processes, rather than isolated events, is crucial for moving beyond mere distributional metrics (Pulido, 1996).
- 2) According to Soja’s (1980) concept of the “socio-spatial dialectic,” space and society are in constant interplay, with each shaping the other. This dynamic means that environmental injustices can perpetuate urban, social and economic inequalities. For instance, when places become stigmatized as “disposable,” they are more likely to be targeted for further environmental burdens, which perpetuates marginalization and hinders opportunities for development (Pellow, 2004; Walker, 2009). Space also operates on multiple levels, including political, institutional, and cultural, and at various scales, from local to national and from the body to the community (Walker, 2009). These intersecting spatialities imply that environmental injustice occurs through complex, multi-scalar processes that cannot be understood through a simplistic distributional lens.
- 3) As Walker (2009) points out, simply documenting the unequal distribution of environmental goods and bads does not prove injustice, as environmental features are inherently uneven; what matters is the fairness of the processes by which these distributions occur and the opportunities available for communities to avoid or mitigate risks. Therefore, a meaningful assessment of environmental injustice must therefore include a deeper examination of the processes of exclusion and systemic power imbalances, ensuring that justice is understood as more than just distribution.

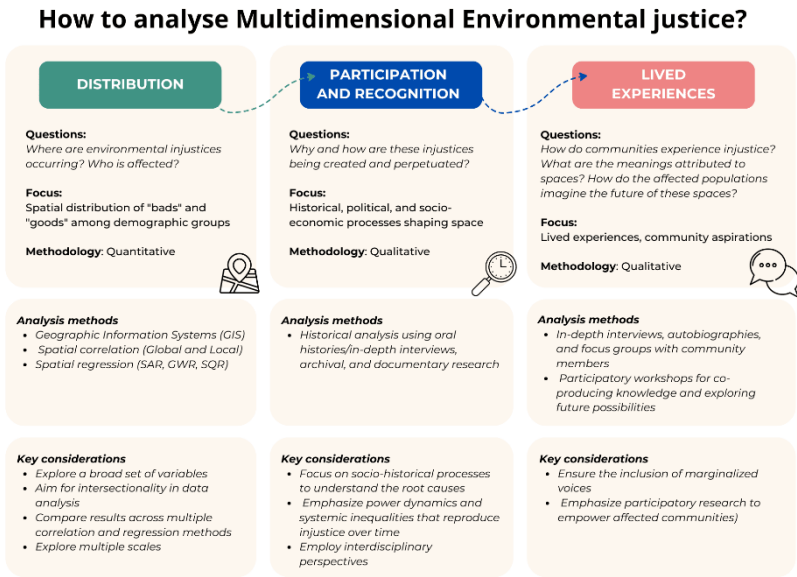
It is critical that the multidimensional nature of environmental justice be emphasized without discarding the traditional distributional focus. As noted by Young (1990), justice is inherently a balance between distribution, recognition, and participation (among potential others, I would add), and all elements must be addressed together as they are deeply interconnected, co-occurring, and mutually reinforcing.

To advance the field, a fourth-generation of environmental justice scholars should adopt mixed and multimethod approaches (Anguera et al., 2018; Hunter & Brewer, 2015), that combine quantitative and qualitative techniques. Such an approach connects the traditional focus on distribution with the newer, multifaceted geographies of justice, providing a fuller understanding of how injustices are produced, experienced, and addressed. Mixed and multimethod approaches can mitigate the limitations inherent in relying solely on either quantitative or qualitative methods, enhancing rigor and effectively addressing both the subjective and objective dimensions of research questions (Hawthorne, 2016). Spatial and statistical analysis can reveal where marginalized communities are disproportionately exposed to environmental hazards, while qualitative methods can shed light on the socio-historical processes and lived experiences underlying these injustices. Geography, with its focus on spa-

tiality and intricate social and economic issues, is particularly well-positioned to facilitate this integration (Hawthorne, 2016).

The proposed framework for this approach is illustrated in Table 1, which details the different dimensions of justice and the methodologies that would be suitable to explore them, showing how quantitative and qualitative methods can be utilized in tandem to capture both the spatial distribution (“where” and “who”) and the socio- historical processes (“why” and “how”) that underlie environmental injustices.

Figure 1. Environmental justice research framework: toward a fourth generation of EJ scholars



Source: author’s elaboration

5 Conclusions

This critical review highlighted significant gaps and shortcomings in the existing literature on environmental justice, particularly regarding methodologies employed in both quantitative and qualitative studies.

The theoretical evolution of environmental justice – from focusing solely on distributional inequalities to a more complex, multidimensional understanding of justice – has yet to be adequately translated into empirical research, creating a persistent gap between theory and practice.

Quantitative research has been crucial in providing a clear, data-driven picture of how

environmental “goods” and “bads” are distributed, with methodological innovations contributing to an ever richer understanding (e.g., Chakraborty et al., 2022; Rüttenauer & Best, 2021; Mennis & Heckert, 2017). Despite its strengths, quantitative studies often face several challenges, such as selecting the appropriate geographic scale, metrics, and statistical models, which often lead to disparate and contradictory conclusions and interpretations. The focus on methodological rigor has gone hand-in-hand with weak theoretical foundations (Pellow, 2000) and the inability to capture the socio-historical processes that shape these environmental injustices, resulting in a partial understanding of the complexities involved in EJ.

On the other hand, qualitative research has provided essential insights into lived experiences and structural forces shaping environmental injustices, offering a broader theoretical scope for understanding EJ (e.g., Armiero et al., 2019; Gay-Antaki, 2023; Gibson-Wood & Wakefield, 2013). However, EJ qualitative studies often lack transparency, struggle with methodological rigor, and fail to adequately address spatial dimensions, thereby providing an incomplete understanding of environmental injustice.

The persistent separation between quantitative and qualitative research has limited the capacity of EJ studies to fully explore the intricate socio-environmental relationships involved, thus urging a more integrated approach that combines the strengths of both methodologies. Ultimately, overcoming the bias between conceptual and empirical approaches in EJ research requires embracing interdisciplinary integration and critical perspectives that challenge existing power structures and advocate systemic change.

This review also highlighted the missed opportunity for geography as a discipline to fully engage with the complexities of environmental justice (Walker, 2009; Walker & Bulkeley, 2006). The inherent spatial nature of environmental inequalities presents a unique opportunity for geographers to advance empirical research integrating the various dimensions of justice: distribution, participation, recognition and others. Critical geography, grounded in theories of spatial production, socio-spatial dialectics, and multiple spatialities, is well-positioned to examine how social and political processes shape places creating “sacrifice zones” where environmental burdens are disproportionately placed, and how certain places in turn shape social, political and economic dynamics.

The gaps identified in this review highlight the urgent need for a fourth-generation environmental justice scholars. This new generation should adopt a multidimensional framework and a mixed-method approach. This means integrating quantitative methods to analyze the “where” and “who” with qualitative approaches to explore the “why” and “how” of environmental injustices. Specifically, quantitative methods can be employed to analyze the distributional aspects, while qualitative methods can delve into the socio-historical contexts and lived experiences that shape these injustices. Such an integrated approach will not only bridge the gap between theory and practice, but also provide a more comprehensive understanding of how environmental injustices are produced, experienced and perpetuated. This will not only advance academic understanding but also have practical implications, informing policy and advocacy efforts aimed at fostering a more just and equitable society.

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A Appendix A Summary of reviewed literature

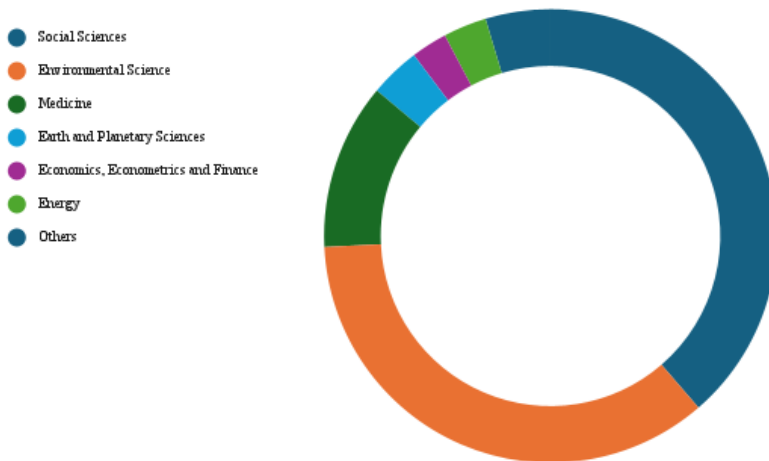
The journals included in this review are primarily published in the U.S. and U.K (both 42.3%), reflecting their significant contributions to environmental justice scholarship. Notably, a considerable body of work from the Netherlands (11.0%) also emerges. The remaining articles are published in Switzerland and India (Table A1). The journals in which the articles included in the review appear are mainly in the fields of “Social sciences” (38.7%) and “Environmental sciences” (35.6%) (Figure A1).

Table A1. List of journals of the articles included in the review: geographic area of publication and number of articles from each source

Journals	Count	Geographic area
American behavioral scientist	1	US
American journal of public health	2	US
Annals of the Association of American Geographers	4	US
Annual Review of Environment and Resources	2	US
Annual Review of Public Health	2	US
Antipode	6	UK
Applied Geography	1	Netherlands
Capitalism Nature Socialism	1	UK
Computers, Environment and Urban Systems	1	UK
Demography	2	US
Ecological Economics	4	Netherlands
Environmental and Ecological Statistics	1	Netherlands
Environment and Planning E: Nature and Space	2	US
Environmental Health Perspectives	2	US
Environmental Humanities	3	US
Environmental Justice	8	US
Environmental Management	1	US
Environmental Politics	2	UK
Environmental Research	2	UK
Environmental Research Letters	5	UK
Environmental Science & Policy	1	Netherlands
Epidemiologia e Prevenzione	1	Italy
Ètude, a Multidisciplinary Research Journal	1	India
Exposure and Health	1	Netherlands
Frontiers in Climate	1	Switzerland
Geoforum	3	UK
Geografiska Annaler: Series B, Human Geography	1	UK
GeoJournal	1	Netherlands
Geotema	1	Italy
Global Environmental Change	1	UK
Health & Place	1	UK
Health Education & Behavior	1	UK
Health, Risk & Society	1	UK
International Journal of Environmental Research and Public Health	2	Switzerland
Journal of Economic Perspectives	1	US
Journal of Environmental Planning and Management	2	UK
Journal of Environmental Economics and Management	1	US
Journal of Environmental Studies and Sciences	1	US
Journal of Political Ecology	2	US

Journals	Count	Geographic area
Journal of Urban Affairs	1	UK
Landscape and Urban Planning	1	Netherlands
Local Environment	3	UK
Oxford Development Studies	1	UK
Pennsylvania Geographer	1	US
Population and Environment	2	Netherlands
Progress in Human Geography	1	UK
Qualitative Research Journal	1	UK
Qualitative Sociology	1	US
Social Problems	1	US
Social Science Quarterly	2	UK
Sociology Compass	1	US
The Extractive Industries and Society	2	UK
The Geographical Journal	1	UK
The Journal of Peasant Studies	1	UK
The Professional Geographer	3	US
Urban Geography	1	UK
Total count	100	

Figure A1. Subject areas of the journals publishing the articles included in the review

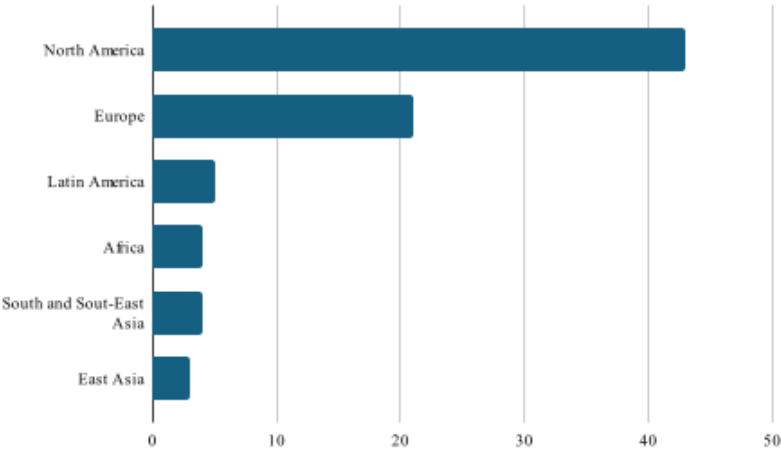


Source: author's elaboration

In addition to the 100 articles included, 7 books and 6 book chapters were also included

in the review. The geographical scope of the reviewed documents themselves is diverse (FigureA2). The literature reviewed included case studies and analyses from regions around the world, including Europe, Latin America, Asia, and Africa. In Europe, the countries included are Italy, United Kingdom, Finland, Ireland, France, and Germany.

Figure A2. Geographic scope of the reviewed documents (articles, books, book chapters)



Source: author’s elaboration

The review included articles published between 2000 and 2024, with a larger number of articles published in 2009, 2016 and 2021 (FigureA3).

Figure A3. Concentration in time of the reviewed documents (articles, books, book chapters)



Source: author's elaboration



Critical Review

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THE ECOSYSTEM SERVICES ANALYTICAL FRAMEWORK IN ITALY. A HUMAN GEOGRAPHY PROSPECT

Abstract

This paper examines the ecosystem services (ES) analytical framework from a Human Geography perspective. It firstly aims to describe the development of the ES paradigm within international and Italian scientific debates. Although ES appeared in the international scientific debate in the early 1990s, they gained attention by Italian scholars later around 2011. During this period, the paradigm was harshly criticised and several controversial aspects emerged. Payments for ecosystem services (PES) schemes are one of the most frequently discussed topics. However, the limits highlighted by international literature have been rarely mentioned in the Italian debate. Furthermore, PES schemes were introduced through Law No. 221/2015. This output is the result of a social and cultural process that has shaped a strong utilitarian attitude toward ecosystems. For these reasons the paper focuses on the features of Law No. 221/2015 and on the other existing regulatory instruments, which can counterbalance its criticalities. In conclusion, the paper stresses the elements which should be considered in order to implement an effective ecosystems restoration.

Keywords: ecosystem services, cultural ecosystem services (SEC), co-benefits, social and cultural values, ecosystems restoration.

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Although the contribution is the result of a shared work, Valentina Capocéfalo is the author of the sections 1-3 and 6, while Flaminia Leuti is the author of sections 4 and 5.

1 Introduction

Social sciences can significantly contribute to a robust understanding of the relationship between ecosystems and society (Pellizzoni, 2021). This is particularly the case because of the social matter of nature (Castree & Braun, 2001). The relevance of social sciences as well as humanities results even more true for the debate within a paradigm, that of ecosystem services (ES), which in Italy still sees ecologists and economists as principal interlocutors¹. In particular, human geography can play a leading role in this perspective, given its theoretical origins in the study of relationships between ecosystems and human communities.

The ES analytical framework consolidated in the international scientific debate in the late 1990s. Subsequently, it was introduced in the Italian legislation through the Law No. 221/2015 titled “Environmental provisions to promote green economy measures and curb the excessive use of natural resources”². Therefore, this law clearly manifests the link between green economy and ES. The same relation has been underlined by Martin et al. (2024). In their study green economy represents one out of four comprehensive pathways to sustainability which have characterised the scientific debate in the last decades³. According to the authors, green economy uses payments for ecosystem services (PES)⁴ schemes with the aim to highlight and valorise positive environmental externalities, which otherwise would be ignored.

The most recent ES scientific and political debate in Italy has been often focused on market-based solutions (Marino et al., 2024; ASviS, 2024). However, PES schemes have been harshly criticised from their earliest appearances (McCauley, 2006). Additionally, the international debate has produced both scientific publications and policy documents capable of incorporating demands from social and cultural scientific research fields.

Based on these premises, the contribution aims to: i) describe the development of the ES analytical framework within the international and Italian debates; ii) highlight the features of the Law No. 221/2015 and the other existing regulatory instruments, which can counterbalance its criticalities; iii) finally, stress the elements that should be considered in order to implement an effective ecosystems restoration. The paper focuses in particular on the socio-cultural factors and the heterogeneity of values, which constitute relevant issues within human geography studies.

This paper rests its foundation on the idea that the concept of nature is socially constructed (Bonati et al., 2021). Consequently, even the elaboration of the ES analytical framework and its introduction into the Italian legislation are not neutral processes.

The paper thoroughly examines legal aspects. However, it does not intend to place itself within the framework of legal geography for two main reasons. Firstly, this field of

1 The relevance of these disciplines for the development of the ES analytical framework has been underlined by Conti Pourger (2022).

2 The original title is: “Disposizioni in materia ambientale per promuovere misure di green economy e per il contenimento dell’uso eccessivo di risorse naturali” (Law No. 221, approved on 28th of Dicembre 2015).

3 The other three comprehensive pathways to sustainability are: i) nature protection; ii) degrowth; iii) earth stewardship and biocultural diversity. The latter is going to be presented later in the paper.

4 According to Marino and Palmieri (2018), PES can be described as “a transfer of resources between social actors that serves to create incentives to align individual and/or collective decisions with the management of NC [Natural Capital]”.

research is difficult to define and circumscribe (Asoni, 2024). Secondly, laws are not the starting point of the analysis. Rather, they are seen here as the result of a social and cultural constructive process (Priel, 2019), which is analysed through a human geography prospect.

2 The ecosystem services analytical framework within the international scientific debate

The first references to terms and concepts similar to ES are contained into the studies conducted by Wilson & Matthews and by Westman in the 1970s (Lai, 2016). Although the term *ecosystem services* appeared for the first time in a contribution written by Ehrlich & Ehlich in the early 1980s (Pellizzoni, 2021), the ES analytical framework gained attention later starting from the early 1990s (Daily et al., 1996). Daily defined ES as “the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfil human life” (Daily, 1997, p. 3). Some of the most important ES highlighted were air and water purification, fertile soil generation, pollination processes, seed dispersal and nutrients transportation. This initial non-structured listing of ES later led scholars to express the need of “describing, classifying and valuing ecosystem functions, goods and services in a clear and consistent manner” (de Groot et al., 2002, p. 393).

A well-known assessment of the ES globally produced was subsequently developed by the Millennium Ecosystem Assessment (MEA) within the report *Ecosystems and human well-being* (2005). ES are here defined as “the benefits people obtain from ecosystems” (MEA, 2005, p. 27). Additionally, the report identifies four different categories of ES: i) provisioning services (e.g. food provision); ii) regulating services (e.g. pollination processes); iii) supporting services (e.g. nutrient, air and water cycling); iv) cultural ecosystem services (CES) (non-material benefits, e.g. recreational benefits).

The study *The Economics of Ecosystems and Biodiversity* (TEEB) was later presented during the Conference of the Parties of the Convention on Biological Diversity held in Bonn (2008) (Sukhdev et al., 2014)⁵. It is here evident a passage from a mere scientific operation of cataloguing benefits as ES to expressing their value mainly through economic tools. This change was particularly encouraged by scholars how felt the need to elaborate practical instruments which could be used by policy-makers in order to implement environmental-friendly strategies and politics (Daily et al., 2007). In the following years ES analytical framework was adopted by several international organisations (Jax et al., 2013; Tomao et al., 2013).

Therefore, on the one hand the wide spreading of ES completed their consolidation process on a scientific and political level. On the other hand, it exposed them to much criticism. Noorgard (2010) notes how the reflections promoted by ES scholars discouraged them-selves from studying how to prevent anthropic pressure on ecosystems and how to relate with the ongoing environmental changes. He states that mainly compensatory logics and strategies were in that moment promoted. Ernstson and Sörlin (2013) highlight the few attentions given to the peculiar social and cultural dimensions of the territory investigated through the ES lens. In their opinion ES have to renounce to their global claims, given

5 The report has been preceded in 2003 by the Handbook of National Accounting: Integrated Environmental and Economic Accounting (Conti Pourger, 2022).

the social nature and consequently the positionality of any scientific analytical framework. Kolinjivadi (2019) stresses the use of the term *service*, which entails in his opinion an unbalanced power between humans and ecosystems. West et al. (2020) also highlight this aspect. The authors state that “language does not simply reflect the world but actively intervenes in and shapes it – it is ‘performative’ [...]. Language is therefore vital when it comes to understanding and responding to complex sustainability challenges” (West et al., 2020, p. 314).

While the term *value* was initially used implicitly meaning its instrumental and economic dimension, scientific literature later highlighted other relevant aspects. Relational values⁶ emerged as a mediation between the most exploiting attitudes towards the ecosystems and the existence of an intrinsic value of nature, untied from any type of material and non-material use of the ecosystems (Chan et al., 2016). Additionally, bequest values (Swift, 2004; O’Garra, 2008) constitute a useful concept to understand caring for future generations.

Critics led the ES analytical framework in two main directions. On the one hand, they stimulated the emerging of a paradigm called *Nature’s Contribution to People* (NCP) (Díaz et al., 2015), which includes and expands the ES one (Díaz et al., 2018). On the other hand, the critics made it possible to develop a greater awareness of the deep and complex relationship between society and ecosystems even within the ES analytical framework (Kenter et al., 2016). In the same period, more articulated categorisation of ES also emerged (Haines-Young & Potschin, 2018). As it is known, socio-ecological relationships have also been deeply studied by scholars outside the analytical frameworks already mentioned. In particular, Nicklay et al. (2020) highlight the concept of *co-benefit* between humans and the ecosystem. Likewise, West et al. (2020) stress the importance of care, which “is not simply an emotional sentiment in the individual human mind, but an embodied, collective and reciprocal practice involving humans and nonhumans” (West et al., 2020, p. 314).

NCP was in particular developed within the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES). The international organisation was created in 2012 as an independent body linked to the United Nations. IPBES aims to develop scientific knowledge on socio-environmental issues, empower governance strategies and promote communication and dissemination practices related to ecosystems and biodiversity (Washbourne et al., 2020). ES constitute one of the several ways to look at socio-ecological relationships within this framework. They do not constitute the exclusive one. Indeed, NCP recognises several ontologies and epistemologies of nature (West et al., 2020).

Both NCP and a part of ES scientific publications can nowadays be included into the earth stewardship and biocultural diversity comprehensive pathways to sustainability, which has been individuated by Martin et al. (2024). The interest today is generally no longer for top-down data collection at large geographical scales. On the contrary, there is a growing sensitivity to practices of knowledge co-creation through multi-, inter-, trans-disciplinary approaches at the local and sub-local scale (Zolyomi, 2022).

6 “Relational values refer to a normative human sense of connection or kinship with other living things, reflective and expressive of care, identity, belonging and responsibility, and congruent with notions of what it means to live a ‘good life’” (West et al., 2018, p. 30).

3 The ecosystem services analytical framework in Italy

The international debate marginally influenced the Italian one, where only the ES analytical framework was assimilated. Although some studies highlight social and cultural aspects, the Italian scientific and especially political debates appear to be weakly influenced by these factors (Cerreto et al., 2020).

Two notable exceptions are worth mentioning. On the one hand, some authors deeply analyse the social and cultural features of ES analytical framework from a theoretical point of view (Poli, 2020; Longo & Parenti, 2022). On the other hand, some scholars focus their attention on CES detection practices at the local scale (Canedoli et al., 2017; Dal Borgo et al., 2023) and their relation with social equality and justice (Benetti & Langemeyer, 2021; Benati et al., 2024). Part of these studies emphasises the importance of qualitative survey methods and tools such as participatory mapping (Kenter et al., 2016; Ryfield et al., 2019). This research tool has been used by Italian geographers in order to study the values associated with socio-ecological relationships, even outside the ES debate (Mazza & Zanolin, 2023). However, “although the importance of CES is recognised, starting with the MEA itself, and as scholars’ attempts to measure them grow, the role of CES is largely underestimated in land-use decisions, and it risks losing an important part of the relationship that binds ecosystems and humanity” (Borghini et al., 2021, p.26).

One element prevails within the Italian debate. This is the aforementioned idea that the only way to make evident and to valorise environmental positive externalities is to assign them a monetary value (de Groot et al., 2012; Poli, 2020)⁷. This idea originally stems from a similar one expressed by Goulder and Kennedy (1997). In contrast to more recent formulations, they assigned to the public sector an important role in enhancing the positive externalities generated by ecosystem functions and goods.

Nowadays the monetary value generally considered most appropriate is the exchange value. According to Ring et al. (2010), choosing PES schemes as priority tools allows to come to terms with the market rules which are dominant today, while waiting for more complex socio-economic changes to take place. Therefore, although PES schemes have been strongly criticised also by Italian scholars (Pellizzoni, 2021), the rationale which supports them was placed at the heart of the Law No. 221/2015. The attempts to imagine solutions aimed to triggering a long-term social and cultural transformation are rare.

4 The features of the Law No. 221/2015

Law No. 221 of 28th December 2015 addresses ES within Articles 67 and 70. Article 67 establishes the Natural Capital Committee, tasked with producing annual reports on the state of Italy’s Natural Capital, using both physical and monetary indicators. Article 70 delegates authority to the government to introduce a Payment System for Ecosystem and

7 The same concept has been expressed also by Comandulli et al. (2022). Indeed, they state that “the idea which lies at the basis is that, by adopting a common unit of reference and system of measurement (one to which the various stakeholders are accustomed), the value of nature can be better understood and made to be understood, enabling it to be protected and conserved more effectively” (ivi, p. 26).

Environmental Services (PSEA)⁸. This article outlines ten guiding principles, envisioning a mechanism that remunerates added value derived from transforming ES into marketable products, while ensuring their long-term preservation⁹. The same law also provides that the public operator must recognize the role played by agriculture in relation to ES through incentive mechanisms for farmers who protect or provide such services. Additionally, it establishes that the final beneficiaries of the PSEA schemes are municipalities, municipalities unions, protected areas, integrated mountain basin foundations and collective management organizations of common goods, regardless their denomination. A similar provision is addressed to the Regions in relation to forest management activities¹⁰.

Law No. 221/2015 presents two critical features. Firstly, the guiding principles simultaneously treat ES as market products while acknowledging their public function, creating a conceptual ambiguity. Secondly, the law fails to introduce a clear legal definition of ES, which would help delineate the boundaries and scope of PSEA schemes. References to ES appear in the National Biodiversity Strategy (2011–2020) and its updated version (2030)¹¹.

Despite the absence of a legal definition, the first Strategy highlights the role of PES as economic instruments capable of realigning public interest with the private ones. According to the text, adopting PES schemes implies “transforming the ecosystem service into a true market product”. Additionally, it also means “recognizing the right of the service provider to demand economic compensation from the consumer of the good”. Therefore, these documents reinforce a primarily economic perspective, emphasizing the transformation of ES into marketable goods based on supply and demand dynamics.

5 The Italian Constitution opens the way for social sciences within the legal system: constitutionally compliant interpretations of Law No. 221/2015

While a long-term social and cultural change is certainly desirable, relevant elements for a transformative approach toward ecosystems can already be found in the current Italian Legislation. Indeed, a constitutionally oriented interpretation of the Law No. 221/2015 could already allow human geography to provide a significant contribution to the understanding of the relationship between ecosystems and society. Moreover, it would pave the way for a radically different conceptual and normative approach. An analysis of the current legal context already reveals the possibility of overturning the model focused exclusively on the remunerative potential of ES. It would also permit to empower CES through placing the relationship that binds ecosystems and humanity back at the core. As is well known, with Constitutional Law No. 1 of 11th February 2022 a third paragraph was introduced to Article 9 of the Italian Constitution. This paragraph provides that the Republic “protects

⁸ The acronym refers to *Pagamento dei Servizi Ecosistemici e Ambientali*.

⁹ The description given by law is close to that given by literature for PES (see note 4). Therefore, the two are considered here equivalent.

¹⁰ See paragraph 8 of Article 7 of Legislative Decree No. 34 of 3rd April 2018, which refers to the Article 70 of the Law 221/2015.

¹¹ The latter has been adopted by the Ministerial Decree No. 252 of 3rd August 2023.

the environment, biodiversity, and ecosystems, also in the interest of future generations¹². Moreover, the amendment to Article 41 of the Constitution introduced by the same Constitutional Law imposes human health and environment protection as additional limits to private economic initiative. In particular, the amendment to the third paragraph of Article 9 established that the law may direct and coordinate economic activities not only for social reasons but also for environmental purposes. This means that private economic initiative cannot be conducted in a way that damages the constitutionally significant spheres of human health and environment. Therefore, ecosystems and biodiversity (included in the normative concept of environment) protection constitute a value in-itself. Furthermore, it represents a primary value constitutionally protected and not merely a resource that generates purely economic value.

Given the fact that ES are provided by the ecosystems, they too must be legally treated as components of constitutionally protected values. It implies the necessity to reverse the concept of economic value to that of constitutional value. These objectives can be achieved through interpretative means, given that Law No. 221/2015, as an ordinary law, must be interpreted in a constitutionally compliant manner according to the principle of the hierarchy of norms.

Article 9 of the Constitution, being one of the fundamental principles, ensures that the protection and promotion of the goods and values it references (the environment, including ecosystems and their biodiversity) simultaneously become: i) a directive for the legislator; ii) a prescriptive norm capable of determining the decisions of various subjects within the legal system; iii) a criterion of legitimacy for the Constitutional Court. These key legal elements permit the reinterpretation of the contents of the Law No. 221/2015. Only in the light of this legal interpretation, the same law would promote an approach that goes "beyond the minimization of harm, capable of producing in harmony with and in favor of the regeneration of ecosystems and human communities" (Dal Borgo, 2021, p.18). This implies a sort of Contribution of People to Nature (CPN), and not just Contributions of Nature to People (CNP). Ecosystems and biodiversity thus become objects of rights at the highest level of legal protection within the Italian legal system. This condition entails the fulfillment of duties, which are imposed both on public entities responsible for safeguarding and on each citizen. The latter are called to take it into account in any conduct-related decision (Nazzicone, 2022).

6 From services to co-benefits. Moving beyond the utilitarian approach

Although knowledge about socio-ecosystems has been the subject of a large scientific production over the past fifty years, environmental protection policies do not seem to have grown in effectiveness, either on the global scale or in many cases on the regional and local ones¹³. Their lack of success would account for the ineffectiveness of the persuasive power

12 The clause referring to the interest of future generations implies a dynamic, promotional perspective, which places responsibility on both the State and citizens.

13 The fifth report on the condition of the Italian Natural Capital states that "much progress has been achieved, but the actions implemented are still insufficient to effectively counteract the pressures acting on species

of economic instruments (Muradian & Gómez-Baggethun, 2021). Additionally, there is little awareness of environmental issues such as the depletion of ecosystems and biodiversity loss among citizens when compared to other issues such as climate change (Bekessy et al., 2018). This implies a lack of disseminated understanding of the strong relationships between different phenomena that occur within the ecosystems and the effects they all have on humans and non-human entities.

The social and cultural long-term transformative process which is required for a more balanced relationship between humans and the ecosystems could find its genesis in a normatively correct interpretation of current laws. This choice would allow for the inclusion of the many stimuli that emerged within the international and national scientific debate in the last decade. Indeed, it is increasingly urgent to start thinking no longer in terms of services, but in terms of co-benefits.

A rigorous legal interpretation of the constitutional amendment can promote effectively transformative approaches that are not merely confined to the commodification conceptualization of nature. This would lead to a deep redefinition of the contents of Law No. 211/2015. This change could be significantly enriched by inputs provided by human geography. Indeed, it can accompany and support the appropriate interpretation of the law through a sound knowledge base of socio-ecological relationship, both in terms of theory and research methodologies. In particular, human geography plays a key role in rebalancing the relationship between human communities and ecosystems, enhancing heterogeneous environmental values and promoting earth stewardship and biocultural diversity as leading path within both the scientific and political debates.

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Critical review

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MOBILITY AND INNOVATION: A CRITICAL REVIEW

Abstract

The increasing attention given to inventors' mobility and its relationship with regional innovative activity has garnered significant interest among scholars. This review critically examines the key findings in this area, identifying both strengths and limitations in existing research. The discussion is organized into three primary areas: first, the mechanisms by which mobility influences innovation; second, the effects of mobility on the regions involved; and third, the factors that drive inventors' mobility. The review concludes that while recent studies have made notable contributions to understanding these dynamics, there remains a need for new analytical frameworks. These would be instrumental not only in reconciling divergent perspectives but also in shaping future research directions.

Keywords: brain drain, brain gain, innovation, inventors' mobility.

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1 Introduction

The positive relationship between human mobility and innovation is well- established, through its recognized role in driving human progress and the diffusion of knowledge since the Neolithic era (Manning & Trimmer, 2020; Skoglund et al., 2012). Recently, thanks to greater data availability, migratory waves – such as the Huguenots in Prussia or Jews and Soviets in the United States – have underscored the significance of mobility in the diffusion and production of innovation (De Rassenfosse & Pellegrino, 2024; Hornung, 2014; Moser et al., 2014)

It is quite intuitive that the topic of inventors' mobility is inherently interdisciplinary, intersecting fields such as economic geography, migration economics, economics of science, labor economics, as well as classical and modern historiography (Lissoni, 2018).

Although there is consensus on the importance of mobility for innovation, the diversity of approaches has led to contrasting positions regarding the theoretical motivations behind mobility's impact on innovation, as well as the effects on various geographic entities. Moreover, the discussion on mobility has often been confined to the phenomenon of migration alone. While migration certainly constitutes a significant aspect of mobility, it isn't exhaustive, representing only a specific case of mobility that often involves the spatial movement of entire communities, and so different effects compared to individual mobility (Lissoni, 2018).

The objective of this review is not to provide a comprehensive reconstruction of the literature on inventors' mobility but rather to offer a critical approach to the topic. It illustrates the most significant findings, highlights the contrasting viewpoints, identifies gaps and shortcomings in the existing narrative, and suggests ways these might be addressed. The approach to gathering literature sources began with keyword searches in two major databases (Scopus and Google Scholar). The keywords used were "Inventors' mobility" and "Migration and innovation." The identified articles were then analyzed to determine the major thematic areas, with additional sources collected through citations.

The general topic will therefore be broken down into its major thematic areas, allowing for a focused analysis of the most important findings. This breakdown is reflected in the structure of the review. Specifically, the first section will explore the reasons why inventors' mobility is particularly important for innovation, distinguishing between the diffusion of knowledge across space and the generation of diversity. The second section will examine the spatial effects of this mobility, considering both origin and destination regions. The third section will focus on the drivers that influence mobility itself. The last section summarizes all the findings exposed previously and suggests new research directions.

2 Mechanisms of Impact: How Mobility Drives Innovation

One of the cornerstones of the geography of innovation, around which the entire literature revolves, is that innovative activity is not uniformly distributed across space but tends to concentrate in specific regions (Asheim & Gertler, 2006). This is largely due to the tacit and "sticky" nature of knowledge, which limits its spatial diffusion (Boschma & Lambooy, 1999; Jaffe et al., 1993). Therefore, it is crucial to investigate the primary

channels of knowledge diffusion. In this context, the inventors' mobility becomes a central theme in economic geography literature, whereas previously, it was largely confined to historiography (Miguelez & Noumedem Temgoua, 2020). Particularly, the pioneering work of (Breschi & Lissoni, 2009) identifies human capital mobility as the main channel for knowledge diffusion and low mobility as the reason for the high spatial concentration of innovative activity. Following this work, the literature increasingly focused on the role of mobility in knowledge diffusion. When discussing flows, there is inevitably at least one source and one destination. The origin- destination topic will be comprehensively revisited in the next paragraph; now, it is essential to define the theoretical mechanisms linking mobility and knowledge diffusion. Thus, we ask: Does mobility actually facilitate knowledge diffusion? If so, what kind of knowledge is diffused, and how does this process occur?

The first question might seem leading, but it is legitimate when trying to detect knowledge transfer by the effects of migration on local scientific production, where results are conflicting: while incoming human capital flows disproportionately increase patent production (Hunt & Gauthier-Loiselle, 2010), a more careful analysis shows that this is actually the result of a "displacement effect" (Borjas & Doran, 2015) where native inventors, rather than benefiting from the knowledge brought in by migrant inventors, tend to shift towards different areas of expertise. Furthermore, skilled workers tend to relocate to areas with already high concentrations of human capital (Kerr et al., 2016), raising the question of reverse causality – whether migrants are exploiting existing knowledge rather than contributing their own (Hilaire-Perez & Verna, 2006). While the extent of knowledge diffusion through migration remains ambiguous when measured solely by patent output, the results become more conclusive when patent citations are considered as a proxy for knowledge transfer, offering a clearer indication of the impact. Ganguli (2015) uses a difference-in-differences approach to estimate the causal impact of the migration of Russian scientists to the United States after the collapse of the Soviet Union on knowledge flows. The results show a disproportionate increase in citations of Soviet-era articles following the scientists' relocation to the United States, demonstrating how geographic mobility serves as a crucial channel for the transfer of ideas.

Regarding what is actually being diffused, knowledge is the main focus, as it is considered the primary fuel for innovation. However, it is well-known that innovation itself is a complex process that requires the coexistence of various factors. In this context, the classic distinction between technical/scientific knowledge and commercial/entrepreneurial information (Cowan, 2000) is useful. Regarding the latter, there is great evidence of the role played by migrant inventors in providing relevant information to firms in host countries for mergers and acquisitions operations undertaken in their origin countries (Useche et al., 2020), their ability to foster collaborative networks between companies (Tóth & Lengyel, 2021), their impact on local entrepreneurship (Balsmeier et al., 2020), and in promoting FDI (Foley & Kerr, 2013). Despite this, many questions remain regarding the transfers made by migrant inventors, particularly about what type of knowledge they are able to diffuse and how it differs from native knowledge. But most importantly, does the specific type of knowledge possessed by inventors influence their propensity or patterns of mobility? So far, there is no answer to this question.

About how migrant inventors contribute to the diffusion of knowledge and/or informa-

tion, two approaches can be distinguished: the transfer-based approach and the community-centered approach (Lissoni, 2018). The first considers the migrant as the unit of analysis, possessing specific knowledge and skills that can be transferred to the destination country if there are the right conditions, such as a favorable and tolerant climate towards foreigners (Scoville, 1952). The second approach, in contrast to the first, focuses on the role of the community and ethnic ties in diffusion, emphasizing the importance of minority communities in facing social discrimination or legal restrictions that may arise in the host region. In this context, the migrant community tends to specialize in sectors left open by natives, facilitating the dissemination of information primarily among the migrants themselves (Lissoni, 2018). The importance of these ethnic ties is demonstrated not only by the tendency of co-ethnic inventors to cite each other, especially if they belong to a minority (Breschi et al., 2017), but also to collaborate more frequently among themselves (Freeman & Huang, 2015), even though this tendency towards homophily – where migrant inventors prefer to collaborate with other migrant inventors – seems to have a negative impact on the quality of innovation (Almeida et al., 2015). This brings to another relevant theme related to the inventors' mobility, which has recently gained prominence: diversity.

The emergence of this new strand can be traced back to the literature on unrelated diversification. Without delving too deeply into detail, the idea originates from the observation that innovative activity is highly path-dependent (Dosi, 1982), meaning that regions tend to diversify more in activities related to their specialization (Hidalgo et al., 2018; Pinheiro et al., 2018). This path dependence can lead to technological lock-in, and the only hope of avoiding this is by diversifying into unrelated activities (Saviotti & Frenken, 2008). However, the factors that enable this unrelated diversification are still under investigation (Boschma, 2017). What is certain is that regions need different and non-redundant knowledge, which can be obtained through various gatekeepers – actors who serve as intermediaries in the innovation network, facilitate novelty generation by external resource transfers – (Breschi & Lenzi, 2015; Morrison et al., 2013), and inventors' mobility can be one of them. Hence, the hypothesis is that migrant inventors not only diffuse their knowledge through their mobility but that this knowledge is also inherently different from native knowledge, thereby enabling a technological shift. This hypothesis is supported by studies on mass migration to the United States between 1870 and 1940, where the inventive activity of migrants not only brought regional benefits but also shaped the technological evolution of the United States through the introduction of new technologies (Diodato et al., 2022). But what mechanisms make this possible? These can be summarized into two main mechanisms: knowledge recombination and knowledge reuse (Choudhury & Kim, 2019).

Knowledge recombination occurs as a result of collaboration between inventors of different ethnicities or backgrounds. These “non-ethnic” teams (as the members do not belong to a single ethnicity) can combine their different knowledge to create something that otherwise would not have been possible, thereby increasing the value of their patents (Ferrucci & Lissoni, 2019). However, this phenomenon contrasts with the homophily tendency previously observed; thus, knowledge recombination cannot be taken for granted. Homophily is closely linked to the second mechanism, knowledge reuse, which involves continuing to work with the knowledge that migrants themselves have imported. This occurs in ethnic teams (whose members belong to the same ethnicity or region) formed in regions differ-

ent from their origin. While both mechanisms can contribute to unrelated diversification, knowledge reuse has a more significant impact on it (Migueluez & Morrison, 2023). This is theoretically understandable, as the knowledge obtained through recombination is also derived from native knowledge, which is likely correlated with regional specialization, whereas reuse is more likely to result in non-correlated knowledge. This view is consistent with the historical work of Koch et al. (2023), which shows that the immigration of individuals specialized in a particular area leads to the emergence of that specialization in the region, while emigration reduces the likelihood of maintaining that specialization.

However, the literature is not unanimous on the role of inventors' mobility in unrelated diversification and thus in technological change. Caviggioli et al. (2020) have even demonstrated that migration and technological diversification are negatively correlated. This can be explained by the tendency of companies to attract workers already specialized in their activities, leaving little room for diversity. To resolve this incompatibility, the same reflection seen previously applies: identifying the different types of knowledge and how they affect the mobility of inventors. Indeed, none of these studies consider the innovation process within which all this takes place, and that this process actually requires both diversity and specialization. Also, the apparent tension between diversity and specialization in regional innovation can be explained by considering the different factors that drive inventors' mobility. When inventors move to regions that are leaders in specific fields to enhance their human capital, the result could be greater specialization. Conversely, if mobility is driven by other factors, such as seeking a less discriminatory environment, this could foster greater diversity. Therefore, understanding the underlying drivers of mobility is crucial to understanding the relationship with regional innovation.

3 Regional effects of investors' mobility

As mentioned in the previous section, inventors' mobility involves a flow that inherently requires both a source and a destination, geographically identified as origin and host region. This section aims to examine the distinct effects of mobility on these regions, addressing the impacts on the host region and the origin region separately due to their differing characteristics.

3.1 Host Regions

The effects of inventors' mobility at the regional level have predominantly been examined with a focus on host regions, where these effects are more pronounced. Initially, the literature concentrated on the impact of inventors' inflows on destination regions. Bahar et al. (2020) find that regions can gain a patenting advantage ranging from 25% to 60% in specific technologies when the number of foreign inventors specializing in these technologies doubles, thereby confirming the role of migrant inventors in the importation of knowledge. Additionally, Capello and Lenzi (2019) highlight that the inflow of inventors can lead to structural changes in innovation models, facilitating the shift towards more complex models.

However, the impact of inventors' mobility is not uniform and appears to depend on the

pre-existing innovation model in the destination region, particularly favoring models that can either strengthen existing knowledge networks or create new ones.

The ongoing debate on the potential displacement effect on native patenting remains unresolved. Borjas and Doran (2015) suggest that this displacement effect may vary based on different immigration regulations. In this regard, Kerr & Lincoln (2010) examine the impact of migration driven by H-1B visas (temporary U.S. visas for highly specialized personnel), finding that an increase in these visas results in a higher number of patents assigned to Indian and Chinese inventors, with limited displacement effects on native inventors. This finding indicates that regulated migration can lead to a direct contribution from migrant inventors.

Interestingly, inventors do not need to travel long distances to benefit regions with their positive effects. Even intraregional mobility is associated with improved innovative activity (Migueléiz & Moreno, 2013). This improvement may stem from both an enhancement in human capital and a better match between skills and opportunities, which can increase inventors' productivity by 30% (Pellegrino et al., 2023). It is also important to note that geographic mobility may, but not always, coincide with job mobility, and that could influence the impact. For instance, corporate mobile inventors tend to be more productive than those who do not change jobs, while higher initial productivity reduces the likelihood of changing employers (Hoisl, 2007).

This relationship is also geographically evident: Cappelli et al. (2019) analyze the impact of inventors' inflows and outflows on total factor productivity growth in Italian regions. Their results indicate that inflows have a positive impact on the host region, although the positive effects may take longer to materialize when the inventor also changes employers. Conversely, the negative effect of outflows is even more pronounced when the inventor changes employers, underscoring the potential negative impact of brain drain. In contrast, Prato (2022) proposes a model in which migrants not only become more productive after relocating (due to a better spatial allocation of talent) but also maintain relationships with inventors in their home countries, generating knowledge spillovers that benefit both the destination and origin countries – a win-win scenario.

3.2 Origin Regions

The aforementioned observations exemplify the ambiguity within the literature regarding the effects of inventors' mobility on origin countries. Initially, the phenomenon was predominantly seen with concern, especially as a loss of human capital with potentially disastrous effects for developing countries (Bhagwati & Hamada, 1974). However, recent studies have identified various channels and mechanisms through which origin countries may also benefit from mobility, possibly offsetting the initial loss of human capital. Although the primary concern remains the loss of human capital in already fragile contexts, the brain drain phenomenon is not limited to developing countries but affects various regions to differing degrees. An illustrative case is Poland, where between 2004 and 2012, emigrant inventors produced a greater number of patents abroad than those filed in Poland during the same period (Wachowska, 2018), highlighting how brain drain can pose a significant challenge to growth. Therefore, identifying the mechanisms through which this loss

can be mitigated has great importance for innovation policy.

One mechanism can be defined as the “incentive effect”, which arises from the prospect of achieving higher economic returns by first investing in one’s education and then emigrating to countries that can better compensate for one’s talent. When migration opportunities are not perfect, the origin country can still experience an increase in human capital (Faini, 2003). Empirically, Beine et al. (2011), using a dataset of 147 countries from 1975 to 2000, found evidence that the prospect of emigration can indeed incentivize investment in education, though under specific conditions: the wage differential between the destination and origin countries must be substantial, and the emigration rate must not become excessively high; otherwise, the effect reverses.

The most studied compensation mechanism, however, is the so-called “knowledge remittances,” the technical-scientific equivalent of the monetary remittances that migrants send to their origin countries. These remittances can take various forms that are not mutually exclusive and can be broadly categorized into two main types: knowledge transfer through social contacts and return or circular migration.

The first type intuitively involves the transfer of foreign knowledge by migrants to their origin countries by maintaining contact with inventors there. Agrawal et al. (2011) call this phenomenon the “brain bank” effect, in contrast to the “brain drain,” and they attempt to analyze it by focusing on the case study of India. They find that, on average, the brain drain effect prevails, although the brain bank effect is significant for more substantial innovations. Using a citation-based approach to trace knowledge flows, Breschi et al. (2017) explore the “brain gain” effect, which occurs when foreign-born inventors operating in the United States are disproportionately cited by inventors in their origin countries. Their findings indicate that this effect is significant only in specific countries (China, Russia, South Korea), underscoring the critical role of origin countries’ characteristics, particularly their absorptive capacity. Moreover, the same study emphasizes the importance of multinational corporations in facilitating these knowledge transfers. Similar results are obtained by Miguelez and Noumedem Temgoua (2020) who find a positive impact only in developing countries, with multinational corporations playing a key role in promoting these transfers. It appears that such knowledge transfers occur spatially but within the same multinational companies, where migrant inventors act as bridges between the headquarters and subsidiaries in their origin countries, so the transferred knowledge can be limited to that within the multinational itself (Marino et al., 2020).

The second category of knowledge remittances considers the possibility that migrants may not permanently settle in the destination country but might return to their home countries. Saxenian (2005) argues that the increasing mobility of inventors, particularly engineers and entrepreneurs born in China and India but operating in Silicon Valley, has transformed brain drain into “brain circulation”. These migrants, through their mobility, act as bridges to their home countries, facilitating the transfer not only of technical knowledge but also of organizational and entrepreneurial models, thereby transforming the innovation ecosystem in their countries. However, this study focuses on China and India; entirely different results are obtained when considering countries like Mexico, where return migration has ambiguous effects and then dissipate within five years (Diodato et al., 2023). To achieve positive results, it is necessary to reintroduce a player previously identified as crucial: the

multinational corporation. When considering managers of multinational corporations who are return migrants, it is observed that their team's members not only file a disproportionately high number of patents but also tend to cite the patents of the headquarters much more than others (Choudhury, 2016).

The mechanism of knowledge remittances fundamentally relies on the migrants' ability to diffuse knowledge, but as previously discussed, they can also diffuse other information useful for business decisions. Here, too, the role of multinational corporations is crucial, as they can obtain information from migrant inventors that can reduce costs and encourage investments in the inventors' origin countries (Foley & Kerr, 2013).

The emerging research on the role of migrant inventors in generating diversity has also contributed to the study of mechanisms that could compensate the brain drain, asserting that migration leads to unrelated diversification even in the origin countries (Di Iasio & Miguelez, 2022), potentially serving as a channel for developing countries to catch up with advanced economies. Despite all these efforts, it cannot be definitively stated that inventors' mobility leads to a win-win situation for both origin and host regions, especially considering that the highest levels of brain drain are observed in Africa and the Caribbean (Miguélez & Fink, 2023), which do not seem to possess the necessary characteristics to benefit from the brain gain effect. The most significant finding is certainly the understanding of the role of multinational corporations in facilitating this effect. It raises the question of how institutions such as multinational corporations (but not exclusively) contribute to shaping this geography. Furthermore, the literature has predominantly adopted a perspective where countries are the geographic unit of analysis, with little consideration of other forms of mobility and their significance within the innovation process.

4 Factors influencing inventors' mobility

Having established the importance and effects of inventors' mobility on the innovative capacity of the regions involved, the question arises as to what factors determine and drive mobility. Understanding the drivers of mobility is crucial from a regional perspective, as it would enable the implementation of precise policies aimed at attracting talent and increasing productivity and, as mentioned previously, it could also shed light on the diversification-specialization debates. So, what factors motivate inventors to relocate? First, it has been observed that mobility enhances the productivity of inventors themselves (Van Der Wouden & Rigby, 2021), which could already serve as an incentive, especially when higher productivity translates into higher wages. From a microeconomic point of view, the decision to move will be made when the benefits outweigh the costs incurred for the relocation. It is therefore not surprising that key factors in mobility include significant wage differentials between countries, greater employment opportunities, or the chance to broaden one's skills (Kerr et al., 2016). All these have the aim of maximizing benefits. On the other hand, it is also necessary to minimize costs, and that influences the choice of destination, with a preference for regions that have a geographical, cultural, technological, and institutional proximity (Gorin, 2016). The opportunities seeking in a different region can lead to higher costs, especially in the presence of information asymmetries, and this is where another crucial factor comes into play: the social network. Dorner et al., (2016), leveraging the natural

experiment of German reunification after the collapse of the Soviet Union, find that stronger social ties between regions in West and East Germany lead to greater migration of inventors, due to the reduction of information asymmetries and associated costs. Although these social networks are often co-ethnic and provide support to the migrant inventor, the ethnic diversity of the network can also play a crucial role in attracting migrants to a region (Campo et al., 2022), likely due to the inventors' desire to benefits of the externalities generated by diversity.

The discussion thus far has focused exclusively on the factors influencing inventors' choices, but there are also demand-side factors that are fundamentally responsible for creating the opportunities inventors seek. First, companies tend to hire based on a learning-by-hiring logic, meaning they are inclined to recruit inventors with strong skills, particularly those skills that are complementary to the competencies of other inventors and/or regarding areas where the company is not dominant (Palomeras & Melero, 2010). It is therefore no coincidence that the likelihood of an inventor moving, including geographically, is linked to the diversification of their skills and their productivity (Haller, 2022). This trend is also observable in the transfer of inventors between universities and the private sector, with such mobility strongly connected to the patenting productivity of inventors, while being indifferent to their scientific output (Crespi et al., 2007), indicating that opportunities for inventors arise when they possess tacit knowledge that can be transferred.

The factors discussed so far primarily focus on objective, economic or non-economic influences on inventors' mobility. While this is an excellent starting point, continuing solely along this path eventually leads to a dead end, as the decision-making process is undoubtedly a subjective matter. Behavioral studies are often confined to inter-firm mobility and typically reference the productivity of inventors and their subsequent risk propensity (Di Lorenzo & Almeida, 2012). Adopting a qualitative approach could shed light on hidden dynamics within inventors' decision-making processes, thereby contributing new insights that could generate novel research paths.

5 Discussion and future research directions

Inventors' mobility has emerged as a central topic in academic discourse, especially in relation to its impact on innovation and regional economies. This review has sought to highlight various aspects of this phenomenon, emphasizing both its potential benefits and the challenges it presents, thus revealing a complex landscape filled with opportunities and obstacles.

While it is undeniable that inventors' mobility plays a crucial role in facilitating the spatial diffusion of knowledge and enhancing innovative output, the literature remains ambiguous in explaining the mechanisms that enable these outcomes. A primary point of contention concerns the actual contribution of migrants' inventors to innovative production in destination regions. While an increase in patenting activity is often observed, some argue that this may result from the displacement of native innovation by migrants, who primarily choose their destination to exploit existing knowledge. These conflicting positions become even more evident when considering the kind of impact on destination regions, where mobility seems to simultaneously drive both diversification and specialization. This duality

is shaped by the interplay between diversity and homophily, presenting a paradox in the dynamics of innovation. Perhaps the best way to understand how these seemingly contradictory characteristics arise from the same phenomenon would be to analyze mobility within the broader innovation process – a complex phenomenon requiring both variety and specialization – and to examine its relationship with mobility.

It has also been demonstrated that the narrative of inventors' mobility, and highly skilled migration more broadly, being universally beneficial to both destination and origin regions is, in fact, quite fragile. The so-called "brain gain" occurs predominantly under stringent conditions and is closely linked to intra-firm mobility within multinational corporations. This finding underscores the necessity of exploring the "dark side" of innovation, a topic frequently overlooked (Morrison, 2023), wherein inventors' mobility and the consequent concentration of human capital may indeed be key factors in understanding the growing spatial inequalities (Storper, 2018).

To achieve this understanding, it may be necessary to partially depart from the approach predominantly used so far, which has focused mainly on countries as the primary geographic unit. This approach has largely ignored, with few exceptions, intra- regional mobility and, consequently, intra-regional disparities. The country-level approach overlooks critical dynamics at multiple scales, including intra-regional and urban levels, as well as interactions between innovative and less innovative regions. Neglecting these dimensions risks missing key mechanisms that drive spatial inequalities. Additionally, there is a need to move beyond the origin/destination dichotomy, as these two dimensions can coexist within the spatial trajectories of inventors, shaping a complex geography that deserves to be analyzed to better understand the role of regions in the innovation process.

Finally, this review has highlighted the multiplicity of factors driving inventors' mobility, including both economic and non-economic factors. However, literature has predominantly concentrated on the attractiveness of regions, using a microeconomic approach to explain inventors' choices and the technical characteristics that make an inventor more mobile. What has been almost entirely overlooked is the subjective decision-making process of inventors, who may be motivated by a much broader range of factors. Therefore, a qualitative analysis of the factors that inventors themselves perceive as most influential in their spatial location choices is necessary. Such an analysis could reveal previously unconsidered factors, potentially opening new research directions.

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BOOK REVIEWS



Book review

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Annalisa Spalazzi*

FRANCESCA SABATINI, GEOGRAFIA DELLE AREE INTERNE, GUERINI SCIENTIFICA, 2024, pp. 320

“Geografia delle aree interne: discorsi e pratiche turistiche nella Sicilia Fredda”, pubblicato nel 2024 rappresenta un nuovo passo nella comprensione delle aree interne. È il primo lavoro monografico di Francesca Sabatini, autrice, attivista e ricercatrice poliedrica, capace di unire teorie, discorsi e un profondo radicamento nel campo di ricerca, “affondando i piedi nel fango” sia fisicamente che intellettualmente. Si tratta di un testo scientifico che si inserisce con autorevolezza nella letteratura fondamentale per chi voglia trattare il tema delle aree interne, reso accessibile e piacevole da una cura stilistica rendendolo anche un’opera divulgativa. Un testo dalla postura femminista in cui la ricerca è un’attività riflessiva, incarnata e situata, che si colloca tra immaginari, discorsi e pianificazione territoriale in cui le aree interne vengono lette nel loro essere “geografie complesse: frammentate, esplose e riconfigurate” (p. 24). Un lavoro minuzioso che riassume l’analisi del 2023 in geografia, guidando nella comprensione di come le politiche e le progettazioni su varie scale producano il territorio non solo nella materialità, ma anche negli immaginari. Un volume che è anche una “cassetta degli attrezzi” per la lettura geografica del territorio, includendo categorie, strumenti, storie e casi che compongono il processo di territorializzazione della Strategia Nazionale sulle Aree Interne (SNAI). Per farlo, l’autrice mette insieme con competenza e profondità aspetti che spaziano dal processo politico da cui derivano queste azioni alle storie minute della quotidianità tra le geografie dei Sicani, “la Sicilia fredda”. Ne risulta un testo sfaccettato, che non parla solo al mondo della ricerca ma anche ai *policy makers*, sindaci e amministratori, chiamati ad attuare una politica pubblica innovativa che ambisce a essere partecipativa e dal basso, richiedendo un forte sforzo immaginativo nel governo

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del territorio. Da qui l'importanza di comprendere il ruolo del discorso nei processi di territorializzazione delle aree interne.

Per accompagnare la lettura attraverso questa complessità, il libro è strutturato in quattro parti. Nella prima, la metafora del fiume conduce in un viaggio temporale tra racconti e discorsi che hanno definito le "aree interne" dagli anni Cinquanta, a partire dalla metafora dell'"osso e la polpa" di Rossi-Doria, fino al discorso contemporaneo della SNAI: un fiume in piena nel discorso attuale. Quest'ultima è analizzata come politica ma anche come processo di riterritorializzazione che ha trasformato le aree interne in una categoria geografica. Sabatini apre così la strada a una miriade di future possibili analisi di geografia critica, sviscerando le geometrie di attori, il modello di governance e il tipo di aggregazioni territoriali caratterizzanti le aree interne. Nel secondo capitolo, l'autrice approfondisce l'aspetto metodologico offrendo una vera e propria "cassetta degli attrezzi" che re-centralizza la geografia, la spacchetta, la innova riprendendo grandi classici come la teoria del discorso di Foucault, portata a sporcarsi i piedi di fango con Frémont. Ne emerge una lettura critica, innovativa e profonda del concetto di aree interne, che valorizza la geografia e il lavoro sul territorio come metodo per analizzare come i discorsi modellino visioni, relazioni di potere e ideologie sul piano locale. Il viaggio diventa poi spaziale, esplorando i processi di territorializzazione legati al turismo, nelle geografie molteplici della "Sicilia fredda", quella dei Sicani. Qui l'autrice analizza i discorsi che hanno territorializzato (e territorializzano) quest'area, "visibile-invisibile", ai margini dei margini nei discorsi regionali e nazionali. Lo fa approfondendo non solo la geografia politica ed economica dei Sicani, ma anche approfondendo la presenza e l'impatto di un attore cruciale: il Gruppo di Azione Locale (GAL) come ente intermedio attivo nello sviluppo rurale nell'area da vent'anni, i progetti che ha supportato, e come ha contribuito alla territorializzazione e alla produzione del discorso turistico intorno ai Sicani. L'analisi approfondita, curata, multilivello e stratificata che emerge da questo capitolo mette a terra, attraverso la pratica, quanto spiegato come teoria e metodo. Racconta di territorio in rivalsa che, tra tentativi di innovazione ed errori, cerca di emergere per rispondere alla chiamata di una Strategia nazionale (la SNAI) che gli chiede di essere connesso, di avere servizi, di essere attrattivo per i turisti. Infine, l'ultimo capitolo, affonda l'attenzione nel "*Sicani- telling*", ovvero la raccolta delle storie di restanza e pratiche di turismo esperienziale. Racconti che, senza la pretesa di offrire un'assoluta verità e conoscenza del territorio, attraverso storie minute accompagnano nei dettagli, nei rigagnoli del territorio, che sfuggono alle logiche delle grandi politiche. Narrazioni di azioni su scala micro-locale che hanno una forte azione trasformativa sui luoghi e che, a loro modo, sono legate al tema delle aree interne anche quando non connesse strettamente a un discorso politico e strategico. Un capitolo che fa emergere le *small stories* locali e ispira su come raccontare e valorizzare i molti lavori sul campo di ricercatori e ricercatrici in geografia, facendo conoscere un territorio e dandogli voce attraverso il linguaggio narrativo nel raccontare la ricerca sul campo. Un capitolo che nella semplicità della lettura esprime tutta la complessità del ruolo della geografa che sceglie di lavorare con i piedi nel fango, dove emerge forte e deciso il bisogno di ricollocare la geografia stessa come strumento di comprensione della complessità territoriale.

Non da ultimo, è un'azione politica: riporta al centro le aree interne meridionali, quelle montagne di mezzo del Sud poco attenzionate, stimolandone l'esplorazione, ricollocandone

sulla mappa e fatte emergere dall'omologazione delle strategie e dalla fredda lettura politica. Viene restituita la voce ai territori, vengono riannodati alle narrazioni, riemergono e trovano spazio. Verso la fine di questo profondo viaggio, la riflessione atterra sul ruolo del turismo rurale esperienziale, visto come fondamentale, ma anche incatenante. Il turismo, presentato come chiave dello sviluppo nei territori ai margini è quel mulinello del fiume in cui i discorsi si imbrigliano e faticano ad uscire dalla pretesa di valorizzazione che poco ha a che fare l'abitare quotidiano. Per tutto questo, è un volume che si presta come guida allo studio della geografia, portando chi si approccia alla ricerca ad immergersi con i piedi nel fango nei temi e nei luoghi, ma anche per chi volesse cogliere il senso più profondo del discorso sulle aree interne. È uno strumento per allargare lo sguardo su una terminologia diventata ormai quotidiana, ma che ha ancora bisogno di attrezzi per essere compresa.



Book review

First published online: December 30, 2024

Roberta Gemmiti*

BRESSAN GIORGIA (A CURA DI), CONOSCERE I CASTELLI ROMANI. RISORSE, ATTORI E PROSPETTIVE, BOLOGNA, PÀTRON, 2024, pp. 164

Curato da Giorgia Bressan, questo volume è dedicato ai Castelli Romani, area molto nota e di grande interesse naturalistico e storico, tradizionalmente oscurata dalla presenza dell'ingombrante e vicina città di Roma.

Il libro è finalizzato a mettere in luce i tanti caratteri pregevoli e le notevoli potenzialità dell'area, raccontandone gli elementi peculiari e, al contempo, riconducendo il territorio ad un unicum attraverso la lettura del suo patrimonio; si rivolge dunque a chi è interessato a conoscere l'area ma, soprattutto, ai decisori pubblici e agli operatori privati, a coloro che hanno desiderio e strumenti per valorizzarla.

Ne nasce una raccolta di saggi riferibili principalmente alla geografia, anche se completati da interventi di letteratura italiana e archeologica. Dopo l'introduzione della curatrice Giorgia Bressan, si parla del rapporto con Roma (S. Bozzato), della storia e del ruolo dell'Ente Parco (V. Baldassarre), della ricchezza di biodiversità nel processo di valorizzazione locale (F. Olivieri e B. Cesarini), del turismo esistente e potenziale (G. Bressan), del percorso possibile di sviluppo nel settore dei prodotti tipici (B. Cesarini e G. Di Rosa), del paesaggio agrario (J. Manni), degli eventi sportivi nell'area (M. Cinti), della letteratura e delle rappresentazioni offerte in letteratura (F. Nardi, M. Palese, S. Di Schiavi), della ricca storia degli scavi archeologici (M. Pisani e F. Fasoli).

Pur essendo un libro a più voci disciplinari, si riconosce l'impronta della geografia nella ricerca del sistema territoriale locale, nel tentativo di individuare quegli agganci, quelle

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“prese” attraverso le quali gli operatori locali possono promuovere, rigenerare, rilanciare il sistema territoriale rafforzando la sua capacità di comportarsi come un “attore collettivo”.

Anche per questo, come chiarisce la curatrice nell'introduzione, vale ancora la pena occuparsi dei Castelli Romani nel 2024, perché sono rappresentativi di potenzialità e rischi, ma anche di capacità di innovazione dimostrata dagli attori locali in diverse misure e pratiche.

A proposito di minacce e opportunità, Roma incombe sui Castelli Romani, e la curatrice è stata brava nell'evitare il rischio che il volume finisse per essere incentrato sul rapporto tra la città e l'area.

La Capitale ha invece il giusto peso, perché il problema è affrontato quasi soltanto nel saggio di Simone Bozzato, dove si cerca di mettere in chiaro la dinamica demografica e insediativa in atto tra Roma e i Castelli. La Capitale è ancora una presenza ingombrante, schiacciante in termini di superficie, popolazione ed economia; i comuni dei Castelli sembrano essere ancora molto dipendenti, per motivi occupazionali, dalla vicina città e in generale da aree esterne, che attraggono quotidianamente in media la metà dei residenti. Tanti sono gli aspetti critici di questo rapporto con la vicina Capitale e, in questo senso, l'attività del Parco, grande protagonista del volume, è molto apprezzabile. Il ruolo degli Enti preposti alla tutela di un territorio sottoposto a così forti pressioni si conferma imprescindibile.

Pur all'interno di questo quadro complesso, sembrano esservi diverse opportunità di sviluppo, e il volume riesce nell'intento di metterle a fuoco: il patrimonio archeologico, la natura e la biodiversità, i prodotti tipici e le eccellenze agroalimentari, il vino e l'olio, la storia e la cultura narrate da scrittori e poeti italiani ed europei.

Gli aspetti più indagati sono ovviamente il turismo, del quale la curatrice ha voluto occuparsi personalmente. Da questo punto di vista, l'approssimarsi dell'evento Giubileo 2025 nella Capitale rischia di essere l'ennesima occasione di “sfruttamento” da parte del centro di tutte le aree periferiche, sia interne che esterne alla città. Questo non deve accadere, perché la globalizzazione ha accelerato la capacità del turismo di appropriarsi del valore e snaturare i territori sui quali si dirige.

Gli attori, non soltanto istituzionali, e la costruzione di una comunità in grado di produrre innovazione economica e sociale locale sono giustamente posti al centro del volume, ed è su quello che sembra suggerire la direzione verso la quale lavorare ed investire.



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