Quantitative Methods to Measure Attitudes Toward Immigrants and National Identity

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"Siamo tolleranti e civili, noi italiani, nei confronti di tutti i diversi. Neri, rossi, gialli. Specie quando si trovano lontano, a distanza telescopica da noi."

INDRO MONTANELLI

"We Italians are tolerant and civil towards everyone who is different. Black, red, yellow. Especially when they are far away, at a telescopic distance from us."

INDRO MONTANELLI

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Abstract

Immigration has always been a very important dynamic phenomenon. In the 19th century, the United States experienced massive immigration from the United Kingdom, Germany and Scandinavian countries. Between the first and the second post-World War, emigration has become a very widespread phenomenon among all European countries, especially among countries that were neutral in warfare or towards American countries, such as the case of Italian emigration to Argentina (Keeling, 1999).

The political and social climate of recent years has caused a hot debate on the issue of immigration. The advance of the extremist political parties that defend the national identity has triggered a social conflict between the supporters of welcoming refugees and those who, on the other hand, support a defense of the country from the economic and cultural threat of newcomers. (Alonso and Fonseca, 2012) .

The nationalist escalation in the political scene in recent years has reshaped citizens' attitudes towards immigrants. Many researchers have studied this phenomenon and how it changes according to political orientation and other socio-economic characteristics (Martín and Indelicato, 2021).

In this context, the literature on studies of attitudes towards immigrants and national identity has mainly used two approaches: the Structural Equation Model (SEM) and the Confirmatory Analysis of Factors (CFA). Both approaches are based on measurement models in which latent variables are obtained using econometric models adapted to the observed elements (Meuleman, 2021; Thomsen, 2018).

The aim of this study is to bring a new methodological point of view to the study of social sciences, in particular on the study of attitudes towards immigrants and nationalist sentiment. This work introduces multivariate analysis approaches, such as Data Envelopment Analysis (DEA) and Fuzzy Set Theory (FST). First, the DEA provides a synthetic indicator of openness to immigrants and refugees. FST is used to transform vague information provided by questionnaires into crisp information. Thus, synthetic indicators are obtained that measure the anti-immigrant sentiment and the national identity value of citizens, through the Technique for Order Preference by Similarity Ideal Solution (TOPSIS).

The data used in this doctoral thesis project were extracted from two databases used frequently in research studies, the European Social Survey (ESS) and the International of Social Survey Program (ISSP). Round 8 and round 9 of the ESS

immigration modules and ISSP national identity modules 2003 and 2013 were used. The results show that both attitudes towards immigrants and national identity are shaped by the individual social and economic characteristics of citizens. The northern European regions and the Iberian Peninsula show greater openness towards immigrants. Furthermore, through the Apostle Method, national identity has been divided into four sub-categories according to two criteria, ethnic and civic.

List of Abbreviation

Table 1: Abbreviations

	Abbreviation
Attitudes Toward Immigrants	ATI
Citizens' Openness Index Towards Immigrants	COITI
Citizens' Openness Index Towards Immigrants and Refugees'	COITIR
Data Envelopment Analysis	DEA
Technique for Order Preference by Similarity Ideal Solution	TOPSIS
Openness Towards Immigrant Synthetic Indicator	OTISI
Fuzzy Hybrid Approach	FHA
Fuzzy Set Theory	FST
Structural Equation Model	SEM
Confirmatory Factor Analysis	CFA
European Social Survey	ESS
International Social Survey Programme	ISSP

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This work is the conclusion of years of many efforts and sacrifices and many satisfactions. Many times, I thought I would not make it, but thanks to the passion and the people who supported me I went ahead.
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Fortunately, I have always had the support of my tutor and thesis director, Professor Juan Carlos Martín, who has always been a guide and has always managed to give me the support to continue and to do better, even in times when I could produce nothing. I also have to thank my tutor for the master's thesis, Professor Aura Reggiani, who pushed me on this adventure.
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Thank you.

1

Introduction

1.1 Context and concepts

The European borders are facing a long intense period of immigration flows. The Afghan crises, the Arab Spring, the war in Syria and the Russian invasion of Ukraine are strongly fueling a rapidly growing demographic phenomenon(Yıldız, 2016).
According to Ravenstein (1889), the driving forces of immigration are economic reasons, family reunification and the attraction of large urban centers. Despite this, since the last century, many immigrants have been moving for war reasons. Many events had characterized the migration phenomenon, such as the European migration to America, during the two post-world war, as well as the Albanian exodus to the Adriatic coasts of southern Italy. Also, in the early 2000s, conflicts in the Middle East prompted thousands of Afghans and Syrians to flee to European destinations. As well as the Russian invasion of Ukraine which caused more than seven million refugees.
Consequently, the social and political debate has flared up in recent years on the issue of welcoming immigrants and refugees. Citizens' views on immigrants have always been favorable, but in recent years they are undergoing changes. The invasion announced by right-wing extremists and the succession of Islamic terrorist attacks, such as Madrid, London 2005, Charlie Hebdo 2015, and Paris 2018, have reshaped citizens' perceptions toward immigrants (Bar -Tal and Sharvit, 2004; Ben-Ezra, Leshem, and Goodwin, 2015; Huddy et al., 2005; Miguel-Tobal et al., 2006; Skitka, Bauman, and Mullen, 2004; Vasilopoulos, Marcus, and Foucault, 2018).
According to various researchers, attitudes towards immigrants are often modeled by the socio-economic characteristics of citizens (Bail, 2008; Czymara, 2021; de Vreese, 2017; Martín and Indelicato, 2022). In fact, studies at the European level show that the northern central countries of Europe are more open to immigrants than the countries of Eastern Europe. Despite this, Martín and Indelicato (2021) identify the Iberian Peninsula as the most open European region for newcomers.
Religion has been used many times as a proxy to measure relations between natives and immigrants (Marfouk, 2019). Belonging to one religion or another is crucial in modeling the attitudes of citizens towards immigrants. Results show that the majority religion in European countries, the Roman Catholic, shows a negative relationship with indicators that measure citizens' attitudes toward immigrants. In

this context, Kerwin and Alulema (2021) explain that many Catholics find it difficult to align with the teachings of the Catholic Church.
The increase in migratory flows has also involved the European political scene. Governments have had to face exploitation of extremist forces in defense of borders. In fact, in recent years, the extreme European leaders, Marine Le Pen, Viktor Orban, Santiago Abascal and Giorgia Meloni, have increased their electorate. They have gathered a common discontent and the perception of the socio-economic and cultural threat of immigration (Alonso and Fonseca, 2012). In this context, the defense of national identity threatened by immigration has become the main point of the political agenda of many far-right movements. (Tamir, 2020).
Despite this, national identity has been the subject of theoretical contrasts by various scholars. Kunovich (2009) highlights that national identity is mainly characterized by citizens who associate national identity with civic criteria and those who view it as an ethnic issue. On the other hand, Custodi (2021) states that national identity can refer to moral criteria and the feeling of belonging to a community. Medrano (2005) provides a first broader overview of national identity which not only includes the classic ethnic/civic duality of national identity, but provides a definition for those who consider both criteria important, creedentialists, and those who do not consider important the ethnic and civic criteria for being part of a national community, the postnationalists.
Hlavac (2017) and Tamir (2020) argue that the defense of ethnic and cultural identity is typical among the discourses of far-right populists. They argue that the movements of Marine Le Pen and Giorgia Meloni find the blame for internal economic and cultural crises in immigration. On the other side, Custodi (2021) defines the Spanish left extremists of Podemos as those who do not cling to any criteria in the construction of national identity. Thus, following Medrano's (2005) theory, the two political extremes represent ethnic-oriented and post-nationalists respectively. Other studies reveal that the association with credentialist behaviors of national identity are associated with the two great world powers, the United States and Russia (Indelicato and Martín, 2022; Kolstø Blakkisrud, 2016), while Kunovich (2009) shows that the dichotomy of ethnic-civic represented by Germany and France is obsolete, as both countries together with the northern European countries represent the national civic identity.

1.2 Objectives

The methodology used in the field of social sciences often involves regression models, Structural Equation Model (SEM) or Confirmatory Factor Analysis (CFA). Despite the great academic successes in the social sciences, and, in particular, in the study of attitudes towards immigrants (ATI) and national identity, the literature does not present advances in the methodologies used.
Although SEM and CFA prove to be useful approaches in the social sciences, opening up to new methodological frontiers can be interesting. Therefore, this dissertation aims to introduce new mathematical approaches in the study of attitudes towards immigrants and national identity. Thus, the work introduces the Data Envelopment Analysis (DEA), the Fuzzy Set Theory (FST) and the Apostle Model theory to analyse the citizens' attitudes towards immigration and national identity.
The other research questions of the project can be summarized as follows:

- Can attitudes towards immigrates be shaped by individual socioeconomic characteristics?
- Can political orientation influence anti-immigrant sentiment?
- Is there a territorial influence at the regional level in the behavior of citizens towards immigrants?
- Are there other types of national identity beyond the well-knows ethnic/civic dichotomy?

1.3 Structure of the chapters

The work deals with two closely related themes: citizens' attitudes towards immigrants and national identity. As said, the main contribution and novelty of the work are based on the methodological approach, so the next chapter will be dedicated to illustrating in detail the methodologies used. Afterwards, five papers will be presented, three of them have already been published and the other two are under

review in indexed international journals. Therefore, the first paper proposes the introduction of the DEA methodology in the field studied. Subsequently, the second article introduces the theory of Fuzzy Sets in the study of attitudes towards immigrants. The third article already under review offers a territorial overview of the ATI comparing the results between continental and island regions. The fourth article focuses on the methodological comparison between CFA and FST in the study of national identity. The fifth article provides a broader overview of the definition of national identity widening the ethnic/civic dichotomy concept. Finally, the work concludes with a chapter dedicated to the conclusions and discussions of the main results obtained.

2

Data and Methodology

2.1 Data

Data for this work was mainly provided by two major databases that have been largely used in social science: the European Social Survey (ESS) and the International Social Survey Program (ISSP).
In addition, some papers included in the dissertation used data from other external sources, such as the Economist Intelligence Unit, Universal Declaration of Human Rights, Eurostat and election data provided by the Interior Ministries of each analysed country. These sources were useful for comparing the results between ATI, national identity and indices that measure other important social latent variables or concepts, such as democracy, civil rights, freedom in the country, the net migration rate and the voting rates obtained by far-right parties for each country.

2.1.1 European Social Survey

The European Social Survey (ESS) is a biennial social science survey study program. The survey measures the attitudes and behaviours of citizens of more than thirty countries.
The study uses round 8 and round 9 questionnaires and nine indicators were used to analyse the citizens' attitudes towards immigrants.
The first three indicators are related to the special characteristics of the immigrants allowed to come to the country. These indicators are based on the following three questions: To what extent do you think [country] should allow people:

- of the same race or ethnic group as most [country]'s people to come and live here?
- of a different race or ethnic group from most [country] people to come and live here?
- 'from poorer countries outside Europe to come and live here?

The answer format is based on a semantic scale with the following response options: (1) Allow many to come and live here; (2) Allow some; (3) Allow a few; and (4) Allow none. Thus, the responses constitute a plausible index of opposition to immigration. Since the aim is to measure a composite indicator of openness to migratory attitudes,

the scale is inverted for the three indicators.
Then, three additional indicators were selected to analyze the perception of citizens on the effects that immigrants have on the economy and culture. These indicators are:

- immigration is bad or good for the country's economy.
- country's cultural life is undermined or enriched by immigrants.
- immigrants make the country a worse or better place to live.

The answer format for the three indicators is based on 11-point Likert scales anchored in the extreme points, where 0 means bad, undermined or worse; and 10 means good, enriched or better.
Finally, the three indicators that measure attitudes towards refugees are:

- Governments should be generous in judging applications for refugee status.
- Most refugee applicants are not in real fear of persecution in their own countries.
- Granted refugees should be entitled to bring close family members.

The answer format is based on a 5-point Likert scale (1. Agree strongly; 2. Agree; 3. Neither agree nor disagree; 4. Disagree; 5. Disagree strongly). In this case, the first and the third indicators have an inverse relationship with having a positive attitude towards the refugees, and for this reason, they are finally reverse recoded.

2.1.2 International Social Survey Programme

The ISSP is a social survey program organized in different modules, carried out by universities and research institutes. The dissertation uses the module of the National Identity for the waves 2003 and 2013. In both waves, there are questions related to citizens' attitudes towards immigrants and national identity.
The analysis of ATI is based on eight different items that measure the citizens' perception of the threat caused by immigrants regarding the safety, economy, traditions and culture of the country. The answers were extracted from the following questions:

- Immigrants increase crime rates.
- Immigrants take jobs away from people born in [Country].
- Legal immigrants should have the same rights.
- Immigrants are generally good for the economy.
- Immigrants bring new ideas and cultures.
- Immigrants undermine the culture.
- Illegal immigrants should be excluded.
- Legal immigrants should have equal access to education.

All items are answered on an anchored 5-point Likert scale, where one refers to "Strongly agree" and five refers to "Strongly disagree". Items 1, 2, 6 and 7 have been reverse recoded, so that higher scores express a positive attitude towards immigrants. With the aim of analyzing citizens' feeling of national identity, eight other indicators were introduced. Each of these measures the corresponding importance of ethnical and civic issues of the national identity. The questions are:

- born in (country);
- have the citizenship (of the country);
- have lived in (country) for most of their life;
- speak the (country) language;
- to be (religion);
- respect political institutions and laws (of the country);
- feel (nationality of the country);
- have (nationality of the country) ancestors

The parenthetical expressions of each item were converted in each country by the respective country name, majority religion and nationality. For example, in the case of Spain, the questions were worded as follows: Some people say that the following things are important for being truly Spanish. Others say that they are not important. How important do you think each of the following is (To have been born in Spain; To have Spanish citizenship; To have lived in Spain; To be able to speak Spanish; To be a Catholic; To respect the political institutions and laws of Spain; To feel Spanish; To have Spanish ancestry. All the questions were answered according to a 4-point semantic scale where 1 was very important; 2-fairly important; 3-not very important; and 4-not important at all. All the answers were reverse recoded to express the degree of importance that each citizen gave to each item to be a truly national.

2.2 Data Envelopment Analysis

The literature on composite indicators states that simple mean or other functional forms based on equal weights are considered unweighted indicators. On the other hand, Data Envelopment Analysis (DEA) obtains the weights of individual indicators endogenously (Charnes et al., 1978) without any human interaction that could contaminate the weights in a spurious way.

Data Envelopment analysis (DEA) is a non-parametric technique developed to measure production efficiency. It is a linear mathematical program that is solved in an iterative way to obtain the efficiency indicator for a sample of decision-making units (DMU), in which the inputs and outputs of each unit are compared with a linear combination of inputs and outputs observed in the sample. (Charnes, 1978). Different assumptions about the flexibility of linear combinations and about orientation result in different DEA models. Cooper et al. (2007) can be consulted for more information on the different DEA methods that exist.

The first question to consider is whether partial indicators are inputs or outputs, and, normally, the following convention applies: input (the less, the better) and output (the more, the better). In some cases, there are no input or output vectors, so researchers must create a dummy output vector equal to one (or input) to apply a DEA model with the rest of the inputs (or outputs) (Lovell et al., 1995; Zhou et

al., 2007). Therefore, given i which represents the individual partial indicators and d represents the population groups under study, the mathematical program that calculates the synthetic indicator is the following:

$$SI_d = \underset{w_{id}}{Max} \sum_{v=1}^{n} w_{id} Ind_{id}$$
$$\text{subject to}$$
$$\sum_{v=1}^{n} w_{id} Ind_{id} \leq 1, d = 1, ..., n; w_{id} \geq 0$$

where Ind_{id} is the figure of the partial indicator i in each of the scales for the d group; and w_{id} refers to the weight obtained for the partial indicator i in the *syntheticindicator* of the d group. Furthermore, the indicators obtained are normalized to one, so that the higher the score, the better is the d group performance.

2.3 Fuzzy Set Theory

2.3.1 The Fuzzy Topsis hybrid method

The vagueness associated with subjective assessments, such as in questionnaire responses, is a difficult problem to handle when researchers aim to find synthetic indicators. However, fuzzy logic models result an appropriate tool for partially resolving the vagueness associated with linguistic terms (Behdioğlu et al., 2019; Martínez et al., 2020). These models deal with ambiguous information by deconstructing the concept of objective information to a degree of different strengths. The degree of intensity is conceptualized by a membership function, also called characteristic functions, discriminant functions, or indicator functions (Martin et al., 2022).
This method consists of 6-consecutive steps, which are summarized as follows:

1. Convert the information per respondent into triangular fuzzy numbers TFNs.
2. Estimate the average TFNs per group of analysis and item.
3. Estimate the crisp values for each group of analysis (Defuzzification).
4. Determine the positive and negative ideal solutions.
5. Measure the distances of each group of analysis with respect to the ideal solutions.

6. Calculate the synthetic indicator as the relative distance of each observation with respect to the ideal solutions.

FST is applied to handle the vagueness of the information provided by answers given to the questionnaire. First, the provided scales are converted into Triangular Fuzzy Numbers (TFNs). Triangular fuzzy numbers are characterized by a triplet (a_1, a_2, a_3) of real numbers. Thus, each point of the semantic scale will be assigned to a TFN. A TFN $\tilde{A}$ is usually parametrized as follows:

$$\mu_a(x) = \begin{cases} \frac{x-a_1}{a_2-a_1} & a_1 \leq x \leq a_2 \\ \frac{x-a_3}{a_2-a_3} & a_2 \leq x \leq a_3 \\ 0 & otherwise \end{cases}$$

The responses scales provided by the respondents are transformed into TFNs characterized because the universe of discourse is within the interval [0, 100]. The interval of the discourse is chosen for clarity without loss of generalization. The 3-uples that represent the vague information usually intersect in some interval. Fuzzy Set Logic Algebra facilitates the aggregation of TFNs. The algebra of TFNs is applied here to calculate the average fuzzy number of n TFNs $A_i = \left(a^{(i)}_1, a^{(i)}_2, a^{(i)}_3\right) (i = 1, ..., n)$ as follows:

$$\tilde{A} = (a_1, a_2, a_3) = \left(\tfrac{1}{n}\right) \bigotimes \left(\tilde{A}_1 \bigoplus \tilde{A}_2 \bigoplus ... \bigoplus \tilde{A}_n\right) = \left(\frac{\sum_{i=1}^{n} a^{(i)}_1}{n}, \frac{\sum_{i=1}^{n} a^{(i)}_2}{n}, \frac{\sum_{i=1}^{n} a^{(i)}_3}{n}\right)$$

where $\bigotimes$ stands for the external multiplication of a scalar and a TFN, and $\bigoplus$ is the internal addition of TFNs (Buckley, 1985). The properties of the algebra guarantee that the average of TFNs is also a TFN.

Thus, a matrix of TFNs is obtained. This matrix is known as the TFN information matrix, and it contains a lot of information that is difficult to analyse. For this reason, a defuzzification of the matrix is carried out to synthesize the information (Kumar, 2017). Thus, the fuzzy information matrix will be converted into a plausible real number or crisp value information matrix as uncertainty and information vagueness have been adequately handled.

Kaufmann (1996) provides a defuzzification method by calculating the weighted average of the 3-uple that represents the respective TFN of the fuzzy information

matrix. Thus, we give more importance to the value that, according to fuzzy logic, contains more truth. Therefore, the defuzzified value is obtained as follows:

$$v_{\tilde{A}} = \frac{(a_1+2a_2+a_3)}{4}$$

Kaufmann and Gupta (1988) named this approach the centroid method. It turns out to be a simple method, robust and with good properties (Martín et al., 2016; 2019).

TOPSIS

TOPSIS was first proposed by Hwang and Yoon (1981). As explained above a crisp information matrix V has been obtained. This matrix contains the defuzzified value for each item and population group. Thus, it is possible to obtain the positive and negative-ideal solutions. Following Behzadian et al. (2012), all the items are recoded as benefit values. Thus, the positive ideal solution is obtained by the maximum figures observed in the matrix. Following the same logic, the negative ideal solution is characterized by the minimum figures. Mathematically, the positive and negative ideal solutions are measured, respectively, as follows:

$$A_i^+ = \{(maxV_{ij}, j = 1, 2, ..., groups)\}, i = 1, 2, ..., items$$
$$A_i^- = \{(minV_{ij}, j = 1, 2, ..., groups)\}, i = 1, 2, ..., items$$

Once the positive and negative ideal solutions are obtained, the TOPSIS approach measures the Euclidean distances between each group observation and the ideal solutions. The Euclidean distances, S_j^+ and S_j^-, and synthetic indicator is calculated as follows:

$$S_j^+ = \sqrt{\sum_{i=1}^{items} \left(A_i^+ - V_{ij}\right)^2}$$

$$S_j^- = \sqrt{\sum_{i=1}^{items} \left(A_i^- - V_{ij}\right)^2}$$

$$CC_j = \frac{S_j^-}{S_j^+ + S_j^-}$$

The TOPSIS's logic is clear because the indicator is higher for those groups closest to the positive ideal solution and further away from the negative ideal solution (Martín et al., 2016; 2019).

2.3.2 Fuzzy Clustering Analysis

TOPSIS indicator can be calculated not only at aggregated levels. The indicator can be measured at individual level too. It can be possible if step-2 of the stage presented in the preview section is omitted. Thus, the membership function can determine the degree of similarity that each citizen has with respect to a representative citizen profile (Kruse et al., 2007). Fuzzy cluster analysis segmentation extends that of the Bagged Cluster algorithm introduced by Leisch (1999). Hence, the C-means fuzzy algorithm for fuzzy data can be expressed as follows:

$$\begin{cases} min : \sum_{i=1}^{n} \sum_{c=1}^{C} u_{ic}^{m} d_F^2 \left(\tilde{x_i}, \tilde{p_c}\right) = \sum_{i=1}^{n} \sum_{c=1}^{C} u_{ic}^{m} \left[w_2^2 \left\|a_2^i - p_2^c\right\|\right] + \\ +w_1^2 \left(\left\|a_1^i - p_1^c\right\|^2 + \left\|a_3^i - p_3^c\right\|^2\right]) \\ m > 1, u_{ic} \geq 0, \sum_{c=1}^{C} u_{ic} = 1 \\ st \\ w_1 \geq w_2 \geq 0, w_1 + w_2 = 1 \end{cases}$$

Where $d_F^2 \left(\tilde{x_i}, \tilde{pc}\right)$ is the squared fuzzy distance between the ith citizen and the profile of a set of representative citizens $x_i \equiv (a_{1ik}, a_{2ik}, a_{3ik}) : k = 1...K$ (K is equal to the number of items) where the vector represents the TFN assigned to the information provided by the i-th citizen (Martín et al., 2020).
$\tilde{p_c} \equiv \left\{p_{ck} = (\tilde{p_{1ck}}, p_{2ck}, p_{3ck}) : k = 1...K\right\}$ represents the TFN provided by the representative citizen of the cth cluster, while the expression $\left\|a_2^i - p_2^c\right\|^2$ is the squared Euclidian distances between the centers of the TFN vectors of the ith citizen and the representative citizen of the cth cluster. The squared Euclidian distances between the left and right extreme components of the TFN vectors of the ith citizen and the representative citizen of the cth cluster are represented by $\left\|a_1^i - p_1^c\right\|^2$ and $\left\|a_3^i - p_3^c\right\|^2$. In addition, $w_1 \geq w_1 \geq 0$ are suitable weights respectively for the center, and extreme components for the fuzzy distance considered, and the weighted exponent that controls the fuzziness of the obtained partition m is larger than one. Thus, the membership degree of the ith resident in the cth cluster is given by and it is obtained by the Lagrangian minimization problem. For more information on cluster validation and cluster profiles, consult (D'Urso et al., 2013, 2015, 2016).

2.4 Apostle Model

The "Apostle model" is demonstrating to be a new frontier in the study of ecology of invasive species, endangered species, and keystone species (Schaefer, 2013). The model has been studied firstly in the mid-1990s by Harvard Business School as a tool for improving the performance of an organization that offers a product to customers (Jones Sasser, 1995).
This approach was used to compare the customer loyalty and satisfaction relationship (Figure 2.1), and it is a good tool to categorize the customers' typology according to the existing relationship that exists between the two latent variables satisfaction and loyalty. Thus, consumers are divided into four categories. It identified the "Apostles", those who are very satisfied and very loyal customers; the "hostages", those customers that do not have any alternatives, the "mercenaries" as those who buy what is cheaper being satisfied and unloyal; and the "deserters" are neither satisfied nor loyal, so they would readily switch to other products (Hadi et al., 2019; Jones Sasser, 1995).

FIGURE 2.1: Apostle Model

Similarly to the apostle's model dimensions (loyalty and satisfaction), this project uses the apostle model logic to two dimensions of national identity such as ethnic and civic dimensions. Following Indelicato & Martín (2022) and Medrano (2005), it extends the classical apostle model with the fuzzy clustering method using an alpha

value of 0.5 to categorize each of the dimensions into four different classes. Thus, the four-quadrant apostle model is converted into a sixteen quadrant eco-extended national identity apostle model.
Let (e_1, e_2, e_3) and (c_1, c_2, c_3) be the vectors that represent the membership functions of the ethnic and civic national identity obtained through the Hybrid Fuzzy Clustering. Thus, citizens are pure credentialist if e_1 and c_1 are greater than 0.5, pure post-nationalist if e_2 and c_2 are greater than 0.5, pure civic oriented if e_2 and c_1 are greater than 0.5, and finally pure ethnic oriented if e_1 and c_2 are greater than 0.5.

2.5 Other statistical approaches

2.5.1 Contingency Analysis

Contingency tables are used to determine whether the citizens' perception regarding any latent variable are independent of the covariates.
Pearson (1903) was the first author formulating contingency tables. He stated that a contingency table is a matrix that displays the (multivariate) frequency distribution of variables. They are widely used in survey research, business intelligence, engineering, and scientific research (Greenacre, 1988). It is a method that provides a primary picture of the interrelationship between two variables, and with its help, researchers can analyze the interactions between variables. Thus, the study analyses the degree of independence between the citizens' perception on some social latent variable and the covariates.
The chi-square independence test is used to analyze the contingency table of two categorical variables. The chi-squared test evaluates whether there is a significant association between the categories of the two variables. The cell results can be blue, or red. Positive residuals are in blue. The cells' positive values specify an attraction (positive association) between the corresponding row and column variables. Negative residuals are in red, implying a repulsion (negative association) between the corresponding row and column variables.

2.5.2 Conditional probability ratios

The method is used to analyze the relationship between citizens' perception and the covariates of interest. This approach is based on the fact that two events are independent, i.e. the probability of their intersection is given by the product of the single probabilities (Grimmett et al., 2014).
Theoretically, two events A and B are independent if and only if:

$$P(A \cap B) = P(A)P(B) \Leftrightarrow P(A/B) = P(A) \Leftrightarrow P(B/A) = P(B)$$

Thus, the conditional probability ratios can be calculated for each population group, on each covariate. If these ratios are significantly greater than one, it can be concluded that A and B are positively associated, and they are not independent. Similarly, A and B are negatively associated when the ratios are lower than one.
Thus, the method is based on the calculus of the following ratios:

$$R_{AB} = \frac{P(A \cap B)}{P(A)P(B)}$$

that will be used to analyze the relationship between the national identity categories and other sociodemographic categories of citizens.
The ratios are obtained through 1000 bootstrap subsamples obtained with replacement. Bootstrap is a well-known tool in statistics that is used for statistical inference. As Efron (1993), the idea behind the method is that if a sample approximates the population that generated it, then we can sample the sample to calculate a statistic of interest and measure its accuracy. Bootstrapping is useful when there is doubt that the usual distributive assumptions and asymptotic results are valid and accurate. Bootstrap is a non-parametric method that calculates estimated standard errors, confidence intervals, and hypothesis tests (Davison, 1998).

3

PAPER 1: A DEA MCDM Approach Applied to ESS8 Dataset for Measuring Immigration and Refugees Citizens' Openness

J.C. Martín, A. Indelicato

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Abstract

The current refugees' crisis is undermining the main government coalitions of many countries in the European Union (EU), and tolerant attitudes and open admission policies toward immigrants seem to be part of the recent past history. The dilemma is gaining a lot of media attention as the public and political debate on migration is now playing an important role in all the European elections. Thus, the aim of this paper twofold. First, an analytical tool is developed to measure two synthetic indicators: (1) the citizens' openness towards immigration for 23 countries—18 EU Countries, plus Iceland, Israel, Norway, Switzerland, and Russia—included in the 2016 European Social Survey; and (2) the citizens' openness towards immigrants and refugees for 22 countries (same set without Hungary). And second, the effects of political orientation of citizens over the last synthetic indicator (immigrants and refugees) are studied. The approach of Data Envelopment Analysis (DEA) will be adopted here, with the purpose of identifying which countries are more, or less, open to the phenomenon of immigration and refugees. The results show that the Nordic countries and leftist are those which show more openness to immigration and refugees.

Keywords: Immigration · Political parties · European Social Survey · Data Envelopment Analysis · Europe.

3.1 Introduction

Between 1850 and 1915, over 30 million of people moved from Europe to the USA. Until 1890, most of the immigrants came from British islands, Germany, and Scandinavia and since 1880 migration phenomenon from southern and eastern Europe steadily increased because the costs of migration fell down as the transport technology improved (Keeling, 1999).
Yıldız (2016) affirms that migration and refugees' crisis are becoming quite controversial in the EU by four main events that have affected the EU immigration policy, such as the 2004–2007 Eastern enlargement, the terrorist attacks 9/11, Madrid, London, Paris, the debate about the Welfare States and the refugee crisis (Arab spring and Syria civil war).
With the increase of immigration to Europe, the political scene is changing too. Indeed, in the recent political elections, much of nationalist and anti-immigrant parties are showing up in European and National Parliaments. Some examples are Orban in Hungary where his government built a wall in his southern border, Marine Le Pen, with her nationalist ideas, is now the most voted party in France and Matteo Salvini, in Italy, where his antiimmigrant policy is closing Italian frontiers to hopeless.
Aside to judge if the Orban-Le Pen-Salvini policies are bad or good for their countries, it would be more interesting to detect whether the citizens of the more open countries regarding migration have themselves different values about immigration and immigrants. Immigrants have historically been received without animadversion by the hosts residents but the perspective is changing with the recent trends of inflows in the EU affecting national parliaments and citizens alike.
Immigration has become an important topic in the recent political agenda of the EU (Grande et al., 2019). In 2015 Europe was seeing its greatest refugee flow since World War II in which more than 200,000 refugees and migrants risked their lives in overcrowded and unsafe boats crossing the Mediterranean Sea (UNHCR, 2015). The recent refugee influx is weakening several European Union (EU) nations' key governing coalitions, but liberal views and open admittance policies to immigrants appeared to be a part of modern history (European Parliament, 2017; Geddes and

Scholten, 2016). Nevertheless, the welcoming and unwelcoming dilemma was receiving a lot of media attention (Berry et al., 2015). Thus, Greco and Polli (2020) contend that, at this point, migration has become crucial and relevant not only on the European political agendas, but also in a more general public debate.

For this reason, the aim of this paper is to analyse the immigration openness of 23 European countries, 17 EU Countries plus Iceland, Israel, Norway, Switzerland, Russia, and the UK. Specifically, this research provides an approach to construct a synthetic indicator that measures the immigration openness of the citizens of the countries under analysis. In addition, the study is extended to analyse the openness towards immigrants and refugees for 22 countries as Hungary could not be included in the dataset according to the political orientation. Using this political perspective, the paper fills an important gap in the literature as to date there are no studies analysing this relationship, and we contend that the result could affect the way that new extreme oriented parties can get more support for the next election polls in the EU.

Using a taxonomy of political orientation based on four categories, extreme-left, centre-left, centre-right, and extreme-right, we examine whether the immigration-refugees openness is affected by the political orientation. Thus, it can be seen if some anti-immigration attitudes can be connected with the support for extreme-right political parties that are associated with the re-appearance of nationalist ideologies that can also contribute to anti-Muslims and general animadversion towards immigrants (Braun, 2011; Rydgren, 2008; Taras, 2012).

The present paper is divided as follows. In Section 2, some context of previous studies concerning the migration phenomenon will be presented. Section 3 describes the data and the sources used in the study. Section 4 presents the methodology used in the study, Data Envelopment Analysis (DEA) that will be applied to the data according to two different scenarios: immigration (6 indicators) and immigration-refugees (9 indicators). In Section 5, the results will be presented analysing the obtained indicators for the countries and the countries-political orientation; the relationship between the citizens' openness index towards immigrants and refugees (COITIR-9 indicators) and other interesting variables such as democracy index, civil liberties, freedom index, far-right parties' representativeness, net migration, and foreign-born residents, will also be presented. Section 6 will end the paper with

the main conclusions by providing some reflections on the results emerging from the analysis and suggesting indications on future research directions.

3.2 Theorical Background

Ravenstein (1889) stated "Of course I am perfectly aware that our laws of population, and economic laws generally, have not the rigidity of physical laws, as they are continually being interfered with by human agency" (p.241). Despite this, he was one of the first researchers to study immigration from a scientific and statistical approach. He was the inventor of the nowadays called the "Laws of Immigration". Through these 12 "laws", Ravenstein (1885), affirms that people prefer to move to nearby places and in large industrial and commercial centers. In addition, he defines the profile of the person who emigrates as a country person, man, and adult. Another crucial law by Ravenstein (1885) states that large centers grow more because of immigration than the birth rate among the natives. About that, in the 19th and 20th centuries, a great wave of immigration from the European continent invaded North America. For this reason, the USA knew the first restricted visions on immigration issues, which were later portrayed, after World War II, due to the low percentage of births (Espenshade, 1995; Simon, 1985; Zolberg, 2006).
However, now Ravenstein's laws cannot be sufficient to explain the current migratory flow. According to the European Commission's Report on Statistics on Migration to Europe (2020), in 2019, almost 270 thousand people fled the war in their countries and emigrated to Europe to request political asylum, while 125 thousand people crossed borders illegally, and among them, almost 87 thousand people arrived in the European coasts. This phenomenon of new forms of immigration is also due to the Afghan crisis that began at the beginning of the 21st century and the Arab Springs that began in Tunisia in 2011 and that spread to Egypt, Yemen, Bahrain, Morocco, Yemen, Libya, and Syria (Balcilar and Nugent, 2019). Thus, the migration crisis began to be characterized by large flows of asylum seekers and illegals from Syria, Afghanistan, Iran, and other war-torn African countries (Heath & Richards, 2019). According to Slominski and Trauner (2018), the new refugee migration crises caused that asylum applications will be multiplicated, but especially in four countries within the European Union: Germany, Hungary, Sweden, and Austria. Germany decided

to temporarily suspend the conditions of the Dublin treaty for Syrians, but divergent interests within the EU have been particularly visible in its application, which provides reception responsibilities to the countries of the arrival of immigrants (Slominski and Trauner, 2018).

To avoid divergences, the German government, together with others northern EU countries, has pushed the use of financial and administrative resources provided by the EU to address the institutional deficit of the migration and asylum systems of Italy and Greece. This, however, was insufficient and the EU demonstrated not having sufficient instruments and competencies in social policy and immigration integration policies (Thym and Hailbronner, 2016).

A number of difficulties appeared in the EU to guarantee a common policy of immigration and refugees. For example, Germany, in 2015, began to adopt "asylum packages" to reduce social benefits for asylum seekers (Slominski and Trauner, 2018). It became evident that not all countries want to raise the costs of the Dublin treaty. Similarly, Hungary denied entry of asylum seekers from Austria under the Dublin rules (Zalan, 2016). According to the Austrian government, Hungary had to accept their applications, while the Orban government took advantage of the poor clarity of the Dublin treaty, and argued that asylum seekers in Austria should be returned directly to Greece or Bulgaria, where they first entered to the EU (Thym and Hailbronner, 2016).

Beyond what are the causes of immigration and refugees as well as how the phenomenon is handled by different countries, it is evident that immigrants and refugees have an effect in citizens' attitudes. The literature on attitudes towards immigrants focuses on some psychological and social factors as well as some structural social settings. Interesting psychological and social factors provide a more complete view of why and how people have certain attitudes about immigration, but only a few researchers incorporate them in the analysis (Berg, 2015). This is mainly due to the difficulty of finding adequate datasets that deal with attitudes towards immigration and refugees (Shapira, 2013).

In the literature, some studies have analysed the identity of people to detect the origin of negative attitudes towards specific groups. For example, authoritarian people, who distrust other groups, increase rigor and discipline-oriented authority (Allport et al., 1954). Therefore, a negative attitude is transmitted from an individual and is

directed outward to specific groups. Several studies analyse the differences between internal and external groups to explain attitudes towards immigration. In their models, they use people's status as predictors, such as racial identity, ethnicity, and belonging to certain political currents. Studies have highlighted how Latinos and Republicans in the USA tend to be pro and anti-immigrant, respectively, due to sociocultural and group-oriented political values (e.g., Barreto et al., 2009; Berg, 2010; Hawley, 2011; Rocha et al., 2011; Sanchez, 2006).

Thus, political values can play a determinant role in forming attitudes towards immigrants and refugees. According to Cohrs and Stelzl (2010), in Europe, but especially in Germany and Italy, people with anti-immigrant attitudes tend to be people with a right-wing authoritarian disposition. Moving from the individual level to the aggregate level, Semyonov et al. (2006, 2008) point out that the European countries that present more supporters of right-wing extremist parties also present greater anti-foreign attitudes.

The symbiosis that exists between political values, attitudes towards immigrants and refugees and political parties' discourses caused that the phenomenon of immigration penetrated the political debate in the EU favouring the explosion of nationalist parties in National Parliaments. In fact, Green-Pedersen and Mortensen (2015) showed how conservative and nationalist parties tend to have more radical and negative attitudes towards immigrants than other parties. For this reason, in a circumstance of the migration crisis, where some native low-skill workers see immigrants as a threat to their economic stability, the firm positions that these parties assume against immigration have pushed a large part of the population Europe began to shelter its fears in the anti-immigrant ideologies of far-right parties (Ivarsflaten, 2005; Van der Brug et al., 2000; Van der Brug and Fennema, 2003; Van Spanje, 2010).

3.3 Data

Table 2.1 shows some basic information of the countries included in the analysis: (1) Democracy Index; (2) Civil liberties; (3) Freedom in the world; (4) Right party; (5) Net migration; and (6) Foreign-born residents. The information has been obtained from different data sources. Our intent is to compare how the citizens' openness index towards immigration and refugees (COITIR) is related to these variables which

can be interrelated, and whether this relationship is strong or not. Important insights are derived from the analysis.

Table 3.1: List of countries. Raw basic information

Name	Democracy	Civil Liberties	Freedom	Far-Right (%)	Net migration	Foreign born (%)
Austria	8.29	8.82	95	46.2	7.5	22
Belgium	7.78	8.53	95	3.67	2.4	20
Switzerland	9.03	9.12	96	0.50	4.7	39
Czechia	7.69	8.53	94	35.40	1.9	4
Germany	8.68	9.41	95	12.64	5.6	15
Estonia	7.97	8.53	94	1.30	0.8	17
Spain	8.08	8.82	94	10.26	1.9	15
Finland	9.14	9.71	100	17.07	3.1	6
France	7.80	9.53	90	33.90	1	14
UK	8.53	9.12	95	30.50	3.8	15
Hungary	6.63	7.06	76	16.67	-0.1	2
Ireland	9.15	10.00	96	0	5.2	20
Israel	7.79	5.88	80	26.46	2.2	26
Iceland	9.58	9.71	97	0.20	4.2	14
Italy	7.71	8.24	89	34.30	1.1	11
Lithuania	7.50	9.12	91	2.60	-10.5	5
Netherlands	8.89	9.12	99	13.06	4.6	14
Norway	9.87	9.71	100	16.30	6.6	17
Poland	6.67	7.63	89	28.89	0.3	2
Portugal	7.84	9.12	97	0.34	-0.8	9
Russian	2.94	3.24	20	5.65	1.7	8
Sweden	9.39	9.41	100	17.50	11.9	20
Slovenia	7.50	8.24	92	4.17	0.7	13

Own elaboration

Democracy index is obtained from data available online at the Economist Intelligence Unit (EUI, 2019). The index is based on sixty indicators and their respective

five categories: (1) Electoral process and pluralism; (2) Civil liberties; (3) Functioning of government; (4) Political participation; (5) Political culture. Civil liberties index is obtained from one of the categories included in the Democracy Index. Civil liberties index resembles the protection of human rights that includes freedom of speech, freedom of expression, a free press, freedom of religion, the rights to assembly and association, and the right to a fair judicial process.

Freedom in the world index contains information provided by Freedom House staff members and consultants. The index is based on political rights and civil liberties derived from the Universal Declaration of Human Rights.

The scores are based on the analysis of 25 indicators: 10 for political rights and 15 for civil liberties (Freedom House, 2019). The political rights questions are grouped into three subcategories: Electoral Process (3 questions), Political Pluralism and Participation (4), and Functioning of Government (3). The civil liberties questions are grouped into four subcategories: Freedom of Expression and Belief (4 questions), Associational and Organizational Rights (3), Rule of Law (4), and Personal Autonomy and Individual Rights (4). The information is based on the 2019 edition.

The far-right party column includes the information of the success of the party in the last national election held in the country in which the analysis is limited to the most successful far-right party in each country. We identified the relevant far-right parties by relying in previous classifications (Immerzeel et al., 2016; Mudde, 2007; Szöcsik and Polyakova, 2019). We deviate from Mudde's selection –as Immerzeel et al. (2016) and Szöcsik and Polyakova (2019) did—in that we also include neoliberal populist parties in our selection. Similarly to Szöcsik and Polyakova (2019), we also include Alternative for Germany (Alternative für Deutschland) and Dawn—National Coalition (Občanská Demokratická Strana) in Germany and Czech Republic, respectively.

Net migration provides information obtained from Eurostat for the migration flow data for the year 2016. The migration flow is affected by a number of issues in which different labour bilateral agreements between countries and labour free-mobility areas can be considered important key drivers. For example, immediately upon accession to the EU, the countries are obliged to facilitate labour insertion for other nationals of EU the new member countries. Switzerland entered into the free-mobility zone of the EU between 2004 and 2007 in gradual steps (Jauer et al., 2019). Net

migration is defined as the difference between the number of immigrants and the number of emigrants from a given year per one thousand inhabitants. Net migration is negative when the number of emigrants exceeds the number of immigrants. According to Eurostat, as some countries either do not have accurate figures on immigration or emigration, net migration is generally estimated on the basis of the difference between population change and natural increase between two dates, and it is then named as corrected net migration (EC, 2003).

And finally, the last column—foreign-born residents—measures in percentage the share of the residents who have born outside of the country. The share of foreign-born residents depends on two different issues: first, the number of immigrants, and, second, how difficult or easy is for the foreigners to achieve the full citizenship status of the countries which host them. An interesting example is observed in the USA where the dynamics is changing dramatically, as 80% of the foreigners were naturalized in the 1980s, and more recently, less than 40% of the foreigners obtained the American citizenship in 2000s. Bloemraad (2006) contended that this trend is explained by the shift of the origins of newcomers from Europe to Latin America and Asia. Some conjectures are also placed regarding the loyalty, the civic spirit and the interests in political participation of the new comers.

To measure the citizens' openness index towards immigration (COITI) and the citizens' openness index towards immigration and refugees (COITIR), the study relies mainly on the data from the European Social Survey (ESS) round 8 (version 2.0). The ESS includes stable and well-defined measurement scales that are related to citizens' migration attitudes (Messing & Ságvári, 2018). These include measures of opposition to immigration (3 indicators), measures of economic, cultural life and place to live quality effects (3 indicators) and measures of opposition to refugees (3 indicators). At first glance, the idea is to build a synthetic openness immigration-refugees indicator with the 9 indicators included in the ESS database. However, one of the three indicators of the opposition to refugees' scales is missing in the ESS data for Hungary. Individual indicators have typically been used on their own (Davidov et al., 2020; Green et al., 2019). However, the aim of our study is to estimate a composite indicator using all the indicators as components, as individual indicators usually provide partial and conflicting views of the phenomenon under study.

The opposition to immigration module is based on the following three questions:

'To what extent do you think [country] should allow people': (1) of the same race or ethnic group as most [country]'s people to come and live here?' [variable: imsmetn]; '(2) of a different race or ethnic group from most [country] people to come and live here?' [variable: imdfetn]; (3) 'from poorer countries outside Europe to come and live here?' [variable: impcntr]. The semantic scale is based on the following response options: (1) Allow many to come and live here; (2) Allow some; (3) Allow a few; and (4) Allow none. The immigration module constitutes a plausible index of opposition to immigration as, in our case, we are interested in measuring a composite indicator of openness to immigration attitude, the scale is reversed for the three indicators.
The three statements included in the measurement of the effects of immigration on the economy, the cultural life and the place to live quality are as follows: (1) Immigration bad or good for country's economy [variable: imbgeco]; (2) country's cultural life undermined or enriched by immigrants [variable: imueclt]; and (3) immigrants make country worse or better place to live [variable: imwbcnt]. The answer format for the three attributes is based on 11-points Likert scales anchored in the extreme points: 0 means bad, undermined or worse; and 10 means good, enriched or better. In this case, it is obvious that the scale presents a direct relationship with the openness to immigration scale, so the raw data do not need to be transformed.
And finally, the three statements included in the refugees' module are as follows: (1) governments should be generous judging applications for refugee status [variable: gvrfgap]; (2) most refugee applicants are not in real fear of persecution in the own countries [variable: rfgfrpc]; and (3) granted refugees should be entitled to bring close family members [variable: rfgbfml]. The answer format is based on a 5-points Likert scale (1. Agree strongly, 2. Agree, 3. Neither agree nor disagree, 4. Disagree, 5. Disagree strongly). In this case, the first and the third variables have an inverse relationship with the degree of agreement that citizens have on the ethical responsibility towards refugees. Meanwhile, the second variable presents a direct relationship as the question is presented with a negation of the real fear of persecution, so in this case 5 means that citizens think that most of the refugees' applicants are in real fear. Thus, the first and third variables are reversed.
Finally, in order to analyse whether political orientation affects the phenomenon under study, the answers to the question of citizen's placement on left-right scale [variable: lrscale] were also included in the database. The answer format is based on

11-points anchored scale in which 0 and 10 mean left and right, respectively. The variable is recoded into four different categories according to the following scheme: left (0–2), centre-left (3–5), centre-right (5–7), and right (8–10). As said, the political orientation scale is divided into eleven categories, so we preferred to include the median value 5 into two categories centre-left and centre-right. Political orientation is important as immigration has been depicted by many right-wing parties as the central danger against the social welfare and quality of life of true national citizens, so anti-immigration sentiments can explain, in part, right-wing voting (Bello, 2016; Davidov et al., 2020; de Vreese, 2017; Gorodzeisky, 2011; Kunovich, 2004; Semyonov & Glikman, 2009).

3.4 Methodology

Composite indicators (CIs) are usually prescribed when researchers analyse some phenomenon that has a multidimensional nature. Mendola and Volo (2017) propose 15 criteria that researchers need to look at when they develop CIs. Among the 15 criteria, two of them (11 and 12), the weighting method to aggregate the individual indicators and the aggregation method, are considered crucial. In the literature of CIs, the simple average or other functional forms based on equal weights are considered unweighted indicators.

On the other hand, Data Envelopment Analysis (DEA) obtains the weights of the individual indicators endogenously (Charnes et al., 1978) without any human interaction that can contaminate the weights spuriously. In addition, the weights are obtained through the Benefit-of-the-Doubt (BoD) principle (Cherchye et al., 2007) which means that every individual observation weights are obtained in order to rank each observation as high as possible. DEA is a non-parametric technique developed to measure production efficiency that was proposed in the 1970s by Charnes and his colleagues. Basically, a linear mathematical program is resolved iteratively to obtain the efficiency indicator for a sample of decision-making-units (DMUs), in which the vector of inputs and outputs of each unit are compared with a linear combination of the vectors of inputs and outputs observed in the sample. Different assumptions about the flexibility of the linear combinations as well as the orientation result in

different DEA models. Cooper et al. (2007) can be consulted to have more information of the different existing DEA methods.
The first issue to consider is whether the partial indicators are inputs or outputs, and, normally, the following convention applies: inputs (the less, the better) and outputs (the more, the better). In some cases, input or output vectors do not exist, then researchers need to create a dummy output vector equal to one (or input) to apply a DEA model with the rest of inputs (or outputs) (Lovell et al., 1995; Zhou et al., 2007).
Our case study is based in two different scales: 6 immigration openness indicators and 9 individual indicators in which the three refugees' openness indicators have been added to the previous scale. The DMUs or observations are based on the country average figures and the country-political orientation average figures. Thus, assuming that i represents the individual partial indicators and d represents the population segments, the mathematical program that calculates the synthetic indicator for each of the scales is as follows:

$$SI_d = \underset{w_{id}}{Max} \sum_{v=1}^{n} w_{id} Ind_{id}$$
$$\text{subject to}$$
$$\sum_{v=1}^{n} w_{id} Ind_{id} \leq 1, d = 1, ..., n; w_{id} \geq 0$$

Where Ind_{id} is the figure of the partial indicator i in each of the scales for the population segment d; and w_{id} is the weight obtained for the partial indicator i in the SI of the population segment d. Furthermore, the indicators obtained from (1) are normalised to one, so that the larger the score, the population segment d is more open to immigrants. As previously said, the main feature of DEA methods is that the weights obtained for each individual indicator are endogenously determined at the population segment level. Moreover, in line with the abovementioned BoD principle, these weights —which by construction are idiosyncratic— are calculated so as to maximise the respective composite indicators when the frontier is made considering all the population segments assessed according to the same scheme (Cherchye et al., 2007). The BoD principle is one of the main advantages presented by DEA in comparison with other multiple multi-criteria decision making methods that can be used to obtain CIs. Some other methods are based on obtaining exogenous weights

using expert opinions through well documented practices like Analytic Hierarchy Process [AHP] (Saaty, 1990) and Delphi methodologies (Linstone & Turoff, 2002). The model is applied for two different scenarios that correspond to the two scales under study: immigration (6 indicators) and immigration-refugees (9 indicators). Regarding D, the number of population segments, the number of DMUs is equal to 115 that corresponds to the 23 countries which participated in ESS8 (Austria, Belgium, the Czech Republic, Estonia, Finland, France, Germany, Hungary, Iceland, Ireland, Israel, Italy, Lithuania, the Netherlands, Norway, Poland, Portugal, Russian Federation, Slovenia, Spain, Sweden, Switzerland, and the UK) times 5 population segments obtained through the political orientation variable (left, centre-left, centre-right, right and all the citizens).

3.5 Results

3.5.1 Immigrants and refugees

We present and discuss the results obtained with our model for the two commented scenarios. First, it can be seen in Table 3.2, that despite of the refugees' crisis in 2015/16, the inclusion of the three indicators of the refugees' module seems not to affect the openness attitude towards immigration and refugees. In fact, all the countries seem to be more open in relative terms when the refugees' indicators are included with the exception of the five following countries: Switzerland, Germany, Estonia, Israel and Iceland. In these countries, including the refugees' attitudes does not change the immigration index. This result was not expected as, according to Heath and Richards (2019), there was marked shift in negative direction after the 2015/16 refugee crisis of the government policy towards refugees. The refugee crisis was characterized by large flows of asylum seekers coming from war-torn Syria, Afghanistan, Iran and other African countries. 'Countries such as Austria, Germany and Sweden which had experienced large inflows of refugees showed particularly large declines in public support for generous government policy with respect to the treatment of asylum requests (p.4)'. Nevertheless, as we analyse below, the relative position of the most and the least open countries changes and depends on whether the refugees' information is included or not. The analysis of each index serves to

conclude that regarding immigration, the following countries are the most open: Iceland, Sweden, Germany, Finland and Israel. On the other hand, the following countries are the least open: Austria, Russian Federation, Italy, Hungary and Czech Republic. The rest of the countries included in the analysis are in between. Our results are concordant with those obtained by Heath and Richard (2019). The authors found that 'in general Nordic countries such as Sweden, Norway and Finland have been consistently the most favourable to immigration while eastern European countries such as the Czech Republic and Hungary have been the least favourable (p. 4)'. Our index concludes that Norway occupies the seventh position regarding the most favourable attitude towards immigrants. When we include the refugees' dimension, it can be seen that the most open countries are: Iceland, Spain, Finland, Portugal and Sweden. Meanwhile, the least open countries are: Lithuania, Estonia, Russian Federation, Austria and Czech Republic. An important difference exists when the analysis is done including the refugees' variables, as now, Portugal and Spain, the countries of the Iberian Peninsula join the Nordic countries as the most favourable to immigrants and refugees. In the case of Spain, it is highly probable that the public media have played a proactive role in changing the negative refugees' vision. In addition, the role of activists of some NGOs, especially those directly involved in humanitarian tasks either on the Mediterranean Sea or in refugee campgrounds, has also contributed to raise awareness of the need to not criminalize the refugees' image.

Table 3.2: DEA Immigration (1) and DEA Immigration-Refugees Openness Indices (2)

Country	(1)	(2)
Austria	0.728	0.740
Belgium	0.808	0.840
Switzerland	0.850	0.850
Czech Republic	0.607	0.708
Germany	0.894	0.894
Estonia	0.786	0.786
Spain	0.841	0.944

Table 3.2 continued from previous page

Finland	0.886	0.928
France	0.796	0.856
United Kingdom	0.803	0.815
Hungary	0.659	NA
Ireland	0.823	0.850
Israel	0.861	0.861
Iceland	0.955	0.955
Italy	0.712	0.803
Lithuania	0.736	0.797
Netherlands	0.797	0.843
Norway	0.848	0.899
Poland	0.739	0.832
Portugal	0.812	0.926
Russian Federation	0.720	0.770
Sweden	0.920	0.921
Slovenia	0.788	0.802

Source: own elaboration

On the other hand, the results for the least open countries have not changed much as the countries belong to the sphere of the old Soviet Republics, Austria and Czech Republic. The results are explained in part by the anti-resettlement consensus that exist in some of the new Eastern member states of the EU (Ágh, 2016). A decisive turning point appeared after the Balkan Route crisis that precipitated Merkel's government temporary decision to lift existing EU immigrant and refugees' restrictions. The important solidarity gesture caused a huge number of political tensions that precipitated new more restrictive immigration and refugees' policies (Crage, 2016). According to Park (2015), Berlin swiftly started asking for co-responsibilities in terms of mandatory migrant relocation quotas which elevated immigration policies in the core of EU politics. Provisional measures were adopted for the benefit of Italy and of Greece, but not without many Central and Eastern countries' objections. In fact, Czech Republic, Hungary and Slovakia voted against

these measures. Unfortunately, it was not possible to include Hungary in the analysis for the commented problem of the missing variables, but it is highly probable that the country had been in the set of the least open countries to immigrants and refugees.

3.5.2 Political Orientation

Heath and Richards (2019) contend that immigration was, is and will be one of the most important affairs in the political agenda in Brussels. Anti-immigration sentiment is growing in many European countries and far-right political parties as the main advocates of policies aligned with this sentiment are entering in many National Parliaments and the EU Parliament. In a similar way, Capelos and Katsanidou (2018) analysed how the concurrent waves of anti-EU integration and anti-immigration, dormant cultural fears, suspicious towards international institutions and general politics could explain the changes on political preferences that could cause political disengagement, violent protests and more votes for populist and anti-establishment parties.

Table 1.3 shows how political orientation affects to COITIR. Thus, it can be seen that the most open population segments are: Spain (Left), Iceland (Left), Norway (Left), Finland (Left), Sweden (Left), France (Left), Switzerland (Left), Israel (Right), Iceland (Left-Centre), Spain (Left-Centre), United Kingdom (Left), Iceland (Right-Centre), Portugal (Left), Netherlands (Left), Austria (Left). Meanwhile, the least open population segments are: Austria (Left-Centre), Russian Federation (Left-Centre), Netherlands (Right), Russian Federation (Right-Centre), Slovenia (Right), Switzerland (Right), France (Right), United Kingdom (Right), Italy (Right), Czech Republic (Right-Centre), Czech Republic (Left-Centre), Austria (Right-Centre), Czech Republic (Right), Czech Republic (Left), Austria (Right). In Table 3.3, it can also be seen that the general trend for the majority of the countries is that leftist are more open to immigrant and refugees than left-centrist; left-centrist are more open than right-centrist; and right-centrist are more open than rightist. Czech Republic and Israel are the main exceptions to the general rule. It is not easy to find a tentative explanation to these observed exceptions, but maybe, for the case of Israel, the explanation can be found in the own migrant composition

of the country.

Another possible explanation can be rooted in the own history of the country in which the Law of Return enables free immigration and grants immediate citizenship to immigrants. The case of Czechia can be better explained by the fact that all the segments are more homogeneous, and as we will analyse below Czechs, independently of the political orientation, are among the least favourable segments to immigration and refugees.

Table 3.3: DEA Immigration-Refugees Openness Index by political orientation

Country	Left	Left-Centre	Right-Centre	Right
Austria	0.933	0.766	0.707	0.581
Belgium	0.877	0.847	0.823	0.773
Switzerland	0.975	0.862	0.820	0.758
Czech Republic	0.654	0.711	0.720	0.705
Germany	0.932	0.896	0.868	0.845
Estonia	0.780	0.775	0.773	0.823
Spain	1.000	0.956	0.915	0.838
Finland	0.998	0.926	0.919	0.909
France	0.987	0.876	0.822	0.745
United Kingdom	0.952	0.824	0.791	0.743
Ireland	0.878	0.861	0.850	0.808
Israel	0.865	0.823	0.889	0.973
Iceland	1.000	0.964	0.948	0.917
Italy	0.899	0.815	0.791	0.721
Lithuania	0.840	0.769	0.782	0.868
Netherlands	0.934	0.865	0.823	0.764
Norway	1.000	0.913	0.879	0.831
Poland	0.872	0.830	0.814	0.832
Portugal	0.945	0.923	0.907	0.928
Russian Federation	0.797	0.765	0.763	0.795
Sweden	0.997	0.930	0.907	0.862

Table 3.3 continued from previous page

Slovenia	0.875	0.807	0.780	0.759

Own elaboration

Analysing the 15 most favourable segments, it can be seen that most of them (11) belong to some country leftist group. The four exceptions -Israel(Right), Iceland(Left-Centre), Spain(Left-Centre) and Iceland(Right-Centre) – can be explained by the special characteristics of Spain, Iceland and Israel. In the case of Iceland, the most open country to immigrants and refugees, it is evident that the citizens are more homogeneous. The case of Spain can be partly explained by the already commented media positioning of not criminalizing the refugees and the movement of opinion in some important municipalities of Spain towards 'welcome refugees'. In any case, it can be concluded that the most favourable segments are clearly characterized by the political orientation. Regarding the 15 least favourable segments, there are now 8 rightist segments. The seven non-rightist segments -Austria(Left-Centre), Russian Federation(Left-Centre), Russian Federation(Right-Centre), Czech Republic(Right-Centre), Czech Republic(Left-Centre), Austria(Right-Centre) and Czech Republic(Left)- are characterized for being segments of Austria, Russian Federation and Czech Republic which are the countries least favourable towards immigration and refugees.

3.5.3 Analysis of the relationship between COITIR and other variables

Figure 3.1 shows the plots that can be used to see at first glance the existing type of relationship between COITIR and the six variables included in Table 3.1: Democracy index, Civil liberties, Freedom in the world, Far-Right party representativeness, Net migration and Foreign-born residents. The plot pretends to give a first visualization of the relationship, and for that, COITIR represents the response variable on the y axis and the six variables are seen as explanatory variables on the x axis. In all the cases and given the nature of COITIR, scatterplots with the average values of both variables are represented by vertical and horizontal lines.
Thus, there are four regions in the plot that are going to be explained from quadrant

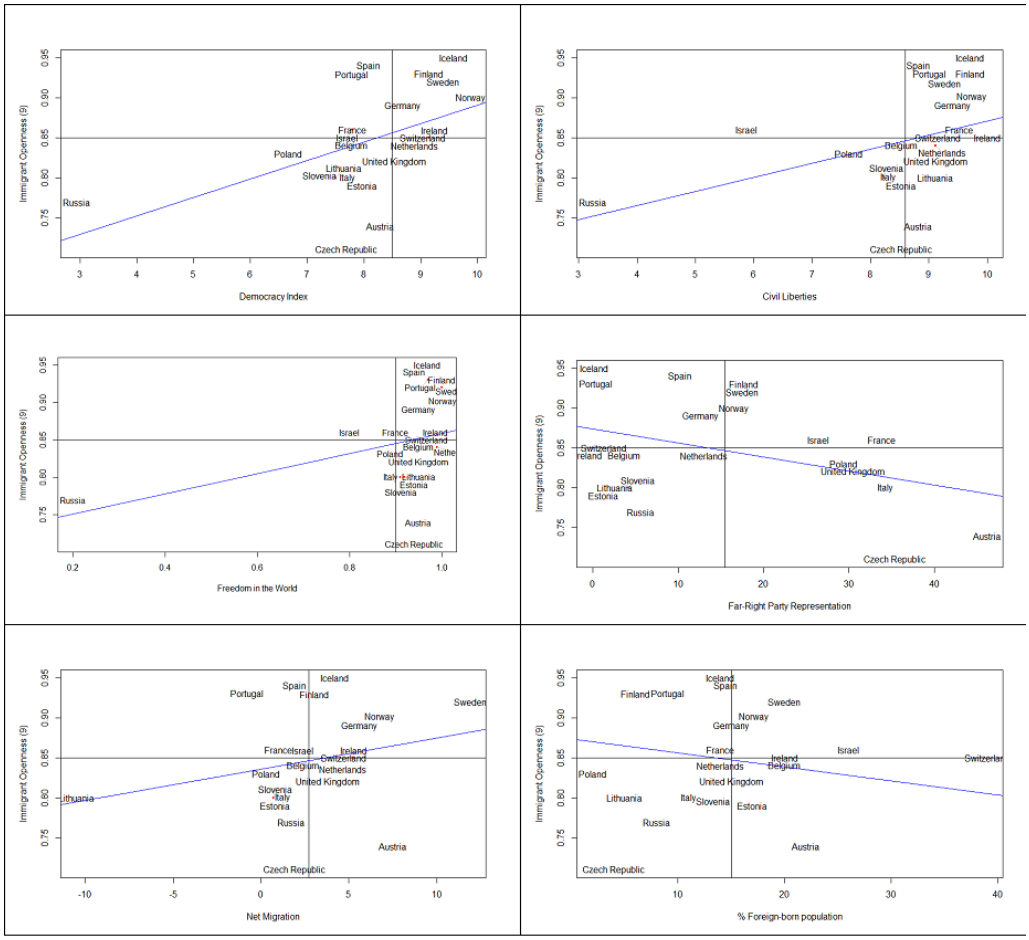

FIGURE 3.1: Relationship between immigration-refugees openness index and other variables - own elaboration

I to quadrant IV moving anti-clockwise: quadrant I (>,>) is characterized by countries with observations greater than the average values for both variables include in the analysis; quadrant II (<,>) is characterized because the countries are more open than the average country but the values of the variable are lower than the average; quadrant III (<,<) is characterized by countries with observations lower than the average values; and quadrant IV (>,<) is characterized because the countries are less open than the average country and the values of the variables are greater than the average. The relationship is analysed with the linear regression line represented

in the plot. Thus, it is very simple to see which countries depart more from the general trend when there exists a positive relationship (quadrants II and IV) or when there exists a negative relationship (quadrants I and III).
The figure shows that there exists a positive relationship between COITIR and Democracy index (left plot of first row), Civil liberties (right plot of first row), Freedom in the world (left plot of second row) and Net migration (left plot of third row). Meanwhile, the existing relationship is negative with Far-right party representativeness (right plot of second row) and foreign-born residents (right plot of third row).
The plots of the relationship between COITIR and democracy index, civil liberties and freedom in the world show some similarities. It can be seen that the first quadrant is characterized by the Nordic countries –Finland, Sweden and Norway – and Iceland. Nevertheless, the good results of these countries present also some grey areas. The analysis is based on the report of the freedom in the world 2017 (Freedom House, 2017). In Finland, the number of new asylum seekers decreased in 2016, but the government decided to tighten asylum laws during the year. In Sweden, asylum seekers in 2015 and 2016 led to political tensions as well as a strain on government resources. The asylum influx led to a number of reversals in both policies and attitudes, and in 2016, officials aligned asylum regulations with the minimum standards set by the EU. In Norway, the continued influx of refugees and other migrants dominated the political debate in 2015 and 2016. The government passed a more stringent law that restricted access to asylum. Norway has also been criticized for violating the principle of non-refoulement in the border with Russia.
The second quadrant is not uniform and some countries entered into the quadrant and left it depending on each variable. The third quadrant is mainly characterized by Russia and Czechia. Russia is world widely known by its restrictive political atmosphere—press freedom does not exist and the state controls the flow of information, there are important limitations on activism, and hostility to opposition is highly exerted with fraudulent electoral results. In 2016, 70 percent of the economy is still centralized either directly or through state-owned enterprises. Immigrants and ethnic minorities—particularly those who appear to be from the Caucasus or Central Asia— suffer from discrimination, and the government restricts freedoms of movement and residence, limiting the place of residence to specific minorities and migrants from the Caucasus and Central Asia. In Czechia, several rallies in contra

of the acceptance and integration of refugee and immigrant communities were common throughout 2016. Anti-immigrant, anti-refugees, and anti-Islamic sentiment is persistent in the Czech Republic. In addition, asylum seekers are routinely detained, and conditions in detention centres are generally poor.

The causality of the observed negative relationship between COITIR and the representativeness of far-right parties is still being investigated. In fact, Dennison and Geddes (2019) showed that the commonly assumed reason for the representativeness increase is not necessarily associated with an increase in anti-immigration attitude. Nevertheless, the right centred plot shows that quadrant I contains Finland, Sweden, Norway, France and Israel. Iceland, Spain, Portugal, Germany and Switzerland lay in the quadrant II. Quadrant III contains Ireland, Belgium, Netherlands, Slovenia, Lithuania, Estonia and Russia. And, quadrant IV contains Poland, United Kingdom, Italy, Austria and Czechia. According to Dennison and Geddes (2019), the anti-immigration sentiment existed already within a shrinking segment of the population of some European states. Nevertheless, the existing credo of a rising tide of anti-immigration sentiment that apparently swept the core of the EU was the resultant from negative and hostile media coverage of immigration and migrants. The authors showed that these two arguments are totally questionable. First, there is little evidence that anti-immigration is sweeping Europe. In fact, the authors contended that, counterintuitively, a more favourable sentiment appeared during and since the 'migration crisis' of 2015. Regarding the relevance of negative media coverage of migrants and asylum-seekers, attitudes to migration do not change that much because as any other attitude to other political issues, attitudes to migrants "are primarily formed relatively early in life and linked to key formative experiences such as education (p.108)." Regarding net migration (left bottom plot), it can be seen that quadrant I -more positive attitude to immigrants and refugees than average and a higher net migration rate than average – contains the following countries: Iceland, Sweden, Norway, Germany and Ireland. These countries are characterized by low unemployment rates and are net receptors of immigrants who searched better labour market conditions. Portugal, Spain, Finland, France and Israel lay in the quadrant II which is regarded as the area with a more favourable attitude to immigrants and refugees, and a lower net migration rate than the average. It is well known that the financial crisis of 2008 affected very much to Portugal and Spain,

so both countries displayed low levels of immigration numbers in recent years. In fact, the sovereign debt crisis coupled with austerity policies affected the southern periphery of the EU –Spain, Italy, Portugal and Greece- exacerbating the emigration phenomenon (Pereira and Azevedo, 2019).

The quadrant III is formed by those countries that have a lower attitude towards immigrant and refugees, and a lower net emigration rate than the average. The following countries are in this area: Lithuania, Poland, Estonia, Czech Republic, Slovenia, Russia, United Kingdom, Belgium and Italy. And finally, there are only three countries, Netherlands, Switzerland and Austria, which constitute the quadrant IV, the area in which the countries have a lower favourable attitude to immigrants and refugees and a higher net migration rate than the average. In this case, it is likely that many of these migrants were citizens from new EU member states (Arpaia et al. 2016), as east-west migration in the free-mobility area in Europe was accelerated with the EU enlargements in 2004 and 2007 (Kahanec and Pytliková, 2017).

And finally, analysing the relationship of COITIR with the share of foreign-born residents (right bottom plot), it can be seen that quadrant I is formed by Sweden, Norway, Germany, Ireland, Israel and Switzerland. The quadrant II contains Iceland, Spain, France, Finland and Portugal. The quadrant III is formed by Czechia, Poland, Lithuania, Russia, Italy, Slovenia, United Kingdom and Netherlands. And quadrant IV only contains Belgium, Estonia and Austria. Previous research shows that people commonly exaggerate the size of foreign-born residents. Hopkins et al. (2019) contended that Americans are prone to exaggerate the size of foreign-born residents –much as they exaggerate the size of other minority groups- and these misperceptions are the cause of unfavourable attitudes to immigration. The findings suggest that attitudes toward immigration do not change much and are quite stable and resistant to information as they were established early in life and reinforced by later socialization (Hainmueller and Hopkins, 2014). Theories of inter-group power threat predict that the cognitive mechanism could be affected by misperceptions about how large the minority groups. Nevertheless, Hopkins et al. (2019) results are concordant with previous research (Wong, 2007) as the correction of the subjective misperceptions of the size of the minority groups seems not to alter attitudes about the minority group.

In summary, net migration and the size of foreign-born residents have made national

citizens of the majority group more sensitive to threats from migration and this has caused an increase in anti-immigration sentiments. For example, "in Britain, public preferences for less immigration have been among the drivers of the British immigration policy, including restrictions aimed at reaching a numerical target for estimated annual net migration. The government has explicitly claimed that its motivation to reduce the number of immigrants coming to Britain is a response to public opinion, tying its drive to reduce net migration to public concern about immigration (Dalla Valle et al., 2020) (p. 425)."

3.6 Conclusions

The paper introduces a method based on DEA to provide two composite indicators that measure the citizens' openness to immigration and to immigration and refugees. The interest for the topic has grown significantly for academics, policymakers, and the general public. A better understanding of the phenomenon is crucial for the development of suitable social and political immigration policies at national level. In addition, a common vision and foreseeable strategies will be essential to the success of the European Union's ideal of a new global consciousness that unites the EU's nation-states, European dreams and actions for humanity.

The ESS round 8 is used to analyse the openness towards immigration and refugees of 23 countries, 17 EU Countries, plus Iceland, Israel, Norway, Switzerland, Russia, and the United Kingdom, using 9 individual indicators. In the case of immigration, the number of indicators is reduced to six, and Hungary is also included in the analysis. The results show that Iceland, Nordic countries, Spain and Portugal are more open towards immigrants and refugees than other countries in the sample. The analysis is also extended to see whether political orientation has an effect on COITIR, and results seem to confirm that leftist are in general more open than the rest of political orientation groups. Nevertheless, in the least open population segments, the results show that, for some countries -especially Czechia- citizens are less open independently of the political orientation. Interesting insights are also obtained analysing the relationship between COITIR and other variables related with democracy, civil liberties, net migration, far-right parties' representativeness and foreign-born residents. The results show that the relationship varies between

countries and variables. The proposed composite indicators serve to provide the citizens' attitude towards immigration and refugees, a topic that is currently of great importance for academics, politicians and public in general. Developing suitable social and political immigration strategies will be crucial for the failure or success of the EU dream.

As any other study, there are some important limitations. First, the study is only static and it is based on the round 8 of the ESS. It would be interesting to contrast dynamically the evolution of the indicators using some other rounds of the survey. The number of countries is also limited by the survey constraints and other geographical areas are clearly misrepresented. Another venue for future research is to analyse some specifics about the immigrants such as low-skilled or high-skilled. And finally, the indicators can be estimated for other important covariates such as income, gender, education and religion, among others.

4

PAPER 2: A fuzzy-hybrid analysis of citizens' perception toward immigrants in Europe

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Abstract

The public and political debate about immigration now play a big role in all European elections, and there is a trend increasing an anti-immigrant sentiment that receives important media attention. This work, based on the European Social Survey (ESS) round 9 data for 27 European countries, contributes to such debate by introducing a new method in the field, a Fuzzy-Hybrid Approach (FHA), that complements other methodological methods that have been used to measure citizens' attitudes towards immigrants. The novel approach in the field provides a synthetic indicator that measures openness towards immigrants (OTISI). Then, we analyse the relationship that exists between some specific sociodemographic variables and the new index. Results show that country, political orientation, age, religion, economic situation, gender, birthplace, employment, education, universalism, and conformity are key drivers that explain different attitudes towards immigrants. Our findings concur with other previous studies showing that the results are robust and that the method can be applied in future social science studies.

Keywords: Immigration · European Social Survey · Fuzzy-Hybrid Approach · TOPSIS.

4.1 Introduction

The latest migration waves and the new refugees' crisis have developed an increasing interest in the public and academic debate (Azrout et al., 2011; Esses, 2021; Kusow and DeLisi, 2021). Confirmatory Factory Analysis (CFA) and the Structural Equation Model (SEM) have up to now been valid and significant approaches for

the study of attitudes towards immigrants. These methods are based on a measurement model in which latent variables are obtained through an econometric model adapted to the observed elements (Meuleman and Billiet, 2012; Semyonov et al., 2006; Sønderskov and Thomsen, 2015; Thomsen and Rafiqi, 2018).

Despite the increased scientific contributions on the topic, the methodology does not seem to make any significant progress in the field. To our surprise, the implementation of other quantitative approaches, such as Data Envelopment Analysis (DEA) and Fuzzy Hybrid Approach (FHA), has been scarcely used in the field. Nevertheless, these methods present several advantages over other traditional econometric models (Martín and Indelicato, 2021). Furthermore, Kentmen-Cin and Erisen (2017) recommended, assessing critically previous research on attitudes towards immigrants and their relationship with EU attitudes, the use of other quantitative methods and designs to deepen the understanding of the relationship.

Furthermore, current literature on ATI suggests that anti-immigrant sentiment is affected by both individual-level and country-level factors (Davidov et al., 2020). The principal factors analysed at individual level are socio-economic position (Coenders and Scheepers, 2003; Gorodzeisky, 2011; Kunovich, 2004; Raijman et al., 2003; Semyonov et al., 2008), political orientation (Semyonov et al., 2006) and individual human values (Beierlein et al., 2016; Sagiv and Schwartz, 1995; Schwartz, 2006; 2007). In addition, at the country level, some authors focus on some society structural attributes, such as immigrant population and country integration policies (Kuntz et al., 2017; Schlueter et al., 2020).

Thus, the study has two main aims: (1) to extend the current literature on attitudes towards immigrants, introducing a novel approach in the field based on a Fuzzy-Hybrid Approach (FHA) to obtain an openness towards immigrants' synthetic indicator (OTISI). The synthetic indicator is based on six different items that proxy the ethnic, economic, cultural, and religious threats; and (2) to analyse how OTISI is influenced by sociodemographic variables, such as country, political orientation, age, religion, economic situation, gender, birthplace, employment, education, universalism, and conformity. For the empirical analysis, data are extracted from the European Social Survey (ESS) round 9, and the analysis of the openness towards immigration is carried out for 27 European countries.

The paper complements other studies (Bail, 2008; Capelos and Katsanidou, 2018;

Davidov et al., 2018; Heath and Richards, 2020) using a novel approach in the field that has not been commonly used. Thus, our study will serve to analyse whether the results are robust and to propose a novel quantitative method based on fuzzy logic as a fruitful expansion that can be used in social science for the future research agenda proposed by de Vreese (2017) regarding: (1) the differentiation in EU attitudes towards immigrants; (2) the role of national political elites; (3) the changing communications environment; and (4) the role of religion and religious attitudes.

4.2 Literature Review

4.2.1 Theoretical background

Recent ISIS terrorist attacks in Europe have intensified fear sentiments among native populations and immigrants (Mancosu and Ferrín Pereira, 2021). Several scholars concluded that the dynamics of intolerance and the perception of immigrants as a threat were the results of the created tensions after the 9/11 attacks, the 2004 bombings in Madrid, London 2005, Charlie Hebdo 2015, and Paris 2018 (Miguel-Tobal et al., 2006; Bar-Tal et al., 2012; Huddy et al., 2005; Skitka et al. 2004; Ben-Ezra et al., 2015; Vasilopoulos et al., 2018).

Many researchers have analysed the identity aspects of opinions towards immigrants (Azrout et al. 2011; Davidov and Semyonov; 2017; de Vreese 2017; Esses 2021; Kusow and DeLisi 2021). Azrout et al. (2011) argued that the key component to negative attitudes towards immigration is rooted in the consideration that immigrants are "different". Furthermore, McLaren and Johnson (2007) explained that the negative sentiment towards immigrants was more evident in those populations where the number of immigrants is more relevant. In this context, Claassen and McLaren (2021) found that the increase in immigrant arrivals from Muslim countries caused a galvanization of authoritarian anti-immigrant behaviour.

Barnum and Sullivan (1989) defined intolerance as the main element of the anti-immigrant sentiment. Nelsen and Guth (2003) argued that social diversity fuels the negative relationship between intolerance and anti-immigration attitudes. Within this context, Claasen and McLaren (2021) found that anti-immigrant attitudes varied when the immigrants are culturally distant using an experiment fielded in the

seventh round of the ESS. The experiment was designed to analyse the effects of the economic and cultural/identity threats that significantly contribute to the rhetorical immigration political discourse. Kentmen-Cin and Erisen (2017) showed that intolerance and perceived threats by immigrants are associated with the escalation of far-right parties.

Social diversity intolerance is also influenced by culture. For example, Yavcan (2013) highlighted that Europeans tend to be more open towards European immigrants than non-European immigrants. Thus, countries with a higher percentage of immigrant populations, which are culturally diverse, appear to show more intense opposition to immigration (Tillman, 2013).

In this context, Erisen and Kentmen-Cin (2017) analysed the citizens' perception towards Muslim immigrants in the Netherlands and Germany, finding that, in the Netherlands, citizens are significantly more intolerant towards Muslim immigrants than Germans, as Germans are more used to these immigrants. The authors also found that fear and anger have always increased intolerance and fuelled the perception of immigrants as a threat.

Other studies have analysed ATI from the perspective of the symbolic threat (traditions, religion, culture, and social norms). The literature distinguishes immigration threats through their nature and intensity (Canetti-Nisim et al., 2008). Many scholars affirm that anti-immigrant attitudes are driven by economic situations, security issues, cultural and religious principles (Chandler and Tsai, 2001; Citrin et al., 1997; Espenshade and Calhoun, 1993; Sniderman et al., 2004; Stephan et al., 1999). In addition, these different types of threats find a different manifestation according to the sociological characteristics and individuals' ideological sensitivities (Ceobanu, 2011).

On the other hand, the perception of threat can be a consequence of a vulnerable economic situation, that is often interconnected to nationalism, ethnic conditions of the host country and society (Blalock, 1967; Blumer, 1958; Bobo and Hutchings, 1996; Hainmueller and Hopkins, 2014; Heath and Tilley, 2005; Meuleman et al., 2018; Scheepers et al., 2003; Scheepers et al., 2003). Other researchers affirm that symbolic threat intensifies the fear of losing cultural homogeneity within the group and national identity of the host society (Fetzer, 2000; Raijman et al., 2008; Raijman

and Semyonov, 2004; Sniderman et al., 2004). Dennison and Geddes (2019) contended that immigration affects individuals very differently and that some features could threaten conservative values such as safety, tradition, or conformity. They also warned policymakers and analysts to not cross the soft line that equates negative ATI with racism or xenophobia. Thus, the authors called for a better understanding of ATI's drivers and structure.

4.2.2 Explanatory variables

This section will cover the main explanatory variables that have been used as ATI's predictors. The analysis will be based on individual and country-level covariates. For obvious reasons, we will highlight here the covariates used in the study, such as political orientation, age, religion, income, gender, citizenship, main activity, and education for the group of sociodemographic variables; and universalism and conformity/tradition for the group of human values. Regarding the country-level covariates, our study is only based on the country variable itself, but, we will summarize, in this case, other types of variables that have been used, such as immigration policy, economic trends, and foreign population.

4.2.3 Individual covariates

Ceobanu and Escandell (2010) found that citizens' political orientation plays a determinant role in explaining ATI. The authors based their analysis on the left–right political orientation. McAllister (2018) claimed that right-wing citizens tend to express more negative ATI than left-wing counterparts. In general, right-wing voters see immigrants as an excessive burden to western social welfare states. The effects of age on ATI seem to point out that, in general, older people tend to have more negative ATI than the young generations (Brenner and Fertig, 2006). As we will see below, this is also related to the fact that young people tend to be more universalists than their parents' generation, although this result is contested by Heath (2020). The authors argued that the youngest generations can be highly affected in territories in which the far-right wing parties have got a strong relevance during their formative years.

Social and national identity are mainly identified by birthplace, ancestry, religion,

language, and institutional-laws respect (Fussell, 2014). Ceobanu and Scandell (2010) claimed that researchers are reluctant in exploring the relationship between religion and ATI. Religion has been studied in ATI contexts for some particular cases, such as anti-Muslim prejudice (Hainmueller and Hopkins, 2014; Schlueter et al., 2020). In this case, the authors found that some country-level variables, such as liberal integration policies and state support for religious freedom, are both associated with a lower level of negative ATI. Regarding income, previous studies agreed that high-income citizens usually hold more positive ATI (Coenders et al., 2008; Kuntz et al., 2017). A similar explanation for education is also valid here.

Fussell (2014) claimed that gender has been a common predictor used to analyse ATI but, unfortunately, the obtained relationship is not conclusive. Thus, it is possible to find studies that point out three distinct results: (1) women are more open towards immigrants than men; (2) men are more open than women; and (3) there is not a significant difference between men and women. Citizenship depends on the birthplace in many countries, and it is usually highly associated with social and national identity formation (Heath and Tilley, 2005). In general, previous studies have found that native-born citizens are less open towards immigrants than foreign-born citizens (Raijman et al., 2008). However, Fussell (2014) affirmed, in the case of the USA, that the relationship between ATI and the native-born variable might be biased because the in-group conceptualization was mainly based on non-Hispanic Whites.

Previous studies agreed that native-born unemployed citizens tend to exhibit more negative ATI (Brenner and Fertig, 2006; Fussell 2014). Fussell (2014) argued that the cause that explains this finding is mainly based on the self-interest hypothesis, in which unemployed citizens do not want to compete in the labour market with immigrants. Regarding education, there exists an ample consensus, the more educated a citizen is, the more open towards immigrants is (Hatton, 2020). In this context, Brenner and Fertig (2006) contended that education was found to be one of the most important drivers that explain ATI. This finding is usually explained because education provides citizens with better labour opportunities that make them less likely to compete in the labour market with low-skilled immigrants.

The analysis of human values will end the individual covariates. Several studies have shown that human values are important drivers to analyse ATI (Beierlein et

al., 2016; Sagiv and Schwartz 1995; Schwartz 2006). For example, Beierlein et al. (2016) found that universalist people tend to express lower levels of symbolic threat. On the other hand, it turns out that people associated with conservative beliefs feel the instinct to protect the customs and the traditions of the society, so the values associated with conformity and tradition explain, in part, the negative ATI (Sagiv and Schwartz, 1995).

4.2.4 Country-level covariates

ATI multi-country survey projects have fostered the use of variables at the country level (Ceobanu and Escandell, 2010). The country variable can be used to compare ATI in different countries because the immigration scales developed from multiple items have been rigorously checked by Davidov et al., (2018). In Europe, a well-known result, obtained in the past analysing ATI at the country level, is that there are two differentiated areas: Eastern countries with more negative ATI than Western and Nordic countries (Bail 2008; Heath and Richards 2020). Other country-level variables to proxy country idiosyncratic features include immigration policy, the volume of immigrants, and the economic situation measured as GDP evolution or unemployment rate.

The literature review contextualizes the study and ends with its two main hypotheses: (1) the novel approach in social science, FHA, based on fuzzy set theory is an adequate quantitative method that provides a soundness openness towards immigrants' synthetic indicator (OTISI); and (2) results offer a complementary and robust vision of what is already known, such as left-wing, young, highly educated and universally inclined citizens are more open towards immigrants than a right-wing, old, uneducated and traditionalist citizen.

4.3 Data

Data for this study are extracted from European Social Survey (ESS). ESS is undoubtedly a good source of measurement scales related to citizens' immigration attitudes (Messing and Ságvári, 2018). Here, we analyse a set of 27 countries that have participated in round 9 of the ESS, with a total sample size of 47,086 respondents.

We examine the answers given to six questions included in the questionnaire as primary information to measure OTISI in Europe (Table 4.1). The first block concerns questions regarding opposition to immigration. That is: (1) "To what extent do you think [country] should allow people": (a) of the same race or ethnic group as most people from [country] to come and live here? '[variable: imsmetn (C1)]; (b) "of a race or ethnic group other than most [country] people to come and live here?" [Variable: imdfetn (C2)]; (c) "from the poorest countries outside Europe to come and live here?" [Variable: impcntr (C3)]. It can be seen that for these first three items (allowing immigrants from the same race/ethnic group; allowing immigrants from a different race/ethnic group, and allowing immigrants from poorer countries outside Europe), the answers are based on a four-point semantic ordinal scale in which one means none; two (a few); three (some) and four (many). Originally, the answers are given in a reversed scale as (1) allow many to come and live here; (2) Allow some; (3) Allow a few; and (4) Allow none. The reverse scale was obtained due to the interest in measuring the openness to immigration. As discussed in the theoretical background section, these three items are related to economic and symbolic threats.

The three additional questions included in the second block measure the effects of immigration on the economy [variable: imbgeco (C4)]; the living conditions of the country [variable: imwbcnt (C5)]; the cultural life [variable: imueclt (C6)]. In this case, the raw data range from 0 to 10, and we decide to transform the scale into 1 to 11, as the answer already has a direct relationship with the openness to immigration no further transformation was needed. The last three items are referred to the effects of immigration on the economy, living conditions, and religious beliefs and practices of the host country. In this case, the questionnaire uses an eleven-point semantic scale anchored in the extremes with the following wordings bad vs. good; worse vs. better and undermined vs. enriched. Since the individual items provide only a partial and contrasting view of the phenomenon of immigration, we will propose a method to calculate a composite indicator (OTISI) using all items as components.

TABLE 4.1: Openness towards immigrants' scale

Item	Scale
C1	Semantic 4-point ordinal[a]
C2	Semantic 4-point ordinal[a]
C3	Semantic 4-point ordinal[a]
C4	Semantic 11-point ordinal[b]
C5	Semantic 11-point ordinal[b]
C6	Semantic 11-point ordinal[b]

Own elaboration; [a](1). Allow none; (2) Allow a few; (3) Allow some; (4) Allow many [b] (1). Bad, worse or undermined – (11) Good, better or enriched; C1: Allow none/many immigrants of same race/ethnic group as majority; C2: Allow none/many immigrants of different race/ethnic group as majority; C3: Allow none/many immigrants of poorer countries outside Europe; C4: Immigration is bad or good for country's economy; C5: Country is a worse or better place to live by immigrants; C6: Country's religious beliefs and practices are undermined or enriched by immigrants

Table 4.2 shows the covariates included in the dataset to analyse OTISI on different population segments, such as country, political orientation, age, religion, income, gender, citizenship, main activity, universalism, traditionalism, and education. The raw data were recoded according to the interest of the research. The whole explanation for the recoding process could be consulted in Annex 1. The relationship between OTISI and the covariates used in the study was previously discussed in the section of individual covariates.

Table 4.2: List of covariates included in the analysis

Description	Item	Response Category
Country	Cntry	Austria (1); Belgium (2); Bulgaria (3); Switzerland (4); Cyprus (5); Czechia (6); Germany (7); Estonia (8); Spain (9); Finland (10); France (11); United Kingdom (12); Croatia (13); Hungary (14); Ireland (15); Italy (16); Lithuania (17); Latvia (18); Montenegro (19); Netherlands (20); Norway (21); Poland (22); Portugal (23); Serbia (24); Sweden (25); Slovenia (26); Slovakia (27)

Table 4.2 continued from previous page

Political Orientation	lrscale	Left (0-1); Centre-Left (2-3); Centre (4-6); Centre-Right (7-8); Right (9-10)
Age	agea	25 years or under (1); 26-35 years (2); 36-45 years (3); 46-55 years (4); 56-65 years (5); 66-75 years (6); 76 years or over (7).
Religion	rlgdnm	Roman Catholic (1); Protestant (2); Eastern Orthodox (3); Other Christian denomination (4); Jewish (5); Islamic(6); Eastern Religion (7); Other non-Christian religions (8)
Income	hincfel	Living comfortably on present income (1); Coping on present income (2); Finding it difficult on present income (3); Finding it very difficult on present income (4)
Gender	gndr	Male (1); Female (2)
Citizenship	brncntr	Born in the country (1); Foreign-born (2)

Table 4.2 continued from previous page

Main activity	mnactic	in paid work (1); in education (2); unemployed (3); unemployed (4); permanently sick or disabled (5); retired (6); in community or military (7); doing housework, (8); other (9)
Universalism	ipeqopt	Not like me at all(1); Not like me (2); A little like me (3); Somewhat like me (4); Like me (5); Very much like me (6)
	ipudrst	Not like me at all(1); Not like me (2); A little like me (3); Somewhat like me (4); Like me (5); Very much like me (6)
Conformity/Tradition	ipfrule	Not like me at all(1); Not like me (2); A little like me (3); Somewhat like me (4); Like me (5); Very much like me (6)

Table 4.2 continued from previous page

	ipmodst	Not like me at all(1); Not like me (2); A little like me (3); Somewhat like me (4); Like me (5); Very much like me (6)
	ipbhprp	Not like me at all(1); Not like me (2); A little like me (3); Somewhat like me (4); Like me (5); Very much like me (6)
	imptrad	Not like me at all(1); Not like me (2); A little like me (3); Somewhat like me (4); Like me (5); Very much like me (6)
Education	eisced	Less than lower secondary (1); Lower secondary (2); Lower tier upper secondary (3); Upper tier upper secondary (4); Advanced vocational (5); Lower tertiary education (6); Higher tertiary education, >= MA level (7)

Table 4.3 presents the descriptive statistics of the sample, showing the number of respondents and percentage for each category analysed. Results can be summarised as follows: Austria, Germany, Czechia, and Italy present more than 5 per cent of the total sample. Liberals (Centre) are over-represented with 44.6 per cent. Moreover, the sample is more represented by citizens older than 56 years old. On the other hand, the least represented group is that of those who are younger than 26 years

old. Regarding religion, the sample is predominantly Christian (55.7%), follows by agnostics (40.2%). The sample is also characterized by citizens who feel that the household income is adequate to pay the bills –as 76% think that the situation is comfortable. In contrast, six per cent of the sample find it very difficult. The sample is slightly more represented by women (53.8%) than by men (46.2%). Only ten and five per cent of the sample were born in a foreign country and are unemployed, respectively. Fifty per cent of the sample receive a salary and 28 per cent are retired. And finally, regarding education, it can be seen that 22 per cent of the population are highly educated, meanwhile, those whose studies are less than lower secondary drop to eight per cent. The next section will detail the FHA.

Table 4.3: Respondents' profile

Label	**N**	**%**	**Label**	**N**	**%**
Country			**Country**		
Austria	2499	5.3	Ireland	2216	4.7
Belgium	1767	3.8	Italy	2745	5.8
Bulgaria	2198	4.7	Lithuania	1835	3.9
Switzerland	1542	3.3	Latvia	918	1.9
Cyprus	781	1.7	Montenegro	1200	2.5
Czechia	2398	5.1	Netherlands	1673	3.6
Germany	2358	5	Norway	1406	3
Estonia	1904	4	Poland	1500	3.2
Spain	1668	3.5	Portugal	1055	2.2
Finland	1755	3.7	Serbia	2043	4.3
France	2010	4.3	Sweden	1539	3.3
United Kingdom	2204	4.7	Slovenia	1318	2.8
Croatia	1810	3.8	Slovakia	1083	2.3
Hungary	1661	3.5			
Political Orientation			**Age**		
Left	2744	5.8	25 years or under	3087	6.6
Centre-Left	6449	13.7	26-35 years	4919	10.4
Centre	20995	44.6	36-45 years	6723	14.3

Table 4.3 continued from previous page

Centre-Right	7200	15.3	46-55 years	7541	16.0
Right	2562	5.4	56-65 years	8341	17.7
			66-75 years	8280	17.6
			76 years or over	7973	16.9
Religion			**Household income**		
Christian	26250	55.7	Comfortably	13975	29.7
Jewish	39	0.1	Coping	21637	46.0
Islamic	1378	2.9	Finding it difficult	7896	16.8
Other	345	0.7	Finding it very Difficult	2905	6.2
Agnostic	18938	40.2			
Gender			**Place of birth**		
Male	21753	46.2	Born in the country	42394	90.0
Female	25333	53.8	Foreign-born	4667	9.9
Unemployed			**Universalism**		
Paid work	23308	49.5	Not like me at all	12873	27.3
Student	3236	6.9	Like me	20072	42.6
Unemployed	2431	5.2	Very much like me	12705	27.0
Retired	13080	27.8			
Other	4871	10.3			
Conformity/Traditions			**Education**		
Not like me at all	11538	24.5	Less than lower secondary	3702	7.9
Like me	23098	49.1	Lower secondary	788	16.7
Very much like me	10499	22.3	Lower tier upper secondary	7546	16.0
			Upper tier upper secondary	11009	23.4
			Advanced vocational	5806	12.3
			Lower tertiary education level	4963	10.5
			Higher tertiary education	5918	12.6

N: Number of individuals. %: percentage of the sample

4.4 Methodology

The six items included in the questionnaire that measures the openness attitude towards immigrants use semantic ordinal scales. The semantic ordinal scales are, in general, used to collect intrinsically vague information (Marasini et al., 2016). In our case, it is evident that if respondent A answers that she wants to accept many immigrants and a respondent B responds, on the other hand, that he wants to admit only a few immigrants, it is reasonable to agree that respondent A is more open towards immigrants than respondent B. The discrete semantic ordinal scales are similar to Likert scales that are also commonly used in social science in which the judgments made by respondents are usually seen as equidistant crisp numbers. In this case, respondents provide a set of statements with a positive or negative connotation regarding the phenomenon under study, and they evaluate them according to the following format: (1) strongly disagree; (2) disagree; (3) uncertain; (4) agree; and (5) strongly agree. For example, the ESS could have used the Likert scale for imbgeco with the following question: Immigration is good for the country's economy.

The complex steps involved in the mental process that respondents use to answer the questionnaire, undoubtedly, pose the base to ascertain that, in most of the cases, the information provided is uncertain or vague, as is the case for the eleven-point ordinal scale used in the survey. Thus, the information provided by respondents in the immigration scale is not so precise as the information provided by other categorical variables such as age, religion, or political orientation.

According to Smithson and Verkuilen (2006), "many concepts in the social sciences contain essential vagueness in the sense that while we can define prototypical cases that fit the definition, it is not possible to provide crisp boundaries between sets [. . .]. The fuzzy set theory provides a mathematical toolbox for analysing situations like this with precision, not via a definite cut-off, but by defining a degree of membership between the qualitatively different state" (Smithson and Verkuilen 2006, pp. 6–7). Fuzzy Set Theory (FST) is not only appropriate to adjust the vague information provided by ordinal semantic scales but also to develop mathematical models that resolve many different empirical applications in many fields, such as the tourism or hotel industry (Kumar, 2019; Martín et al., 2019), education (Di Nardo and Simone,

2019), supplier selection (Rashidi and Cullinane, 2019), green energy (Mohsin et al., 2019). The essence of the application of the FST resides in that there is not a unique objective function that exists to measure latent concepts that are common in social science (Martín et al., 2019). There are not many empirical studies that apply the Fuzzy Hybrid Approach to Social Science, although Ragin (2000) recommended the application of Fuzzy Theory as strengthening the relationships among theory and data analysis in sociology and political science.

4.4.1 The Fuzzy Topsis hybrid method

This method consists of 6-consecutive stages, which are summarized in Fig. 4.1 (Cantillo et al., 2020). In our study, FST is applied to handle the vagueness of the information provided by answers given to the questionnaire. We first convert the semantic ordinal scales into Triangular Fuzzy Numbers (TFNs). Salih et al. (2019) reviewed the studies that use the keywords 'TOPSIS' or 'technique for order preference by similarity ideal solution' and 'development' and 'fuzzy', and the authors concluded that TFNs are still the most common fuzzy sets used by researchers when they deal with uncertainty and vague information.

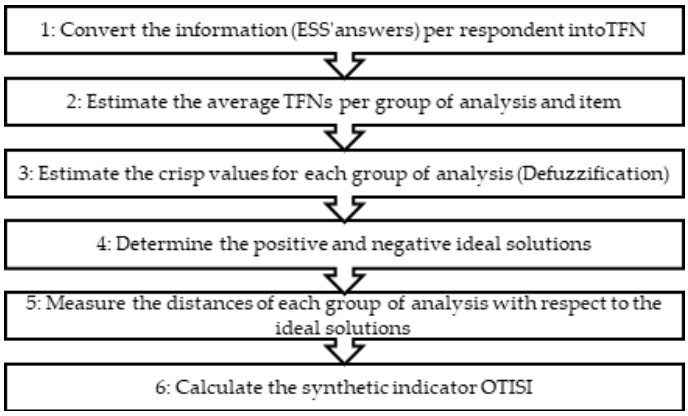

FIGURE 4.1: Synthetic diagram of the methodology FHA

Triangular fuzzy numbers are characterized by a triplet (a1, a2, a3) of real numbers. Thus, we assign each point of the semantic scale a TFN. A TFN A is usually

parametrized as follo:w

$$\mu_a(x) = \begin{cases} \frac{x-a_1}{a_2-a_1} & a_1 \leq x \leq a_2 \\ \frac{x-a_3}{a_2-a_3} & a_2 \leq x \leq a_3 \\ 0 & otherwise \end{cases}$$

Table 4.4 presents the transformation of the semantic ordinal scales provided by the respondents into TFNs characterized because the universe of discourse is within the interval [0, 100]. The interval of the discourse is chosen for clarity without loss of generalization. In each of the scales, it can be seen that the information provided is vague as all the consecutive ordinal semantic points are represented by 3-uples that intersect in some interval. For example, the interval (30, 50) is in the intersection of the first two points (none and a few) for the items C1-C3. The relative strength of each interval can be calculated according to (1).
Fuzzy Set Logic Algebra facilitates the aggregation of TFNs. The algebra of TFNs is applied here to calculate the average fuzzy number of n TFNs as:
$A_i = \left(a^{1^{(i)}}, a^{2^{(i)}}, a^{3^{(i)}}\right) (i = 1, ..., n)$ as follows:

$$\tilde{A} = (a_1, a_2, a_3) = \left(\tfrac{1}{n}\right) \bigotimes \left(\tilde{A}_1 \bigoplus \tilde{A}_2 \bigoplus ... \bigoplus \tilde{A}_n\right) = \left(\frac{\sum_{i=1}^{n} a_1^{(i)}}{n}, \frac{\sum_{i=1}^{n} a_2^{(i)}}{n}, \frac{\sum_{i=1}^{n} a_3^{(i)}}{n}\right)$$

where $\bigotimes$ stands for the external multiplication of a scalar and a TFN, and $\bigoplus$ is the internal addition of TFNs (Buckley, 1985). The properties of the algebra guarantee that the average of TFNs is also a TFN.
In the study, we analyse 71 different socio-demographic groups obtained from the eleven used covariates, and the average TFN can be obtained for each of these segments of interest. Thus, a matrix (6, 71) of TFNs is obtained. This matrix is known as the TFN information matrix, and it contains a lot of information that is difficult to analyse. For this reason, a defuzzification of the matrix is carried out to synthesize the information (Kumar, 2017). Thus, we transform the fuzzy information matrix into a plausible real number or crisp value information matrix as uncertainty and information vagueness have been adequately handled.

TABLE 4.4: Triangular fuzzy numbers. Default values of the scale.

Scale	Fuzzy Number[a]	Fuzzy Number [b]
1	(0,0,50)	(0,0,10)
2	(30,50,70)	(0,10,20)
3	(50,70,90)	(10,20,30)
4	(70,100,100)	(20,30,40)
5		(30,40,50)
6		(40,50,60)
7		(50,60,70)
8		(60,70,80)
9		(70,80,90)
10		(80,90,100)
11		(90,100,100)

Own elaboration. [a] Indicators C1–C3 [b] Indicators C4–C6

Kaufmann (1996) provides a defuzzification method by calculating the weighted average of the 3-uple that represents the respective TFN of the fuzzy information matrix. Thus, we give more importance to the value that, according to fuzzy logic, contains more truth. Therefore, the defuzzified value is obtained as follow:

$$v_{\tilde{A}} = \frac{(a_1+2a_2+a_3)}{4}$$

Kaufmann and Gupta (1988) named this approach the centroid method. It turns out to be a simple method, robust and with good properties (Martín et al., 2016; 2019).

4.4.2 TOPSIS' steps to obtain OTISI

TOPSIS was first proposed by Hwang and Yoon (1981), and, in the study, it is applied to the crisp information matrix to calculate the synthetic indicator of openness towards immigrants. The three first steps have already been explained in the

previous section. So, now we are going to further explain how the ideal solutions are obtained. As explained above, we have now a crisp information matrix V with dimensions (6, 71) that contains the defuzzified value for each item and population group. Thus, it is now possible to determine the positive and negative-ideal solutions that are obtained after the aggregation stage (step 3, Figure 2.1). As all the items were recoded to associate high values with more openness towards immigrants, TOPSIS is applied considering all the items as benefit values (Behzadian et al., 2012). Thus, the positive ideal solution is obtained by the maximum figures observed in the matrix. Following the same logic, the negative ideal solution is characterized by the minimum figures. Mathematically, the positive and negative ideal solutions are measured, respectively, as follows:

$$A_i^+ = \{(maxV_{ij}, j = 1, 2, ..., 71)\}, i = 1, 2, ..., 6$$
$$A_i^- = \{(minV_{ij}, j = 1, 2, ..., 71)\}, i = 1, 2, ..., 6$$

Once the positive and negative ideal solutions are obtained, the TOPSIS approach measures the Euclidean distances between each group observation and the ideal solutions. The Euclidean distances, S_j^+ and S_j^-, and OTISIj are calculated as follows:

$$S_j^+ = \sqrt{\sum_{i=1}^{6} \left(A_i^+ - V_{ij}\right)^2}$$

$$S_j^- = \sqrt{\sum_{i=1}^{6} \left(A_i^- - V_{ij}\right)^2}$$

$$OTISI_j = \frac{S_j^-}{S_j^+ + S_j^-}$$

A particular group observation perceives immigrants more positively when OTISI is closer to one. Therefore, we rank our segments using the OTISI values of all observations, in descending order, to find which population group is more open to immigrants. The OTISI's logic is clear because the indicator is higher for those segments closest to the positive ideal solution and further away from the negative ideal solution (Martín et al., 2016; 2019).

4.5 Results and Discussions

Here, we present and discuss the results obtained. Table 4.5 shows the TFNs and the defuzzified values that represent the total sample analysed in the study. TFN contains a lot of information that cannot be easily interpreted, and usually, this is a source of tension and stress for readers unfamiliar with fuzzy set theory. Looking at the respective TFNs values, it can be seen that all TFNs overlap. This is not a surprise at all as it shows the essence of fuzzy set theory when information is extracted from the uncertainty derived from semantic or Likert-type scales. For this reason, we use crisp clear values to synthesize the information. The crisp column shows that respondents show a more positive ATI towards immigrants of the same race or ethnic group as the majority and are less open about religious beliefs and practices. The results concur with those obtained by Yavcan (2013) who found that citizens perceive different threats based on immigrants' culture.

TABLE 4.5: TFNs and crisp clarified values for the total sample

Observation	TFN	Crisp Value
Total (C1)	(46.57 , 67.40 , 84.92)	66.57
Total (C2)	(38.92 , 57.18 , 79.05)	58.08
Total (C3)	(37.42 , 55.12 , 77.87)	56.38
Total (C4)	(42.07 , 51.38 , 60.93)	51.44
Total (C5)	(40.43 , 49.82 , 59.42)	49.87
Total (C6)	(44.25 , 53.63 , 62.97)	53.62

Own elaboration. C1: Allow none/many immigrants of same race/ethnic group as majority; C2: Allow none/many immigrants of different race/ethnic group as majority; C3: Allow none/many immigrants of poorer countries outside Europe; C4: Immigration is bad or good for country's economy; C5: Country is a worse or better place to live by immigrants; C6: Country's religious beliefs and practices are undermined or enriched by immigrants

The ideal positive and negative solutions have been calculated. Table 4.6 shows the ideal solutions and the representative segment of the positive ideal solution (PIS)

and the negative ideal solution (NIS). The PIS is characterized by Germany, Sweden, Portugal, and Finland. Similarly, the negative ideal solution is represented by Slovakia, Hungary, and the Czech Republic. Our results complement other analyses, for example, Bail (2008). New immigration destination countries, such as the countries of Eastern Europe, appear to be those which base attitudes towards immigrants on racial and religious diversity. Thus, according to Allport et al. (1954) racial and religious stereotypes could limit positive contact between culturally diverse groups. On the other hand, countries that admit immigrants since the post-First World War, North EU countries, are more tolerant than other countries which have restricted more tightly their borders to immigrants. Hence, anti-racist speeches and integration policies eradicated symbolic racial and religious prejudices and facilitated positive contact between nationals and non-European immigrants (Bail 2008; Heath and Richards, 2020).

Table 4.6: Positive and negative ideal solutions. Openness towards immigrants' scale

Attribute	PIS	Group	NIS	Group	% var
C1	77.58	Germany	51.46	Slovakia	50.8%
C3	74.00	Sweden	37.69	Hungary	96.3%
C3	71.98	Sweden	29.54	Hungary	143.7%
C4	62.88	Portugal	35.93	Hungary	75.0%
C5	63.68	Sweden	36.80	Czechia	73.0%
C6	69.63	Finland	36.71	Czechia	89.7%

Own elaboration; PIS: positive ideal solution; NIS: negative ideal solution. C1: Allow none/many immigrants of same race/ethnic group as majority; C2: Allow none/many immigrants of different race/ethnic group as majority; C3: Allow none/many immigrants of poorer countries outside Europe; C4: Immigration is bad or good for country's economy; C5: Country is a worse or better place to live by immigrants; C6: Country's religious beliefs and practices are undermined or enriched by immigrants

Positive and negative ideal solutions provided group profiles for the most and

least openness towards immigrants, respectively. Thus, we calculated the Euclidean distances between each population group of analysis and the ideal solution. Through (7), the Openness Towards Immigrant Synthetic Indicator (OTISI) for all the 71 population groups is obtained (Table 4.7). We obtain OTISI to measure openness towards the immigrants for each population group obtained from the categories of the 11 covariates used in the study (country, political orientation, age, religion, economic situation, gender, birthplace, employment, education, universalism, and conformity).

TABLE 4.7: Openness towards immigrants' synthetic indicator

Group	OTISI
Sample total	0.568
Hungary	0.077
Czechia	0.134
Slovakia	0.161
Bulgaria	0.210
Cyprus	0.310
Serbia	0.415
Montenegro	0.435
Austria	0.463
Estonia	0.470
Italy	0.470
Slovenia	0.499
Poland	0.521
Lithuania	0.544
Latvia	0.553
Croatia	0.604
France	0.642
Finland	0.719
Belgium	0.727
Netherlands	0.735
United Kingdom	0.745
Ireland	0.795

Table 4.7 continued from previous page

Germany	0.804
Spain	0.805
Switzerland	0.806
Portugal	0.819
Norway	0.882
Sweden	0.934
Right	0.352
Centre-right	0.517
Centre	0.591
Left	0.686
Centre-left	0.765
76 years or over	0.438
66-75 years	0.495
56-65 years	0.551
46-55 years	0.580
36-45 years	0.642
26-35 years	0.681
25 years or under	0.748
Christian	0.512
Agnostic	0.623
Jewish	0.712
Islamic	0.801
Other	0.828
Very Difficult	0.281
Finding it difficult	0.378
Good	0.542
Comfortably	0.775
Female	0.564
Male	0.572
Born in the country	0.540
Foreign-born	0.814
Retired	0.441

Table 4.7 continued from previous page

Unemployed	0.514
Other	0.546
Paid work	0.613
Student	0.817
Not like me at all (U)	0.387
Like me (U)	0.581
Very much like me (U)	0.751
Very much like me (C/T)	0.487
Like me (C/T)	0.556
Not like me at all (C/T)	0.684
Lower tier upper secondary	0.420
Less than lower secondary	0.439
Lower secondary	0.477
Upper tier upper secondary	0.489
Advanced vocational, sub-degree	0.648
Lower tertiary education, BA level	0.784
Higher tertiary education, >= MA level	0.830

Own elaboration. OTISI: Openness Towards Immigrants' Synthetic Indicator

Our results show that: (1) Eastern countries are less open than Western and Nordic countries; (2) left-wing citizens are more open than right-wing citizens; (3) younger citizens are more open than older citizens; (4) Islamic and other eastern religions seem to make practitioners more open than being agnostic or Christians; (5) a good economic situation seems to increase the openness towards immigrants; (6) men are slightly more open than women; (7) foreign-born citizens are more open than native-born citizens; (8) retired and unemployed citizens are less open than workers and students; (9) universalism tend to increase the openness towards immigrants; (10) traditionalism tend to decrease the openness towards immigrants; and (11) high educated citizens are more open than low educated people.

The countries can be split into three main macro-areas: those that showed negative

attitudes towards immigrants (Eastern European countries), those that preferred selective immigration policies (Western European countries), and those showing more positive attitudes towards immigrants (Northern European countries). Although, Austria and Italy seem to be more similar to the Eastern countries than to Western European countries. Results are concordant with other previous studies (Bail, 2008; Chylíková, 2016; Davidov et al, 2018; Heath and Richards, 2020; Martín and Indelicato, 2021).

Our results agree with Löw et al. (2022) who found that the cultural model of Eastern European countries is fundamentally different from that of Western countries. In this case, anti-immigrant sentiments are rooted in the fear of losing the traditional culture of the community. On the other hand, Western countries have experienced and overcome several ethnic and religious pressures. Despite that, they addressed the issue of migratory crisis, implementing integration policies. And finally, Northern European countries resulted to be more open towards immigrants because they have probably been more exposed to the phenomenon of immigration than other countries in Europe. The immigrants helped the countries of Northern Europe to develop their economies. Therefore, the citizens perceive immigrants as a resource rather than a threat, in that immigrants have contributed to the development of this area in the fields of research, arts, and culture.

Similarly, Brenner and Fertig (2006) and Alonso and Fonseca (2012) contended also that political orientation was a crucial factor in the analysis of attitudes towards immigrants. The positive relationship between attitudes towards immigrants and left-wing political orientation is explained by the fact that left-wing citizens perceive immigrants as a resource that can be used to solve labour market problems and fill gaps in sectors health care and pensions (Ruhs 2012). Right-wing citizens, in contrast, tend to perceive immigrants as a threat to the social system and to their jobs, which supports the ethnocentrism of right-wing voters. Therefore, the association between right-wing citizens and negative attitudes towards immigrants is explained by the fact that right-wing citizens tend to have more ethnocentric views and perceive their country as a culturally homogeneous society. Since they perceive their society as homogenous, they are more likely to reject immigrants who are members of a minority group (Alonso and Fonseca, 2012).

Our results suggest that education is also an important factor that influences attitudes towards immigrants. Similarly to McAllister (2018), we found that people with low levels of education are less probably to be tolerant towards immigrants than high-educated citizens. Results show that the relationship between educational level and negative attitudes towards immigrants is explained by the fact that people with higher levels of education tend to be more critical of the economic and political systems that govern their countries. This critical attitude, in turn, leads them to question the government's policy towards immigrants (Brenner and Fertig, 2006; Fussell, 2014).

Several studies have found similar results regarding the economic situation (Celi et al., 2005; Ceobanu and Escandell, 2010). Unemployment can be considered as a factor to develop negative attitudes towards immigrants which are directly derived from the perception of competition in the labour market. Thus, those who are more economically vulnerable tend to be more critical towards immigrants because they can perceive immigrants as a threat to their livelihood.

And finally, regarding religion and birthplace, our results are also similar to those obtained by other researchers (Coenders et al., 2009; Kuntz et al., 2017; Raijman et al., 2008). Muslims seem to be more open to immigrants than Christians, and this can be reasonably explained by the fact that some of them are probably immigrants. For the same reason, foreigners appear to show more positive attitudes towards immigrants than natives.

4.6 Conclusions

The paper introduces a method based on FHA to provide a synthetic indicator that measures the citizens' openness towards immigration. This topic is of great interest to academics, policymakers, and the general public. It is important to understand the immigration phenomenon for the development of suitable social and political immigration policies at the country level.

Many authors have studied ATI using mainly CFA and SEM approaches (Meuleman and Billiet, 2012; Semyonov et al., 2006; Sønderskov and Thomsen, 2015; Thomsen and Rafiqi, 2018). In the study, the authors propose to use a novel approach in the field based on fuzzy set theory. Thus, the new method provides an openness towards

immigrants' synthetic indicator (OTISI) that can be used to rank the openness for 71 population groups obtained from the categories of eleven covariates namely country of residence, political orientation, age, religion, economic situation, gender, born in the country, unemployed, universalism, traditionalism, and education. We used the European Social Survey (2018) round 9 datasets in 27 countries.

The results show that there are differences in attitudes towards immigrants. Countries can be split into three main macro-areas: Eastern European countries that showed the most negative attitudes; Western European countries that showed intermediate openness based on selective immigration policies; and Northern European countries that showed the most positive attitudes. Although Italy is one of the members that signed the treaty of Rome, it obtains OTISI values similar to the first macro area, with lower figures than other countries, such as Slovenia, Poland, Lithuania, and Latvia. Internal socio-demographic and political factors can be the cause of such a result (Di Matteo and Mariotti, 2021).

According to the OTISI ranking, we can summarize the profile of the groups that showed a more positive attitude towards immigrants as young students and left-wing voters, North European citizens, foreigners, highly educated, practising Muslim or other religion, having a good economic position, universalist and non-traditionalist, and being a student or an employee.

Previous studies have also analysed the main determinants that explain attitudes towards immigrants. The current study complements them using a novel Fuzzy Hybrid Approach in the field. Di Nardo and Simone (2019) contended that standard statistical models do not handle properly the inherent vagueness information provided by semantic ordinal scales, and this issue is particularly relevant in many social science questionnaires. The Fuzzy Hybrid Approach provides a mathematical method that analyses these shortcomings with precision, not via a definite cut-off, but by defining a degree of membership among individuals. Thus, we consider that FHA is an appropriate approach that could be very fruitful in future empirical analysis in the field. The paper reproduces the already known results from other studies reinforcing the good applicability of the method in the field of social science.

Like any other study, there are also some limitations. First, the study is only static, and it is based on round 9 of the ESS. It would be interesting to study the dynamic evolution of OTISI using some other rounds of the survey. Second, the dataset is

only based on the ESS. Future research can consider other databases to analyse the results' robustness in the use of different sources of information. Third, another venue for future research is to test whether the method can also be used to analyse other topics, such as national identity or patriotism, to see whether the method produce again robust results.

5

PAPER 3: Comparing Regional Attitudes toward Immigrants in Six European Countries

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Abstract

Many immigrants have risked their lives searching for a better future by crossing the Mediterranean Sea or the Atlantic Ocean. The Canary Islands became the centre of another emerging humanitarian and human rights crisis at Europe's frontier in 2020. The study aims to analyse whether attitudes towards immigrants are affected by territories close to these humanitarian crises. To this end, the study is based on previous studies using a Fuzzy-Hybrid TOPSIS method to analyse attitudes toward immigrants. The synthetic indicator will be built upon a set of eight indicators that proxy the ethnic, economic, cultural, and religious threats experienced by the citizens. The International Social Survey Program (ISSP) dataset for the year 2013 for six countries, namely Belgium, Germany, Spain, France, United Kingdom, and Portugal, will be used. Results show that the attitude toward immigrants is affected by the territorial dimension as classified by the nomenclature of territorial units for statistics at NUTS2 and NUTS3 levels, and that attitudes are very different between those of some of the archipelagos and islands considered in the study. In particular, our results point out a sort of duality between the Balearic Islands—the most open territory toward immigrants, and Corse—the least open territory toward immigrants.

Keywords: Attitudes Toward Immigrants · Europe · Island Regions · International Social Survey Program (ISSP) · Fuzzy-Hybrid TOPSIS.

5.1 Introduction

In recent years, migration flows have been growing up in the Mediterranean Sea and the Atlantic Ocean. Southern European islands have increasingly been a port of arrival for migrants (King & DeBono, 2013). This phenomenon has developed an important public and academic debate on the attitude towards immigrants. Many scholars argue that the anti-immigrant sentiment can depend on the country and socioeconomic characteristics (Czymara, 2021; de Vreese, 2017; Martín & Indelicato, 2021).

Despite the scientific academic advances in the study of attitudes towards immigrants (ATI) and their related methods, the literature confirms that Confirmatory Factor Analysis (CFA) and Structural Equation Modeling (SEM) have been the most frequently adopted approaches to study immigration attitudes. These methods are based on measurement models in which latent variables are obtained using econometric models adapted to the observed elements (Meuleman & Billiet, 2012; Thomsen & Rafiqi, 2018).

However, other methodological approaches that have been used in different fields are less common. This study aims to introduce one of these less common methods in the field of social sciences, the Fuzzy-Hybrid TOPSIS. This approachhas been applied in other disciplines, leading to interesting findings (Cantillo et al., 2020; Di Nardo & Simone, 2019; Palczewski & Sałabun, 2019). The data are extracted from the International Social Survey Program (ISSP) and the analysis of the attitudes toward immigration is conducted for 6 European countries, considering the regions at NUTS2 and NUTS3 levels. First, a country-level research is conducted. Then, the paper analyses ATI across different socioeconomic characteristics, such as religion, age, income, citizenship, gender, education, work status, and political orientation. As a last step, ATI across regional territories is analysed in order to detect which areas present more positive attitudes toward immigrants. The paper complements other studies (Dirksmeier, 2021; Eger & Breznau, 2017; Escandell & Ceobanu, 2010; Karreth et al., 2015; Markaki & Longhi, 2013) using a new approach in the field that has not been commonly used. Therefore, our study will serve as a guideline to apply a new quantitative method based on fuzzy logic and expand the literature of studies on attitudes toward immigrants at the territorial level.

5.2 Theorical background

The anti-immigration and exclusionary sentiment of immigrants derives from a perception of the threat of the natives. This threat affects the social, cultural, and institutional status of a country's society (Czymara, 2021; Sides & Citrin, 2007). Scholars have attributed negative attitudes towards immigrants to various individual factors, such as religion, political orientation, citizenship, or economic status (Czymara, 2021; de Vreese, 2017; Dekeyser & Freedman, 2021; Escandell & Ceobanu, 2010; Sides & Citrin, 2007). Martín & Indelicato (2021; 2022) affirm that openness toward immigrants can depend on the socio-economic characteristics of citizens. They focus on a division of Europe into the most open countries to immigration, i.e. those of central and northern Europe, and those that have shown more hostility to immigratio (Eastern Europe). Furthermore, they find that religion, education, and age as the main determinants of attitudes towards immigrants. At the country level, Davidov & Semyonov (2017) argue that anti-immigration sentiments are shaped by terrorist events, social and political climate of institutions, number of immigrants, and integration policies.

In the global context of immigration, studying the phenomenon at a regional level is arousing much interest among scholars (Dalle Nogare et al., 2021; Dirksmeier, 2021; Eger & Breznau, 2017; Escandell & Ceobanu, 2010; Karreth et al., 2015; Markaki & Longhi, 2013). Dirksmeier (2021) states that although regionalism per se does not influence the feeling of hostility towards immigrants, local economic disparities may accentuate a trend of negative attitudes towards immigrants.

On the other hand, Markaki & Longhi (2013) affirm that anti-immigrant sentiment is a regional factor rather than a national one. They focus on the study of attitudes towards immigrants in a local context, analysing the impact of regional characteristics on anti-immigrant sentiment. They conclude that regional unemployment and high levels of immigration from outside the EU negatively affect natives' attitudes towards immigrants. Although the economic level does not particularly determine anti-immigrant sentiment among regions, the characteristics of immigrant populations are a critical factor in the construction of these sentiments (Markaki & Longhi, 2013).

The relationship between ethnic regional sentiment and anti-immigrant attitudes

has been studied by Escandell & Ceobanu (2010). They explain that at the aggregate level, the results show that where there are high levels of feeling of regionalism, there are often high levels of exclusion of immigrants. Thus, they trace individual prejudice to the collective values of specific regions. Similarly, Sanjay Jeram et al. (2016) find that hostile attitudes towards immigration can be masked under the umbrella of regionalism or regional identity.

Eger & Breznau (2017) shifted the focus of the analysis from national-level attitudes towards immigration to the impact of immigration on regional-level welfare allocation attitudes. In other words, while the literature focuses on a transnational analysis of anti-immigration attitudes, Eger & Breznau (2017) examine the contextual determinants of anti-immigrant sentiment in European regions. In particular, they address whether and to what extent the size of the region's foreign-born population has reduced support for national welfare state programs. They analyze 114 regions and conclude that although the percentage of immigrants in the region has reduced support for generous welfare state policies, immigration itself has not increased opposition to the social rights of immigrants in the regions (Davidov & Semyonov, 2017). Karreth et al. (2015) show that locals living in regions with traditionally high levels of immigration tend to be more open to immigrants. However, recent increases in immigration and immigration levels in socially "racially diverse" and economically less developed regions of Europe are generally associated with lower acceptance of immigration, but only among natives who vote for right-wing parties (Karreth et al., 2015). Dalle Nogare et al (2021) present a cross-country analysis across Italian territories and find that the increase in the population support to some anti-immigration parties may be negatively correlated with the presence of public policies that are addressed to immigrants' integration, like free or discounted access to museums. Thus, anti-immigrant sentiment has increased in the last few years in a regional context. Researchers have also focused on the peculiar context of island regions (Engelken-Jorge, 2010; Salvà-Tomàs, 2002; Vincenzini, 2004). For example, in recent years, there have been demonstrations against the "invasion" of immigrants in the Canary Islands. The motto of these demonstrations proclaimed the islanders' right to have their own territory "free of blood" and "be saved from invasion" (Engelken-Jorge, 2010). Similarly, in Corsica the population feels a loss of identity and accuses the institutions of this loss as they feel abandoned because

of the massive immigration from North Africa. This fact has fuelled in the Corsican islanders an ever-larger increase in the negative attitudes toward immigrants (Vincenzini, 2004). The author attributes the Corsican anti-immigrant sentiment to a crumbling economic and social situation, which is correlated with a loss of identity and generates increase in racism and xenophobia. On the contrary, after years of emigration, in recent years the Balearic Islands in Spain have experienced a significant increase in new citizens . Immigrants come from central and northern European countries and do not seek economic stability, and they are not even fleeing a war. Following Provenzano (2020), there is a nexus between migration and tourism flows. Immigrants to the Balearic islands are often citizens that at a first glance were attracted by the archipelago because of tourism, and then have returned as immigrants. Therefore, this has not caused economic and cultural instability, and consequently, the Balearic attitudes towards immigrants are positive (Salvà-Tomàs, 2002).

5.3 Data

This study uses the International Social Survey Program (ISSP) dataset for 2013. ISSP is a cross-national study on diverse topics relevant to social sciences. Many scholars have adopted ISSP dataset to study attitudes toward immigrants (Ceobanu & Escandell, 2010; Dirksmeier, 2021; Eger & Breznau, 2017). The data we consider cover six European countries, namely Belgium, Germany, Spain, France, United Kingdom (UK), and Portugal. Due to the different regional level of the data provided by the ISSP dataset (2013), Belgium, Germany, and Spain will be analysed at the NUTS2 level; France at the NUTS3 level; and UK at the macro-region level. Nine thousand sixty-six is the total number of individuals interviewed, distributed across countries as reported in Table 5.1. There are more females (51.67%) than males (48.24%). The vast majority of the sample is represented by natives (92.69%) than foreign citizens (6.43%). Almost 50% of the sample is in paid work, while only 4.47% are studying. Twenty-four year-older or younger citizens represent the smallest age group in the sample (7.70%), whereas the 45-54 age group represents the biggest one (18.94%). The sample is almost equally distributed across medium incomes, and the highest and lowest income categories represent only 0.87% and

2.10% of the sample, respectively. More than 60% of the sample prefer that newcomers adapt to the traditions of the larger society. From the political views side, more than 55% is moderate, in which conservatives represent 21.97%, left-centre citizens 23.90%, and liberals 9.20% and the extremist wings, far-left and far-right, 4.40% and 2.69%, respectively. Finally, the majority of the respondents are catholic (44.50%) or agnostics (31.50%).

Table 5.1: Descriptive statistics

Country	N	%	Traditions	N	%
Belgium	2202	24.29	Maintain traditions	1768	19.50
France	2017	22.25	Adapt into larger society	5453	60.15
Germany	1717	18.94	Citizenship	N	%.
Portugal	1001	11.04	Natives	8403	92.69
Spain	1225	13.51	Foreigner	583	6.43
UK	904	9.97	Income	N	%
Education	N	%	Lowest. Bottom. 01	190	2.10
No formal education	222	2.45	Income2	238	2.63
Primary school	761	8.39	Income3	478	5.27
Lower secondary	2383	26.29	Income4	771	8.50
Upper secondary	1741	19.20	Income5	1811	19.98
Post-secondary	1201	13.25	Income6	1685	18.59
Lower-level tertiary	1293	14.26	Income7	1371	15.12
Upper-level tertiary	1326	14.63	Income8	761	8.39
Main status	N	%	Income9	130	1.43
In paid work	4516	49.81	Highest. Top. 10	79	0.87
Unemployed	775	8.55	Political Orientation	N	%
In education	405	4.47	Far left	399	4.40
Apprentice or trainee	77	0.85	Left. centre left	2167	23.90
Disabled	176	1.94	Center. liberal	834	9.20
Retired	2479	27.34	Right. conservative	1992	21.97
Domestic work	494	5.45	Far right	244	2.69
Other	107	1.18	Other	414	4.57

Table 5.1 continued from previous page

Gender	N	%	Religion	N	%
Male	4373	48.24	No religion	2856	31.50
Female	4684	51.67	Catholic	4042	44.58
Age	N	%	Protestant	877	9.67
24 years or under	698	7.70	Orthodox	40	0.44
25-34 years	1343	14.81	Other Christian	629	6.94
35-44 years	1463	16.14	Jewish	24	0.26
45-54 years	1717	18.94	Islamic	290	3.20
55-64 years	1587	17.50	Other religion	124	1.37
65-74 years	1301	14.35			
75 years or over	941	10.38			

N: number of individuals of the group; % percentage of the sample

The ISSP National Identity module contains eight items that concern the immigration issue. These items have been used to measure the Attitudes Toward Immigrants (ATI). These items are:

1. (C1)Immigrants increase crime rates
2. (C2)Immigrants take jobs away from people born in [Country]
3. (C3)Legal immigrants should have the same rights
4. (C4)Immigrants are generally good for the economy
5. (C5)Immigrants bring new ideas and cultures
6. (C6)Immigrants undermine the culture
7. (C7)Illegal immigrants should be excluded
8. (C8)Legal immigrants should have equal access to education

Each of the items are evaluated through a 5-point Likert scale, where one refers to 'Agree strongly' and five to 'Disagree strongly'. Items 3, 4, 5, and 8 were recoded reversely in order to obtain that the higher scores express a positive attitude towards immigrants.

5.4 Methodology

5.4.1 Fuzzy-Hybrid TOPSIS approach

In this study, a hybrid method based on a fuzzy approach and technique of similarity to ideal solution (TOPSIS) is used to measure the citizens' attitudes toward immigrants. This approach has had a growing interest in many fields, such as the hotel industry (Kumar, 2010), education (Di Nardo & Simone, 2019), green energy (Mohsin et al., 2019), logistics (Liu et al., 2020), social sciences (Indelicato & Martín, 2022).
The vagueness associated with subjective assessments is a problem when researchers look for a way to synthesize information for the sake of applying econometric or mathematical models. Fuzzy logic models are an appropriate tool for partially solving such vagueness which is related with linguistic terms (Behdioğlu et al., 2019; Martínez et al., 2020). These models handle ambiguous information by deconstructing the concept of objective information to a degree of different strengths. The degree of intensity is conceptualized by a membership function, also called characteristic functions, discriminant functions, or indicator functions (Martin et al., 2022).

Let X be a set of real numbers ($\mathbb{R}$) , that is, $X\{x_1, x_1, ..., x_n\}\epsilon\mathbb{R}$, a fuzzy set $\tilde{A} = \{(x, \mu_A(x))\,|x\epsilon X\}$ in X is a set of ordered pairs, where $\mu_A(x)$ is a membership function and $\mu_A(x) : X \to [0, 1]$. Thus, the membership function $\mu_A(x)$ is used to proxy the relative truth that exists in the statements (Mamdani and Assilian, 1999; Zadeh, 1965). The set is known as the universe of discourse of the fuzzy set theory emerged as a generalization of the classical set theory.
Fuzzy TOPSIS consists of 6-consecutive steps. First, the ISSP's answers will be converted into Triangular Fuzzy Numbers (TFNs). As in Salih et al. (2019), it has been considered that TFNs are a valid tool to deal with the vagueness and uncertainty of information.
Thus, a triplet (a_1, a_2, a_3) of real numbers is considered to assign each scale point to a TFN, as follows:

$$\mu_a(x) = \begin{cases} \frac{x-a_1}{a_2-a_1} & a_1 \leq x \leq a_2 \\ \frac{x-a_3}{a_2-a_3} & a_2 \leq x \leq a_3 \\ 0 & otherwise \end{cases}$$

The information provided by the scale will be converted into TFNs in a universe of discourse within the interval [0,100]. In order to do not loss generalization and clarity information, it will be chosen 5 intervals to represent the 5-scale points: (1) Disagree strongly (0,0,30); (2) Disagree (20,30,40); (3) Neither agree nor disagree (30,50,70); (4) Agree (60,70,80); and (5) Agree strongly (70,100,100). For any group obtained (NUTS0, NUTS2, and NUTS3 levels), the information has been aggregated through the Fuzzy Set Logic Algebra, and the average fuzzy number is given by:

$$\tilde{A} = (a_1, a_2, a_3) = \left(\tfrac{1}{n}\right) \bigotimes \left(\tilde{A}_1 \bigoplus \tilde{A}_2 \bigoplus ... \bigoplus \tilde{A}_n\right) = \left(\frac{\sum_{i=1}^{n} a_1^{(i)}}{n}, \frac{\sum_{i=1}^{n} a_2^{(i)}}{n}, \frac{\sum_{i=1}^{n} a_3^{(i)}}{n}\right)$$

where $\bigotimes$ stand for the multiplication of a scalar and a TFN, and $\bigoplus$ is the internal addition of TFNs (Buckley, 1985). Thus, we get a matrix of TFNs of each analysed group, that contains a lot of information that is difficult to analyse. Therefore, in agreement with Kumar (2017), the matrix is defuzzified into a matrix of real and clear information since the uncertainty and vagueness of the information have been adequately managed. Thus, crisp values are obtained through the weighted average of the 3-tuple calculated as follows:

$$v_{\tilde{A}} = \frac{a_1+2a_2+a3}{4}$$

5.4.2 TOPSIS steps

Once the matrix of crisp values has been obtained, the following steps concern the calculation of the TOPSIS index which measures attitudes towards immigrants (ATI). Following Hwang Yoon (1981), the ideal positive and negative solutions are calculated as follows:

$$A_j^+ = \{(maxV_{ij}), j = 1, 2, ..., J\}, i = 1, 2, ..., m$$
$$A_j^- = \{(minV_{ij}), j = 1, 2, ..., J\}, i = 1, 2, ..., m$$

where $i = 1$ to m (groups), $j = 1$ to J (criteria), and V_{ij} are crisp values. Therefore, the positive ideal solution (PIS) indicates the maximum value of the observations indicated by the sample, while the negative ideal solution (NIS) is the minimum value. All criteria are considered as benefit criteria, as higher values represent more positive values of ATI (Behzadian et al., 2012). The next step concerns the measurement of the distance of each group with the ideal solutions. Hence, the Euclidean distance between each observation group and the ideal solutions are computed as follows:

$$S_i^+ = \sqrt{\sum_{j=1}^{J} \left(A_j^+ - V_{ij}\right)}$$

$$S_i^- = \sqrt{\sum_{j=1}^{J} \left(A_j^- - V_{ij}\right)}$$

ATI indicator, which measures the attitudes of citizens towards immigrants, is given by the ratio of the negative Euclidean distance and the sum of the positive and negative Euclidean distances. Mathematically this ratio is given by:

$$ATI_i = \frac{S_i^-}{S_i^+ + S_i^-}$$

The group observation is more open toward immigrants when ATI is closer to one. Therefore, the groups are classified using the values obtained from the indicator, in descending order, to find which population group has the most positive attitudes towards immigrants. The ATI indicator logic is clear, the higher the indicator is, the closer it is to the positive ideal solution and the further away from the negative one (Martín et al., 2020).
Finally, the elasticity of the index for each group j concerning each of the eight criteria i included in ATI is calculated. These values measure the sensitivity of ATI for each of the groups studied to each variation of each criterion. Elasticity, therefore, provides a measure of how each criterion shapes the indicator. Mathematically, elasticities are given by:

$$\eta_{ij} = \frac{\Delta\% ATI_j}{\Delta\% V_{ij}}$$

5.5 Results

5.5.1 Attitudes Toward Immigrants

The aforementioned methodology was applied to ISSP data for the categories described in Table 1 and at the territorial level (NUTS2 and NUT3) for the six countries considered. The positive and negative ideal solutions respectively indicate the groups with the maximum and minimum crisp values for each ISSP indicator. This means that each group that represents the positive ideal solutions shows the maximum defuzzified value. The contrary happens for groups that are in the negative ideal solutions.

Table 5.2 shows the results of the ideal solutions for each indicator included in the ATI latent variable. Generally, both for positive and negative ideal solutions the ideal solutions are represented by territories and political orientations. Residents of the French district of Calvados represent those who do not associate immigration with the crime rate, whereas far-right citizens idealize that the immigrant increases the criminal threat. The inhabitants of the French Occitan province of Gers do not perceive the immigrant as a threat to their job, while in the province of Correze, the immigrant is perceived as a threat to the labour market. The Spanish community of Navarre represents the group of those who support equality of rights between natives and immigrants. At the same time, the French of Lot prefer that immigrants have fewer rights than natives. In the province of Hautes-Pyrenees, the immigrant is considered a benefit to the economy, while far-right citizens associate immigration with an economic downfall.

Furthermore, citizens who vote for right-wing parties support the idea that immigrants do not bring ideas and undermine the culture of the country, unlike the Orthodox and the residents of Tarn-et-Garonne. Residents of the northern French province of Ardennes represent those who prefer legal immigration and are opposed to illegal immigration. They prefer legal immigrants having access to education as much as natives, but they would like to expel illegal immigrants. On the contrary, the French from Ariege are more open to illegal immigrants, and those from Lozere are not in favour of educational equality between natives and immigrants.

Table 5.2: Ideal solutions

Indicator	PIS	Group	NIS	Group
C1	66.61	Calvados	21.49	Far right
C2	75.63	Gers	25.71	Correze
C3	85.17	Navarra	19.64	Lot
C4	70.00	Hautes-Pyrenees	27.32	Far right
C5	71.36	Orthodox	28.05	Far right
C6	73.75	Tarn-et-Garonne	24.76	Far right
C8	92.50	Ardennes	50.00	Lozere

Own elaboration. PIS: positive ideal solution; NIS: negative ideal solution

Once the ideal solutions have been obtained, the distances between the groups of observations and the ideal solutions are measured. Thus, ATI for each group has been calculated (Table 5.3). At the country level, results show that the Iberian Peninsula shows more positive attitudes towards immigrants than the other countries in the group under analysis. On the contrary, UK and Belgium show negative attitudes towards immigrants. France and Germany represent both the intermediate ATI.

At a subsequent step, ATI for some socio-economic characteristics has been measured. Results show that citizens with more positive attitudes toward immigrants are foreign ones, whereas natives are less open toward immigrants. Those who prefer newcomers to adapt to the traditions of the country show negative ATI values. Instead, the citizens who support the power of the European Union are more open to immigrants. Religion is a determinant of the attitudes toward immigrants too. Muslims and Orthodox show more positive ATI, whereas Christian religions show low values of attitudes towards immigrants. Levels of education, employment status, age, and political orientation are also decisive in being associated with attitudes towards immigrants. Those with a master's or doctorate, in student status, younger age groups, and far-left voters show more positive attitude. On the other hand, individuals with primary or lower educational level, retirees or the disabled, older age groups, and citizens of a conservative or far-right political orientation are less

open toward immigrants. Finally, the results are less conclusive with respect to other variables, such as country pride, gender, work status, attendance at religious events, and income.

Table 5.3: Attitudes Toward Immigrants

Group	ATI	Group	ATI	Group	ATI
Country		*Religion*		*Age*	
Spain	0.65	Islamic	0.84	25-34 years	0.60
Portugal	0.60	Orthodox	0.80	≤ 24	0.60
Germany	0.59	Other religion	0.64	35-44 years	0.59
France	0.52	Jewish	0.60	45-54 years	0.54
Belgium	0.46	No religion	0.56	55-64 years	0.51
Great Britain	0.39	Protestant	0.52	65-74 years	0.46
Traditions		Catholic	0.51	≥ 75	0.42
Maintain	0.73	Other Christian	0.40	*Assiduousness*	
Adapt	0.46	*Education*		Frequently	0.59
Proud		Upper-level tertiary	0.71	Occasionally	0.52
Somewhat proud	0.54	Lower-level tertiary	0.60	Never	0.52
Not very proud	0.53	Upper secondary	0.55	*Income*	
Not proud at all	0.51	Post-secondary	0.50	Income7	0.58
Very proud	0.46	Primary school	0.48	Income4	0.56
Citizenship		Lower secondary	0.43	Income9	0.56
Native	0.80	No formal education	0.43	Income8	0.56
Foreigner	0.52	*Work status*		Income5	0.55
Family citizenship		Currently in paid work	0.56	Income6	0.55
Neither parent	0.78	Never had paid work	0.56	Top	0.53
Only father	0.59	Currently not in w.	0.49	Income2	0.52
Only mother	0.56	*Main status*		Income3	0.52
Both	0.50	In education	0.67	Bottom	0.49
EU power		Other	0.66	*Political orientation*	
More	0.62	Unemployed	0.59	Far left	0.71
Much more	0.62	Apprentice or trainee	0.57	Left	0.63

Table 5.3 continued from previous page

As much	0.59	In paid work	0.56	Center	0.51
Less	0.47	Domestic work	0.51	Other	0.49
Much less	0.34	Retired	0.44	Right	0.41
Gender		Disabled	0.42	Far right	0.11
Female	0.54				
Male	0.53				

Own elaboration. ATI: Attitudes Toward Immigrants

5.5.2 Differences across territories

Table 3.4 shows the results of the ATI at the regional and provincial levels (NUTS2 and NUTS3) of the countries analysed. The results are sorted in descending order to rank the ATI at the regional level. Thus, the regions or provinces in the first positions of the first column on the left of the table are the areas with the most positive attitudes towards immigrants. Meanwhile, the territories with more negative attitudes toward immigrants are in the last positions of the last column on the right.

At the regional level, the Spanish territories are located in the first part of Table 5.4, that is, among those with the most positive attitude. The Balearic Islands and the community of Navarre are the first two regions in the ATI ranking of all the regions and provinces considered in this study. There are also the Catalans, Madrid, Murcia, and the Basque country among the most open to immigrants. Therefore, the regions with a strong regional identity feeling have the highest ATI values. Even if the Spanish regions are all in the first half of the ATI ranking, the Valencian community is the region with the worst value of attitudes towards immigrants compared to other compatriots.

Although Portugal has high ATI values at the country level, the Portuguese territories are not present in the top positions of the ATI ranking at NUTS2 and NUTS3 levels. The French provinces are the most heterogeneous ones. The territories most open to immigrants are the southwestern French provinces and the territories close to Paris. Citizens residing in Hautes-Pyrenees, Hautes-Alpes, Hauts-de-Seine, and Creuse are the French with a better perception of immigrants. At the same time,

the central and northern provinces, Eure-et-Loire, Correze, and Cantal, show a more negative attitude towards immigrants. Despite this, no reference patron divides the territories among France, even if the results reveal that the territories with regionalist movements, such as Brittany and the French area of the Basque country, present more positive attitudes toward immigrants.

German regions are divided into two macro areas: the former East Germany and the former West Germany. It is evident from the results that the formerly socialist territories are more hostile to immigrants than the former Federal Republic of Germany. The results show that the most economically advanced regions report the most positive ATI values, such as Hessen, Saarland, and Hamburg. The regions adverse to immigration are the eastern regions of Brandenburg, Sachsen, and Mecklenburg.

The results show that the Belgian and British regions have the lowest ATI values. The Belgian case shows that the western Flamenco region (West-Vlaanderen) is the territory with the lowest ATI value in Belgium. All the other Belgian regions are hostile towards immigrants, except for the Namur region and the capital region. Even more hostile are the British towards immigrants. The northern regions of England and Wales have the worst indicator of attitudes toward immigrants in UK. The only region with slightly more positive attitudes toward immigrants is the capital region of London.

Table 5.4: Regional ATI

Region		ATI	Region		ATI
Balearic Islands	ES	0.81	Puy-de-Dome	FR	0.52
Navarra	ES	0.74	Comunidad Valenciana	ES	0.51
Hautes-Pyrenees	FR	0.74	Bas-Rhin	FR	0.51
Berlin-Ost	DE	0.73	Eure	FR	0.51
Ville de Paris	FR	0.72	Meuse	FR	0.51
Hautes-Alpes	FR	0.71	Savoie	FR	0.51
Cataluña	ES	0.70	Seine-Maritime	FR	0.51
Madrid	ES	0.70	Greater London	GB	0.50
Berlin-West	DE	0.70	Mecklenburg-Vorpommern	DE	0.50

Table 5.4 continued from previous page

Hauts-de-Seine	FR	0.70	Sachsen	DE	0.50
Hamburg	DE	0.69	Allier	FR	0.50
Creuse	FR	0.69	Gard	FR	0.50
Gers	FR	0.69	Charente	FR	0.49
Murcia	ES	0.68	Doubs	FR	0.49
País Vasco	ES	0.68	Loire-Atlantique	FR	0.49
Lisbon	PT	0.68	Namur	BE	0.48
Alpes-Hte-Provence	FR	0.68	Ardeche	FR	0.48
Cotes-d'Armor	FR	0.68	Bouche-du-Rhone	FR	0.48
Cantabria	ES	0.67	Haute-Vienne	FR	0.48
Saarland	DE	0.66	Marne	FR	0.48
Ariege	FR	0.66	Mayenne	FR	0.48
Brussels Capital Region	BE	0.65	Vendee	FR	0.48
Aragón	ES	0.65	Haute-Marne	FR	0.47
Galicia	ES	0.65	Ille-et-Vilaine	FR	0.47
Calvados	FR	0.65	Meurthe-et-Moselle	FR	0.47
Andalucía	ES	0.64	Yonne	FR	0.47
Principado de Asturias	ES	0.64	Aveyron	FR	0.46
La Rioja	ES	0.64	Manche	FR	0.46
Hessen	DE	0.64	Pyrenees-Orientales	FR	0.46
Tarn-et-Garonne	FR	0.64	Haut-Rhin	FR	0.45
Val-de-Marne	FR	0.64	Lot-et-Garonne	FR	0.45
Niedersachsen	DE	0.63	Somme	FR	0.45
Nordrhein-Westfalen	DE	0.62	Landes	FR	0.44
Bayern	DE	0.62	Saone-et-Loire	FR	0.44
Haute-Loire	FR	0.62	Limburg	BE	0.43
Herault	FR	0.61	Flemish Brabant	BE	0.43
Val-d'Oise	FR	0.61	Liege	BE	0.43
Castilla-León	ES	0.60	Luxemburg	BE	0.43
Seine-Saint-Denis	FR	0.60	Scotland	GB	0.43
Tarn	FR	0.60	Aisne	FR	0.43
Yvelines	FR	0.60	Pas-de-Calais	FR	0.43

Table 5.4 continued from previous page

Canary Islands	ES	0.59	Sarthe	FR	0.43
Alentejo	PT	0.59	Var	FR	0.43
Isere	FR	0.59	Brabant Walloon	BE	0.42
Nievre	FR	0.59	West	GB	0.42
Baden-Wuerttemberg	DE	0.58	Deux-Sevres	FR	0.42
Haute-Saone	FR	0.58	Loiret	FR	0.42
North	PT	0.57	Cher	FR	0.41
Thueringen	DE	0.57	Vosges	FR	0.41
Essone	FR	0.57	Aude	FR	0.40
Haute-Savoie	FR	0.57	Dordogne	FR	0.40
Loire	FR	0.57	Drome	FR	0.40
Pyrenees-Atlantiques	FR	0.57	Jura	FR	0.40
Castilla-La Mancha	ES	0.56	Nord	FR	0.40
Extremadura	ES	0.56	Antwerp	BE	0.39
Centre	PT	0.56	East	GB	0.39
Finistere	FR	0.56	East Flanders	BE	0.38
Maine-et-Loire	FR	0.56	Charente-Maritime	FR	0.38
Rhone	FR	0.56	Hainaut	BE	0.37
Schleswig-Holstein	DE	0.55	Cote-d'Or	FR	0.36
Bremen	DE	0.55	Orne	FR	0.36
Rheinland-Pfalz	DE	0.55	Vaucluse	FR	0.36
Sachsen-Anhalt	DE	0.55	North	GB	0.34
Belfort (Territoire)	FR	0.55	Loir-et-Cher	FR	0.34
Gironde	FR	0.55	West Flanders	BE	0.33
Indre-et-Loire	FR	0.55	Lozere	FR	0.33
Oise	FR	0.55	Vienne	FR	0.33
Algarve	PT	0.54	Moselle	FR	0.30
Ain	FR	0.54	Ardennes	FR	0.29
Haute-Garonne	FR	0.54	Wales	GB	0.27
Brandenburg	DE	0.53	Lot	FR	0.25
Indre	FR	0.53	Eure-et-Loire	FR	0.24
Seine-et-Marne	FR	0.53	Correze	FR	0.23

Table 5.4 continued from previous page

Alpes-Maritimes	FR	0.52	Cantal	FR	0.20
Aube	FR	0.52	Corsica	FR	0.19
Morbihan	FR	0.52			

Own elaboration; ATI: Attitudes Towards Immigrants. DE: Germany; FR: France; ES: Spain; PT: Portugal; BE: Belgium; GB: United Kingdom

Furthermore, Table 5.4 also focuses on the capital regions of our six countries under analysis. The results have been summarised in Table 5.5 to study the capital effect more easily. In this context, it is evident that there could be a capital effect between the regions analysed, as their ATI indicator is always above the respective national average. The value of Berlin's attitude towards immigrants is at least 11 points above the German ATI (11 for West Berlin and 14 for East Berlin). The seat of the French government, Paris, has an ATI of 0.72, even 20 points higher than the national ATI. Madrid's Spanish capital has an ATI value of 0.70, only 2 points above the national average, while Lisbon is 8 points above the ATI Portuguese average. Brussels is much more open to immigrants than other Belgian regions, with ATI values of 0.65, 21 points above the ATI of Belgium. The last capital in the order of ATI is London, the capital region most hostile to immigrants. Thus, it is in line with the rest of the country, although compared to the British average, it ranks 11 points above.

Table 5.5: ATI Capital regions

Group	Country	ATI	C-ATI
Berlin-East	DE	0.73	0.59
Ville de Paris	FR	0.72	0.52
Berlin-West	DE	0.70	0.59
Madrid	ES	0.70	0.65
Lisbon	PT	0.68	0.60
Brussels	BE	0.65	0.46
Greater London	GB	0.50	0.39

Table 5.5 continued from previous page

Own elaboration; ATI: Attitudes Towards Immigrants. DE: Germany; FR: France; ES: Spain; PT: Portugal; BE: Belgium; GB: United Kingdom. C-ATI: ATI at country level

We now want to provide a comparison between island regions and continental regions. Regarding island regions, Table 5.6 summarises the values of the attitudes towards immigrants from the Balearic Islands, the Canary Islands, and Corsica. The regions have been sorted in order of ATI values. Regional data on the number of immigrants in the regions were extracted from the respective national statistical institutes (Spain: INE; France: INSEE) to provide a broader overview of ATI in insular territories. The Balearic Islands are the island region with both the highest indicators, and it has a high immigration rate (20%) and the best ATI value of all regions. The Canary Islands have more moderate openness towards immigrants and an immigration rate of 14%. The results highlight a dual behaviour between the Balearic Islands and Corsica. These two island regions exhibit an opposite behaviour, as Corsica has the lowest immigration rate and a high hostility towards immigrants.

Table 5.6: ATI and Immigration rate in Corsica, Balearic, and Canary Islands

Group	Country	ATI	Immigration
Balearic Islands	ES	0.81	221.406 (20%)*
Canary Islands	ES	0.59	301.234 (14%)*
Corsica	FR	0.19	32.661 (10.2%)**

Own elaboration; *: INE; **: INSEE ATI: Attitudes Towards Immigrants. FR: France; ES: Spain

Finally, the elasticities of ATI by Islands regions and capital regions were calculated (Table 5.7). The elasticity analysis is studied because it provides interesting insights into the criteria that affect more ATI in each territory. In this study, the elasticities for each criterion of the capital and island regions were calculated. The

ATI of the Balearic Islands is quite inelastic to all criteria, even if the criteria concerning equality of rights and access to education between natives and immigrants have a more significant impact than other criteria. The same behaviour is repeated in the Canary Islands, but the criterion concerning the equality of rights has the most significant impact. The competition in the labour market, the perception of the economic threat of immigrants, and the equal access to education between natives and immigrants are criteria that have a significant impact on the Corsican ATI, and, interestingly, these three values are part of the five most elastic values that are analysed. The ATI is inelastic concerning all attributes as far as the capital regions are concerned. The criterion with the highest elasticity is the same rights between natives and immigrants, especially for Berlin West and Paris.
The five most inelastic pairs also show that three are observed in insular territories (Corse and Balearic Islands) and two in Berlin East. The criteria involved are those of bringing new ideas and cultures, and illegal immigrants should be excluded.

Table 5.7: Elasticities

	C1	C2	C3	C4	C5	C6	C7	C8
Balearic	0.0972	0.2744	0.3137	0.1479	0.1094	0.1236	0.0577	0.3037
Canary	0.1752	0.2106	0.3267	0.1803	0.1876	0.2151	0.1197	0.2497
Corse	0.1305	0.9151	0.2598	0.5688	0.0851	0.1015	0.0554	1.0876
Brussels	0.1822	0.2259	0.3285	0.1810	0.1910	0.2165	0.1487	0.2600
Berlin-E	0.1820	0.1952	0.3306	0.1347	0.0818	0.1803	0.0876	0.2719
Berlin-W	0.1798	0.2151	0.3311	0.1562	0.1389	0.1657	0.1149	0.2454
Madrid	0.1406	0.2408	0.2407	0.1478	0.1731	0.1645	0.1423	0.2393
Paris	0.1656	0.1623	0.3382	0.1525	0.1749	0.1407	0.1422	0.2180
London	0.2231	0.2247	0.2878	0.2396	0.2506	0.2503	0.1301	0.2645
Lisbon	0.1654	0.2347	0.2937	0.1427	0.1542	0.1811	0.1329	0.2513

Table 5.7 continued from previous page

C1:Immigrants increase crime rates; C2:Immigrants take jobs away from people born in [Country]; C3:Legal immigrants should have the same rights; C4:Immigrants are generally good for the economy; C5:Immigrants bring new ideas and cultures; C6:Immigrants undermine the culture; C7:Illegal immigrants should be excluded; C8:Legal immigrants should have equal access to education

5.6 Discussion

5.6.1 Pro-Immigrants Profiles

Previous studies have analysed the attitudes of citizens towards immigrants by country, religion, age, income, and education (Czymara, 2021; Davidov & Semyonov, 2017; Eger & Breznau, 2017; Karreth et al., 2015; Löw et al., 2022; Martín & Indelicato, 2021, 2022). The socio-economic characteristics of individuals are seen as proxies of factors that affect anti-immigrant sentiments.

The study introduced a methodology not commonly used in the social sciences. The Fuzzy-Hybrid TOPSIS approach was recently introduced in attitudes toward immigrants by Martín & Indelicato (2022). The methodology is effective, as the results replicate other studies (Bail, 2008; Davidov & Semyonov, 2017; Grigoryan & Ponizovskiy, 2018; Storm, 2018).

The analysis of the positive and negative ideal solutions shows that the maximum and minimum values expressed for each criterion are mainly represented by French territories and the political orientation of the extreme right. In particular, the criteria concerning the crime rate, the economy, and culture are negatively represented by the political orientation of the far right. In agreement with Creighton et al. (2015), financial and economic crises, such as the first decade of the 2000s, immediately impacted anti-immigrant sentiment. Especially among far-right citizens, the perception of economic and country safety threats arises when immigration increases (Boateng et al., 2021; Melossi, 2012).

At the country level, three areas of attitudes towards immigrants have been detected.

The Iberian Peninsula is the most open territory towards immigrants, civic nationalist countries, France and Germany, present moderate attitudes towards immigrants, and, finally, UK and Belgium represent the group of countries with anti-immigrant sentiments. Following McLaren & Johnson (2007) work, what worries the British citizens is the impact of immigration on society. In this regard, the key factors requiring specific attention are the economy, crime, and symbols of British identity. Brits are concerned that immigration threatens the jobs of their compatriots, which in turn affects how attitudes towards immigrants are shaped. Furthermore, the British are concerned about the symbolic and cultural threats arising from mass immigration, such as perceived religious threats to emphasise non-British values and end communities outside UK and threats to shared customs and lifestyles (Evans, 2002; McLaren & Johnson, 2007).

Religion is an essential determinant of anti-immigrant attitudes. The results show that citizens who profess minority religions in the countries analysed show more positive attitudes towards immigrants. For example, Muslims are the ones most in favour of immigration. This issue can be explained because Muslims are the ethnic minority and the largest share of immigrants to European countries. According to Marfouk (2019), anti-immigrant sentiment is a more Islamophobic sentiment. Therefore, it is easy to think that Muslims show more positive attitudes toward immigration as solidarity.

On the contrary, Catholics display negative attitudes towards immigrants. According to Kerwin & Alulema (2021), many Catholics do not align with Christian teachings, as they have negative feelings and attitudes towards immigrants. Following Ambrosini (2016) work, the charitable activities of Catholics do not include activities toward immigrants because according to the priorities of many Catholics, the protection of migrants and refugees is a secondary or lower priority (Kerwin & Alulema, 2021).

5.6.2 Capital regions and Islands

Attitudes towards immigrants at the territorial level have been summarised in Figure 5.1. The first result that the study confirms is the capital effect of the six countries

which can be explained by the fact that European capitals are multicultural societies. The literature shows that multiculturalism tends to have beneficial effects on immigrant attitudes, but it can also be a detonator against immigration (Deaux & Verkuyten, 2014; Rattan & Ambady, 2013). According to Mahfud et al. (2018), multiculturalism is related to more positive attitudes towards immigration. They have shown that in the condition of multiculturalism, citizens perceive low feelings of threat and, therefore, less prejudice. Research among majority group members has shown that multiculturalism can promote positive relationships between groups and evoke resistance and hinder harmony between groups (Mahfud et al., 2018). This last result is supported by the findings of the British regions, as multiculturalism has resulted in an increased perception of the threat to Britain (McLaren & Johnson, 2007). This study obtains significant results at the island region level. There is a perfect duality between Corsica, and the Balearic Islands, as the French island shows negative attitudes towards immigrants and the Balearics are more open to immigrants. One explanation may be the difference in the level of multiculturalism between the two regions, as the immigrant population in the Balearic islands is 20%, while in Corsica immigrants do not exceed 10%. In addition, it can be explained through the nexus between immigration and tourism (Capó et al., 2007; Provenzano, 2020; Ruggieri & Cal, 2022). Provenzano (2020) shows that the tourist flow between the two countries is affected by the migration rate and vice versa. His findings suggest a positive relationship between tourism and immigration. In other words, the greater the number of migrants from one country to another, the greater the flow of tourists from the first country to the second. Therefore, the duality between the Balearic Islands and Corsica can be dictated by the differences in tourism policies. Provenzano (2020) shows that the islands are characterized by a tourism development model that has favoured the construction of large hotels with a high average number of beds per structure, thus creating important and prominent tourist destinations. According to Capó et al. (2007) and Ruggieri & Cal (2022), the Balearic Islands is the archipelago that invests more in tourism, creating infrastructures, and promoting tourist activity, while Corsica is the island region with the lowest levels of tourism. Thus, the differences between the Balearic Islands and Corsica can be explained by the fact that high levels of tourism cause high rates of immigration (Provenzano, 2020). Thus, high levels of immigration build multicultural societies,

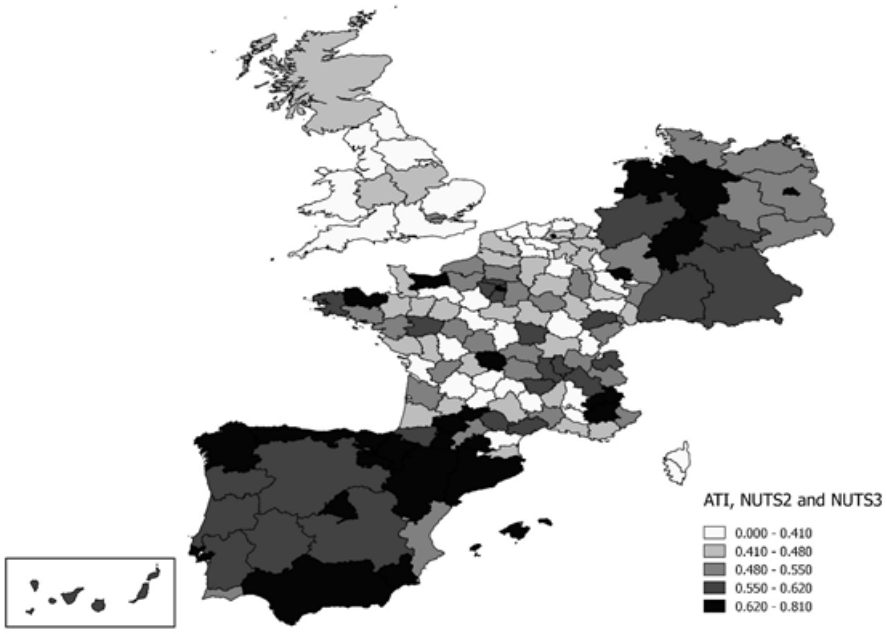

Figure 5.1: ATI at the territorial level - own elaboration

which are societies that show more positive attitudes towards immigrants (Mahfud et al., 2018).

5.7 Conclusions

Attitudes towards immigrants (ATI) is a very studied topic at the academic level (Czymara, 2021; de Vreese, 2017; Martín & Indelicato, 2021). The issue of immigration is still a very hot topic in the political and social debate. Researchers studying the ATI commonly use Confirmatory Factor Analysis (CFA) and Structural Equation Models (SEM), which have proven to be valid methodologies that are confirmed as efficient tools (Eger & Breznau, 2017; Grigoryan & Ponizovskiy, 2018; Löw et al., 2022). Despite this, the research does not seem to advance on a methodological level.

The study aimed to introduce a new methodology in this field of studies, manley the Fuzzy-Hybrid TOPSIS, which is not commonly used in the social sciences. The advantage of this approach is that it deals with the vague information provided by

the Likert scale commonly used in social science questionnaires. The 2013 ISSP data from the National Identity form were extracted. Eight items were chosen to measure attitudes towards immigrants (ATI), such as Immigrants increase crime rates, Immigrants take jobs away from people born in [Country]; Legal immigrants should have the same rights; Immigrants are generally good for the economy; Immigrants bring new ideas and cultures; Immigrants undermine culture; Illegal immigrants should be excluded; and legal immigrants should have equal access to education. The analysis was carried out at the country and territorial levels (NUTS2 and NUTS3).

The results confirm previous studies in the literature, giving an innovative approach by applying the methodology based on the fuzzy set theory. At the country level, the countries showing the highest ATI values are the countries of the Iberian Peninsula and Germany. At the same time, the United Kingdom and Belgium represent the group of countries with negative attitudes towards immigrants. At the territorial level, a capital effect is highlighted, as the capitals of the countries analysed tend to have more positive ATIs than the average of the respective country. Finally, a duality between the Balearic Islands and Corsica has been pointed out. The Spanish archipelago, driven by the nexus between tourist and migratory flows (Provenzano, 2020), has built a multicultural society tolerant of immigrants (Mahfud et al., 2018), while Corsica, which has invested less in tourism, presents more hostile attitudes.

As with any other study, future research is needed to overcome some limitations such as: (1) A small number of countries were chosen; (2) Only 2013 was considered; and (3) The analysis was carried out at an aggregate level, although the methodology allows the study at an individual level. Future research should first aim to introduce new ISSP versions after those of 2013 in the analysis providing more insights into the dynamic of ATI. Furthermore, second, it would be interesting to provide a more complete overview of Europe, introducing countries such as Italy, Austria, and other Eastern European countries.

6

PAPER 4: National Identity Through Two Alternative Methods

J.C. Martín, A.Indelicato

Abstract

National identity studies divert on a number of issues such as the number of factors and their respective items adscription. Multi-Group Confirmatory Factor Analysis is the standard method applied to cross-national datasets. Differences between groups can be the result from measurement artifacts, and we argue here that these problems can be better addressed by an alternative method that builds a synthetic indicator named Relative National Identity Synthetic Indicator (RNISI) which is based on a Fuzzy Hybrid Analysis (FHA). The empirical study is based on a dataset across ten countries using two waves (2003 and 2013) of the International Social Survey Programme (ISSP). The FHA results are compared with those obtained by two MGCFA models in which national identity is built as a second order construct that depends on the ethnic, ancestry and civic first order latent variables. The comparison lets us to conclude that FHA can be considered a valid tool to measure the national identity by groups, and to provide additional information in form of elasticity figures. These figures can be employed to analyse the sensitivity of the indicator by group and with respect to each of the items included in the national identity construct.

Keywords: National Identity · International Social Survey Program (ISSP) · Ethnic Identity · Civic Identity · Ancestry Identity · Fuzzy-Hybrid Analysis · TOPSIS.

6.1 Introduction

Modern states, nations and countries vary in their origin and the composition of national majorities such as linguistic, ethnic and religious. For this reason, national identities and the degree of attachment to the nation have been developed very differently in the historical course of each country in which migration and globalization have been affecting the national identity formation (Sidanius et al., 1997; Staerklé et al., 2010). Kunovich (2009) contended that some nationals could even

develop such strong nationhood identity that make them restrictive regarding the foreigners' naturalization process. Based on data from two waves of the International Social Survey Program (ISSP) in 2003 and 2013 for ten countries (Denmark, France, Germany, Ireland, Norway, Portugal, Russia, Spain, United Kingdom and the United States), the current study analyses the national identity construct with the use of two well-known methodologies: Multi-group Confirmatory Factor Analysis (MGCFA) and a Fuzzy Hybrid Analysis (FHA).

The first method is based on latent constructs which are unobserved variables that are usually measured indirectly using a number of items or indicators in a questionnaire. It is an econometric method that needs to be estimated a a number of assumptions are implicitly made about the error distributions. It also needs to test measurement equivalence for the analysis of the main differences observed between groups in order to obtain reliable results that are not a consequence of measurement biases (Davidov, 2009; Davidov and De Beuckelaer, 2010; Reeskens and Hooghe, 2010). On the other hand, the essence of the second method is analytical and it is mainly based on the properties of the Fuzzy Set Theory (FST). The method is well-known and has been applied to measure latent constructs in many fields such as hotel industry (Kumar, 2019), education (Di Nardo and Simone, 2019), supplier selection (Rashidi and Cullinane, 2019), and Green energy (Mohsin et al., 2019). Martín et al. (2020) argued that FST is a good analytical tool to analyse construct formation as researchers could not find a unique objective function to measure latent concepts that are common in social science.

Thus, the current study has both a substantive and a methodological rationale: we will first test which countries hold a stricter conception of nationhood and whether the dynamic evolution seems to point out into stricter conceptions or not; and secondly, we will compare the results of both methods to analyse whether FHA could complement and validate the results obtained by established methods such as MGCFA. The main advantages of FHA reside in that many of the scale formation in the real world take place within contexts, in which the factor dimensionality and its constituency are not accurately known. The construct building might be seen as a multi criteria decision-making problem that is highly influenced by human subjectivity. Similarly, as in Martín et al. (2020), a hybrid fuzzy TOPSIS (the technique

for order of preference by similarity to ideal Solutions) is proposed as a valid multi-step tool that has the ability to handle vague information using fuzzy concepts and fuzzy logic.

6.2 Nationhood as a construct

Segatti and Westle (2016) contended that national identity been studied from two different analytical perspectives: political and sociological. Both of them depart from the positive force that is able to create a nation integratseting the citizens into a modern political entity. Nevertheless, the approaches differ on the focus of the stakeholders involved in the process. The political approach is focused on the political institutions and the national identity is left in the background, meanwhile the sociological approach considers the characteristics that transcend a national identity into a collective identity. The authors aligned these two approaches with the civic/political and ethnic/cultural ideas of nationhood, and they casted some doubts about whether some dimension makes national identity more or less restrictive. Sinnot (2006) analysed that over a period of 30 years, there have been a series of cross-national surveys that have included questions about national identity, and in some other instances at various subnational and supranational level. ISSP is one of them, but also relevant surveys are the following: the European Values Survey and the World Values Survey. The author provided a categorization of national and related identity in mass public opinion studies according to: "(1) the object of identification (national, subnational, or supranational); (2) the nature of the relationship between the respondent and the object; (3) the nature of the response demanded by the question; and (4) the nature of the scale (if any) used in measuring the response (p. 212)". Regarding the third category, the author distinguished between measures based on a ranking or a rating. With respect to the second category, the author found two main types: identification and proximity. ISSP national surveys are characterized by ratings in terms of proximity. Wright et al. (2012) assessed the validity of national identity measures that were widely used with an emphasis on the effects of measuring the scale items through ratings or rankings. The authors concluded that rating measures can be used to find a national identity

typology, and that the results are not constrained by using ratings or rankings in the national identity measurement. Miller and Sundas (2014) proposed an index to measure national identity as the subtraction of the mean values on ethnic-cultural items (nativity, living, language, religion, and ancestry) and the mean values on civic items (citizenship, respect and feeling). The ISSP nationhood construct has been broadly studied using different countries and ISSP waves (Ariely, 2019; Hadler & Flesken, 2018; Haller & Ressler, 2006; Heath et al., 2009; Kunovich, 2009; Lewin-Epstein & Levanon, 2005; Medrano, 2005; Miller & Sundas, 2014, Pehrson et al., 2009; Reeskens & Hooghe, 2010; Sarrasin et al., 2013; Wright, 2011a,b). Civic and ethnic factors have been underpinned on theoretical approaches on nationalism and citizenship. Medrano (2005) suggested that these constructs have been taken for granted and that reliability tests need to be applied to contrast them with other theories such as the Weber's ideas on social closure. In this sense, the author admitted that it is necessary to go beyond the group threat and cultural affinity theories. The Weberian approach distinguishes between citizens who present very restrictive preferences to in-group membership (credential's vision of the nation) and those who are certainly laxer (post national citizens).

Medrano and Koenig (2005) contended that the prevailing models of nationhood are intertwined with: (1) flexible and restrictive immigration policies; (2) open and xenophobic societies; (3) assimilationist and multiculturalist integration policies; (4) citizenship models dominated either by jus sanguinis or jus soli; and (5) policies that equate immigrants' rights at the same level of citizenship rights. The authors also argued that in the early 1990s there was a shift in social research from nationalism to citizenship, and that a Marshallian focus (civil, political and economic rights) was substituted by a Weberian focus (inclusion and exclusion of the others - out-group citizens).

Now, we analyse pragmatically how different authors have developed the national identity construct based on ISSP data. In all the cases, the operational definition of national identity is based on the responses given to the question: "Some people say that the following things are important for being truly [country-fellow]. Others say they are not important. How important do you think each of the following is? Citizens, then, rate eight indicators from "not important at all" to "very important". There have been different methods to analyse national identity such as

simple average means, single indicators, EFA, CFA, and MGCFA. For example, Pehrson et al. (2009) analysed the national identity using 31 countries and ISSP 2003 wave, excluding from the dataset the observations with missing values and those citizens who did not possess the citizenship of the country. The authors did not apply any multivariate analysis and they construct the national identity using three of the items discussed in the nationalism literature: citizenship (civic), language (cultural) and ancestry (ethnic). They preferred to use this approach because EFA provided very inconsistent results regarding the factor structures across the 31 countries. Exploratory factor analysis (EFA) have been usually first applied to obtain very different patterns of factor composition that ranges from one to three factors. The factors have been mainly named as ethnic and civic. Some studies have analysed different countries or countries with different ethnic groups, so EFA have been performed for different groups, and the results obtained also present many differences: stable results (Kunovich, 2009; Reeskens & Hooghe, 2010 -for the pool dataset), same structure with different factor loadings (Reeskens & Hooghe, 2010 -for different countries) and different structure (Haller & Ressler, 2006; Heath et al., 2009; Lewin-Epstein & Levanon, 2005; Pehrson et al., 2009). In all the cases, the main differences are caused by the number of countries or by the different ethnic groups that exist in multinational countries.

Haller and Ressler (2006) showed that the two dimensions of national identity (ethnic vs. civic) did not homogeneously exist in 19 European countries using ISSP 2003 wave. In fact, the authors found that for seven countries the national identity can be studied with only one factor. For the whole sample, two items citizenship and feeling presented high load factors in both dimensions, so the authors concluded that the neat political distinction proposed by the theory was not real at all but only a non-confirmed illusion. They showed that the distinction between some attributes belonged more to their characteristics in regard to whether some of them can be either considered more or less ascribed or can be related to social and political involvement. After EFA, the most common method applied has been CFA, in which cross-national measurement equivalence has been analysed through MGCFA. Kunovich (2009) included in the analysis 31 countries and began his analysis including only one latent construct to extremely differentiate credentialists from those who are post national individuals. In a second model, two latent constructs were

analysed to represent ethnic and civic dimensions. Interestingly, the author found that the two factor solutions was mainly due to two indicators, respect (civic dimension) and ancestry (ethnic dimension). The other six indicators are included in both dimensions. The author used also a multilevel regression to show that national identity affects public policy preferences related to immigration, citizenship, assimilation, and foreign policy.

Heath et al. (2009) showed that some differences between countries were due to response rates and other features of survey design and that validity of cross-national comparisons can be jeopardized if some of the existing methodological problems are ignored. The authors showed that a number of items does not mean the same in all countries, so there were lessons to be learnt such as non-response bias or measurement errors in order to make the results comparable at national level. The authors found with surprise that the item related to citizenship presented a significant loading on ethnic and civic factors, and they concluded that the item was the main cause that distorted more the configural equivalence across the two obtained factors (ethnic and civic). The authors concluded that the result could be in part explained by the different naturalization processes that exist in each country (Brubaker, 1992).

Reeskens and Hooghe (2010) were the first to apply MGCFA to analyse the cross-national validity and measurement equivalence of the two dimensions of national identity. It is of interest to highlight that one of the indicators used by Pehrson et al. (2009) (ancestry) corresponded to the highest load factor of the ethnic dimension. On the other hand, respect for the political institutions and laws presented the highest load factor for the civic dimension. The authors decided to discard the citizenship status because the item loaded on both factors, and, interestingly, both showed a high correlation which meant that citizens tended to favour both national identity dimensions at the same time. It is unclear why the authors did not decide to include citizenship in both factors in the MGCFA. In any case, the authors found that there is a varying degree of the importance of religion on the ethnic dimension over different countries that showed that this item meant different things when the authors analysed a full scalar equivalent model. The authors found, for example, that religion is a very important item for the ethnic identity in Israel.

Wright (2011) contended that the national identity module is not well-suited to capturing ethnic and civic constructs of national identity as the majority of the

items seem to have an ethnic connotation. The author also distinguished between ascribed and achievable items, and selected ancestry and nativity to represent the ascribed dimension, meanwhile respect for laws and feeling like a national were selected to represent the achievable dimension. The author did not employ EFA or CFA to analyse the national identity, and used the normalized score values for each of the items commented above in multilevel regression models to study a number of hypothesis at country level which are based on the immigrant population growth, multiculturalism, citizenship, social spending policies and unemployment rate.

Sarrasin et al. (2013) analysed the equivalence of a number of MGCFA models for the German and French communities in Switzerland. The authors decided to discard "feeling Swiss" from the analysis because it presented a high loading in both dimensions and for both linguistic groups. In the comparison of latent means, the authors did not find any partial scalar model for which the fit indices changes were acceptable.

Hadler Flesken (2018) analysed whether political party manifestos have had an effect on individual national identity formation analysing three waves of ISSP (1995, 2003 and 2013). They conducted EFA and CFA for the pool and each country datasets. The authors found that only nativity, living and religion loaded constantly in the same dimension, so they decided to use these three indicators to measure a univariate construct that was finally named as "preference for restrictive nationhood". The authors did not discuss the equivalence of the MGCFA but they calculated the dependent variable as the mean value of the respondents' valid answers given to the three items in order to reduce the number of missing values.

We end this section with a recent study by Ariely(2019), in which the author analyses the relationship between national identity and globalization. The study is only focused on the ethnic identity, and it includes items from four cross-national surveys (ISSP 2013 and 2003, the European Values Study (EVS) 2008, and the World Values Survey (WVS) 2005). The dataset contained 190,421 respondents from 74 different countries. Besides the effort made at the scale of the study, the author decides to avoid the comparability issues using only one item to represent the ethnic identity (ancestry).

6.3 Data

The datasets for ten countries from ISSP 2003 and 2013 waves (ISSP 2003; 2013) are selected to analyse the national identity. We include the eight indicators that analyse the construct which are based on the answers given to the importance of each of them for being truly (country) nationals (CN): (1) to have been born in (country); (2) to have the (country) citizenship; (3) to have lived in (country) for most of one's life; (4) to be able to speak the (country) language; (5) to be (religion); (6) to respect the (country's) political institutions and laws; (7) to feel (country nationality); (8) to have (country nationality) ancestry. The terms in parenthesis were accordingly replaced by the respective country names and, in the fifth item by the dominant religion.
The ISSP coding (from 1=very important, 2= fairly important, 3=not very important, to 4=not at all important) was reversed so that high scores are aligned with the idea that the characteristic was important to be a truly CN. The final sample contained 27,873 citizens (Denmark in 2003: 1,322; Denmark in 2013: 1,325; France in 2003: 1,669; France in 2013: 2,017; Germany in 2003: 1,287; Germany in 2013: 1,717; Ireland in 2003: 1,065; Ireland in 2013: 1,215; Norway in 2003: 1,469; Norway in 2013: 1,585; Portugal in 2003: 1,600; Portugal in 2013: 1,001; Russia in 2003: 2,383; Russia in 2013: 1,514; Spain in 2003: 1,212; Spain in 2013: 1,225; United Kingdom in 2003: 873; United Kingdom in 2013: 904; United States in 2003: 1,216; United States in 2013: 1,274).

6.4 Methods

As Hand (1996) pointed out, researchers are usually confronted with the kind of hypotheses that might be formulated and the models that need to be applied in the analysis of these hypotheses. The profound debate and controversy created in the academia is rooted in the legitimacy of applying different statistical methods to data that are commonly used in different disciplines in which the measurement theory plays a determinant protagonist. The measurement theory, the nature of the research questions, the transformation of variables, and the statistical models are all intertwined at the time of obtaining meaningful results.

Bartholomew, in the discussion of the paper by Hand (1996), emphasized that the majority of scientists saw the philosophical debates of little practical importance, and insisted that social measurement needed a much broader foundation. He finally highlighted that social measurement suffers from an inevitable arbitrariness regarding the choice of indicators, the sampling selection and the model adequacy. In any case, the ultimate test for the social measurement is based on whether the results translate the qualitative idea into quantitative terms. On the other hand, Gower discussed the paper by Hand (1996) with a focus in psychometrics and concluded that there are two important issues to handle in developing social measures: (1) how best to combine values on many variables to produce an overall aggregated value; and (2) how to derive a scale or at least an ordering from multidimensional points. The aim of multidimensional scaling is similar to that of multi criteria decision making (MCDM) which has benefitted greatly from the research related to Fuzzy Logic. MCDM is considered a subfield of operations research that aims to find a synthetic evaluation of multidimensional performance criteria. Mardani et al. (2015) found a total of 413 papers published in 150 journals since 1994 that apply fuzzy techniques in MCDM. From the total of papers, 79 were based on hybrid method that also applied TOPSIS proposed by Hwang and Yoon (1981).

In this study, we will compare two well-known methods that have been used in different fields for constructing operational concepts: the latent variable model and the fuzzy hybrid analysis. Both models aim to obtain a construct which is based on the information provided by multiple observed manifests or indicators. Several constructs such as quality of life (Moya et al., 2020; Suárez et al., 2018), national identity (Radziszewska-Zielina & Śladowski, 2017; Sarrasin et al., 2013), or institutional trust (Coromina Peral, 2020; Martín et al., 2020) have been already built in terms of their constituent components using both methods.

6.4.1 Multi-Group Confirmatory Factor Analysis

Artificial significant mean differences among a set of subsamples (population segments) may be the consequence of various methodological issues such as organization

of the survey, item translations that change the meaning across groups or even respondents' response styles (Cheung & Rensvold, 2000; Heath et al., 2009; Steenkamp & Baumgartner, 1998). In such cases, the results could be biased and the conclusions could mislead users and practitioners. Sarrasin et al. (2013) advised researchers to analyse measurement equivalence as a necessary step before comparing or pooling data from distinct groups.

The measurement equivalence is generally based on a group of tests that goes from the least constrained model (configural base scenario) to the most constrained model (full scalar invariance model). Byrne (2010) advised first to analyse via an Exploratory Factor Analysis that the structure (number of factors and patterns of salient and non-salient factor loadings) is similar across groups. Unfortunately, the similarity concept is left to researchers' best judgement, and the results regarding the number of factors and the set of indicators included in each of them has varied substantially. In fact, Reeskens & Hooghe (2010) recommended researchers to discard those items that could distort configural equivalence as these will likely provoke poor adjustment fits in MGCFA. This practice has rendered that the results could not be easily compared as the studies are neither usually based on the same constructs nor the same items are included in their respective reflective or formative specification. This feature is a very restrictive condition that does not exist in FHA. The rest of the steps for measurement invariance can be directly tested by MGCFA. Thus, for example, metric equivalence requires item loadings to be equal. This restriction is scarcely met in real applications, especially if a large number of groups is included in the analysis. For this reason, partial metric equivalence was defined when at least the factor loadings across groups of two items per latent construct are equal (Byrne et al., 1989), and many empirical applications are based on partial metric equivalence rather than on full metric equivalence. In any case, the metric equivalence is irrelevant when, as in the present case, researchers want to compare mean differences. The comparison of latent construct means relies on a more restrictive equivalence – the scalar equivalence, in which the item intercepts are added to the item factor loadings across groups in order to be equal. The scalar equivalence means that there is a pattern of similar high and low scores on the set of indicators, and as this is not normal for some indicators which presents a high variability among groups, the scalar equivalence is not frequently reached with a large number

of indicators (Selig et al., 2008; Steenkamp & Baumgartner, 1998). Similarly, as before, partial scalar equivalence with two indicators per construct is usually addressed, and researchers tend to frequently rely on partially scalar equivalent scores. Nevertheless, although numerous studies rely on partial scalar equivalence models, there exists a certain controversy regarding whether it is necessary or not to have a full scalar invariance model in order to compare meaningfully the latent mean scores. Sarrasin et al. (2013) adopted a pragmatic approach and compared the latent civic and ethnic latent construct means using two models: a partial scalar equivalent model and a full scalar equivalent models. The authors finally came up with a recommendation regarding that the latent means comparison can be based on a partial scalar equivalent model if the rank order of the means between full and partial scalar equivalent models does not fluctuate.

6.4.2 Fuzzy Hybrid Analysis

Most of the social science constructs are based on responses given under a format of Likert or semantic ordinal scales. Both scales are, in general, used to collect information that is intrinsically vague, and cannot be easily transferred as equidistant crisp numbers (Lalla et al., 2004; Marasini et al., 2016). Respondents usually face a set of statements with a positive or negative connotation regarding the phenomenon under study, and they evaluate them according to the following format: (1) strongly disagree or not important at all; (2) disagree or not very important; (3) uncertain or neutral; (4) agree or important; and (5) agree very much or very important. The complex steps involved in the mental process that respondents use to answer the questionnaire undoubtedly pose the base to ascertain that in most of the cases the information provided is uncertain or vague, and this is the core of using fuzzy sets as proxies for the information (Bellman & Zadeh, 1970; Zadeh, 1965; 1975; Zimmermann, 2001).

Zimmermann (2001) discussed the distinction between the concepts of probability and possibility, in which the latter is connected with that of membership function in a fuzzy set. The concept presents a peculiar way to proxy meaning at the time of developing expert systems that are applied in different fields of decision analysis

such as MCDM.
Fuzzy Set Theory (FST) is not only appropriate to adjust the vague information provided by ordinal semantic scales, it has also advanced in multiple applications and disciplines since its origin. In MCDM, the development of mathematical models has resolved a number of different empirical applications in many fields such as hotel industry (Kumar, 2019), education (Di Nardo and Simone, 2019), supplier selection (Rashidi and Cullinane, 2019), or green energy (Mohsin et al., 2019). The essence of the application of the FST in MCDM that analyses scales from a multivariate perspective resides in that there is not a unique objective function that exists to measure latent concepts that are common in social science (Martín et al., 2020a).

6.4.3 The first three steps

The vagueness of the information is introduced with the use of fuzzy set which are based on the membership function $\mu_A(x)$ which is used to proxy the relative truth that exist in the statements that $x \epsilon A$ (Mamdani and Assilian, 1975; Zadeh, 1983, 1999). Zadeh (1965) contended that fuzzy sets provide the perfect framework to deal with problems in which the source of imprecision is related to the absence of accurate and well-defined indicators rather than the presence of random variables. Zimmermann (2001) added that "FST provides a strict mathematical framework (there is nothing fuzzy about fuzzy set theory!) in which vague conceptual phenomena can be precisely and rigorously studied (p. 5)".
The FS that are used in our study are Triangular Fuzzy Numbers (TFNs) that will contain the information matrix of the national identity responses. Salih et al. (2019) review the studies that use the keywords 'TOPSIS' or 'technique for order preference by similarity ideal solution' and 'development' and 'fuzzy', and the authors conclude that TFNs are still the most common FS used by researchers when they deal with uncertainty and vague information. TFNs are also known as type-1 FS. TFNs $\tilde{A}$ are usually parametrized with a 3-uple(a_1, a_2, a_3) in which the extremes of the interval represent the thresholds that determine the possible values for the information, and the mid-point expresses the most likely value. There are different representations that have been used in different applications. Our study will be based on the following representation (1=(0,0,50); 2=(30,50,70); 3=(50,70,90); 4=(70,100,100)) that

has already been used by Saayman et al. (2016). The selected TFNs imply that there is less fuzziness when citizens answer that a particular indicator is considered very important to be a [country] national. In the rest of the cases, it is assumed that the vagueness degree is higher. It can also be seen that TFNs are characterized because their possible values belong to the interval [0, 100]. In each of the categories, it can be seen that the information provided is vague as all the consecutive ordinal semantic points are represented by 3-uples that intersect in some interval. For example, the interval (30, 50) is in the intersection of the first two points (not at all important and not very important). As said, the most likely values are 0 and 50 respectively. Fuzzy Set Logic Algebra facilitates the aggregation of TFNs. Thus, it is straightforward to calculate the average TFN for a particular population segment that can be determined by some variable of interest (Buckley, 1985). The properties of the algebra guarantee that the average of TFNs is also a TFN. In this study, we will examine 143 different socio-demographic segments that have their origin in the categories obtained for thirteen covariates used in the study, and the average TFN can be obtained for each of these segments of interest. Thus, a matrix (8, 143) of TFN will be the information matrix that will be used in subsequent steps of the method. This matrix is known as the TFN information matrix, and it contains a lot of information which is difficult to analyse at first glance. Therefore, a defuzzification of the matrix is carried out to synthesize the information before applying other methods such as, for example, the technique for order of preference by similarity to ideal solutions (TOPSIS) (Kumar, 2017). For this reason, the method is known as FHA. Therefore, we transform the fuzzy information matrix into a plausible or more credible real number or crisp value information matrix as uncertainty and information vagueness has been adequately handled. Chen (1996) provides a defuzzification method by calculating the weighted average of the 3-uple that represent the respective TFN of the fuzzy information matrix, giving more importance to the value that, according to fuzzy ideas, contains more truth. Therefore, the defuzzified value is obtained as $\frac{(a_1+2a_2+a_3)}{4}$. The method is also known as the centroid method, derived from the ideas of Kaufmann and Gupta (1988). It turns out to be a simple method, robust and with good properties. Another method which is equivalent to Chen's proposal is the total integral value method when the neutrality function is applied to other judgments either optimistic or pessimistic (Martín et al., 2019; 2020).

6.4.4 The last four steps

This section will cover the part of the hybrid analysis which is based on TOPSIS. As explained above, after the defuzzification, a crisp information matrix V with dimension (8, 143) contains the defuzzified value for each indicator and population group. Thus, it is now possible to determine the positive and negative-ideal solutions that are observed after the aggregation process. During the data curation, it has been explained that all the criteria to measure the national identity have been chosen in a way in which higher values are associated with stricter national identity formation. Thus, in TOPSIS parlance, it can be said that all the criteria can be considered as benefit values (Behzadian et al., 2012). Thus, the positive ideal solution is obtained by the maximum figures observed in the whole set of groups, and the negative ideal solution is characterized by the minimum figures. Once the positive and negative ideal solutions are obtained, the fifth step consists in obtaining the Euclidean distances between each observation and the ideal solutions, as a way to compare the relative distance which will be used to calculate the relative national identity synthetic indicator (RNISI) per each observation. The Euclidean distances, S_j^+ and S_j^-, measure the distances of the aggregated value of each population segment with respect to the positive and negative ideal solutions respectively. Then, RNISI is calculated as a relative index between the distance with respect to the negative ideal solution and the sum of the obtained distances with respect to both ideal solutions, that is:

$$RNISI_j = \frac{S_j^-}{S_j^+ + S_j^-}$$

Thus, a particular observation (population-segment) perceives national identity in a stricter way if the relative index is closer to one, and the index can be used to rank all the observations according to the descending order to find which segment is more or less strict with respect to the national identity concept. The logic of the index is clear because the indicator is higher for those segments which are closer to the positive ideal solution and farther from the negative ideal solution. Finally, the seventh step is used to calculate the elasticities of the index for each population segment with respect to each of the eight criteria included in the national identity formation. The values measure the sensibility of the indicator with

respect to changes in the crisp values of each criterion. This information allows us to understand which of the criteria included in the index formation produces more or less changes in the respective indicator. The information also permits to analyse whether some population segments are more or less elastic to some of the criteria. Mathematically, elasticities are calculated as

$$\eta_{ij} = \frac{\Delta\%OTISI_j}{\Delta\%C_i} = \frac{d(OTISI_j)}{d(C_i)} \frac{C_i}{OTISI_j}$$

where i denotes the criterion $(1, \ldots, 8)$ and j the population segment $(1, \ldots, 143)$. In the next section, the results of the study will be presented and compared with those obtained by MGCFA.

6.5 Results

6.5.1 MGCFA

As discussed above, EFAs (principal component factor analyses with a Promax rotation) were performed with R to analyse if similar factor structures were present in the twenty respective population segments obtained from ten countries and two different years. EFA revealed that the number and content of the dimensions in each region did not a similar structure across groups, neither in the number of factors, nor in the contents of each factor and the patterns of salient and non-salient factor loadings. The number of factors ranges from 2 to 4, and the split of the indicators in the factors was not stable, but, in most of the cases, the ethnic and the civic dimensions obtained by previous studies were also obtained. For the pool of the observations, 3 factors were obtained: (1) the first factor contains the first three indicators to have been born in the country, to have the country citizenship and to have lived in the country for most of one's life; (2) the second factor contains the indicators 5 and 8 (to practice the majoritarian religion and to have ancestry from the country; and (3) the third factor contains the indicators 4, 6 and seven which are more related to the civic dimension (to speak the language, to respect the country's political institutions and laws and to feel country nationality). Besides the dark prerogatives given by Byrne (2010), we decided to move on with the analysis of measurement equivalence across the territories under analysis by means of MGCFA

using R software. We analyse two different scenarios. First, all the items were assigned to one factor as EFA did not provide any initial similar allocation across countries, and second, we decided to use a second order latent model using the factors obtained for the pool of the data according to the structure provided by the EFA with the pool of observations. The steps discussed above were followed with the idea of being able to compare factor means across territories and political orientation in case of full or partial scalar equivalent models if those could be achieved. The adequacy of the model fit will be based whenever it is possible following the standard practice in the discipline, that is when: (1) both the comparative fit index (CFI) and Tucker–Lewis index (TLI) are higher than .95; and (2) both the standardized root mean square residual (SRMR) and root mean square error of approximation (RMSEA) are lower than .05. We will depart from these standard values using relative close values to the reference points mentioned above as, in some cases, CFI greater than 0.9 and RMSEA lower than 0.08 can be considered acceptable (Byrne, 2010; Schermelleh-Engel et al., 2003). Meanwhile, the loss and gain in successive measurement invariance steps will be based on the differences of the fit indices (Chen, 2007; Cheung & Rensvold, 2002). Thus, the equivalence will be accepted whenever both the decrease in CFI is equal to or smaller than .01 and the increase in RMSEA is equal to or smaller than .015 (Byrne Stewart, 2006; Chen, 2007). Both studies showed that small changes (between the steps) in CFI and RMSEA reliably indicate that a further step in equivalence is reached. If in any step, the difference of fit indices is outside the recommended values, the constraints on some parameters will be relaxed according to the values of the modification indices (MIs) in order to get a partial measurement invariance equivalent model. Table 4.1 shows the initial models that test configural (pool), configural (group), metric and scalar equivalent models. Unsurprisingly, it can be seen that all the uni-dimensional models present a very poor adjustment to the data. On the other hand, the initial models for configural (pool), configural (group), metric and scalar models for the 3-factor national identity model present very acceptable indices for both group variables (country-year and political orientation-year). There are some important differences observed for both group variables. In the first case (country-year), since the step of the scalar equivalent models, it can be seen that the differences of CFI did not fall into the acceptance area although the differences 0.014 and 0.027 are not severe,

and both models present a very good fit to the data. On the other hand, for the political orientation-year group, it can be seen that all the models present a very good fit and the differences between the fit indices belong to the acceptance area so they can be considered equivalent. Thus, for the case of the territories group, based on MI, equality constraints on item intercepts were released until the fit adjustment was acceptable. Accordingly, intercepts for six items were relaxed, and only for the indicators 1 and 5, the constraints were considered equal. The resulting partial metric and scalar equivalent models were supported by the data, but we could not get any partial metric and scalar equivalent model. For practical reasons, we also estimate the same structural models for the case of the groups based on political orientation-year and we could observe that in both models, the fit adjustment was worse and the changes in CFI were not considered acceptable. Thus, it can be concluded that territories exhibit very different patterns for national identity, and that partial models in both groups did not get any fit improvement due to the number of groups and the ordered nature of responses. The analyses revealed that the intercept of some of the items included in the national identity scale as well as the first order latent variables: ethnic, ancestry and civic were neither equivalent across territories nor across political orientation groups. A non-equivalent intercept indicates a systematic bias either positive or negative for measuring the item in each territory. Thus, researchers should study the possible causes of such results through a better understanding of the particular idiosyncrasies of each country. It is notorious that the specific political debates regarding the naturalization process in each country could reveal further information that could shed light on the issue. Table 6.1 also shows that partial scalar equivalence models fitted the data worse than the full scalar equivalent model. It is still under debate whether the partial equivalent latent variable means are a valid tool to obtain robust results. Byrne et al. (1989) argued that the comparison can be validly made, but De Beuckelaer (2002) was not so convinced regarding this was the case. Meanwhile, Chen (2008) and Sarrasin et al. (2013) recommended to compare the latent means provided by full and partial equivalent models whenever the Spearman correlation coefficient between the latent variable mean vectors is equal to one, that is the rank order of the means is stable and does not change across the groups. We postpone the comments on the rankings of the latent variable means for a next section in which

the results will be compared with those obtained from FHA.

Table 6.1: Fit indices for models that test configural, metric and scalar equivalent models

Model	Df	χ^2	CFI	TLI	RMSEA	SRMR
Configural (pool)	20	8,911.5	0.85	0.79	0.13	0.08
Configural (MGCFA)	400	7,120.4	0.89	0.85	0.12	0.05
Metric	533	10,924.1	0.83	0.82	0.13	0.10
Scalar	666	27,907.9	0.56	0.63	0.18	0.18
Model 3 factors (Ethnic:Ind1-Ind3; Anc:Ind5,Ind8; Civic:Ind4,Ind6,Ind7; Nat.Id (Ethnic, Anc, Civic)						
Group by country-year						
Configural (pool)	17	3,501.2	0.98	0.97	0.09	0.07
Configural (MGCFA)	340	2,382.7	0.99	0.99	0.07	0.05
Metric	473	6,296.7	0.98	0.98	0.10	0.08
Scalar	701	14,028.5	0.95	0.96	0.12	0.07
Partial.Metric (Ind2 and 7 f actor loadings are free)	397	5,422.9	0.92	0.89	0.10	0.06
Partial.Scalar (Ind1 and 5 intercepts are equal)	359	5,422.9	0.92	0.87	0.11	0.06
Group by Political orientation-year						
Configural (pool)	17	3,501.2	0.98	0.97	0.09	0.07
Configural (MGCFA)	187	3,550.2	0.99	0.98	0.09	0.07
Metric	257	4,524.7	0.98	0.98	0.09	0.07
Scalar	377	5,261.1	0.98	0.98	0.08	0.07
Partial.Metric (Ind2 and 7 factor loadings are free)	217	5,299.8	0.91	0.87	0.10	0.06

Table 6.1 continued from previous page

Partial.Scalar (Ind1 and 5 intercepts are equal)	197	5,299.8	0.91	0.86	0.11	0.06

In the analysis of the fits of the subsuquent steps, fit indices are usually worsening, that is CFI and TLI are lower and RMSEA and SRMR are higher. However, changes in the other direction (i.e., higher CFI and TLI and lower RMSEA and SRMR) are also possible because most fit indices depend also on the number of degrees of freedom. CFI=comparative fit index; TLI=Tucker–Lewis index; RMSEA=root mean square error of approximation; SRMR=standardized root mean square residual

6.5.2 FHA

Table 6.2 shows the TFNs and the defuzzified values that represent the total sample analysed in the study. TFN contains a lot of information that cannot be easily interpreted, and usually, this is a source of tension and stress for readers who are not familiar with fuzzy set theory. Looking at the values of the respective TFNs, it can be seen that all the TFNs overlap. This is not a surprise at all as it shows the essence of fuzzy set theory when information is extracted from the uncertainty created by semantic ordinal scales. For this reason, it becomes necessary to defuzzyfy the information with the centroid method. Thus, it can be seen that the average citizen is certainly stricter with respect to speak the language and to respect the political institutions and laws, and less strict with respect to process the religion of the majority and to have previous national ancestors in the family. It is interesting to highlight how some populist parties that have appeared in some countries did not include ethnic markers in their discourse to distinguish the national boundaries on the in-group and insist on issues such as language and civic values (Antonsich, 2016; Moffitt, 2017).

Table 6.2: TFNs and crisp clarified values for the total sample

Criteria	TFN	Crisp Value
To have been born in (country)	(49.90 , 72.17 , 86.77)	70.25
To have the (country) citizenship	(57.31 , 82.05 , 92.26)	78.42
To have lived in (country) for most of one's life	(51.56 , 74.45 , 88.20)	72.16
To be able to speak the (country) language	(58.84 , 84.21 , 93.10)	80.09
To be (religion)	(30.38 , 44.86 , 72.17)	48.07
To respect the (country's) political institutions and laws	(58.57 , 83.67 , 93.18)	79.77
To feel (country nationality)	(56.98 , 81.58 , 92.04)	78.05
To have (country nationality) ancestry	(43.74 , 63.82 , 82.18)	63.39

Own elaboration; TFN: Triangular Fuzzy Number

Table 6.3 shows the ideal solutions and the representative segment of the positive ideal solution (PIS) and the negative ideal solution (NIS). It can be seen that the PIS is characterized by countries (United States, Russia and Norway), political orientation (Far right), and education (Primary school). For the sake of exposition, we have preferred to omit the information for the year from the analysis as the picture was mixing. On the other hand, the negative solution is characterized by citizenship (N), religion (Jewish) and country (Ireland). It is not a surprise that those segments formed the NIS vector as they are likely characterized for being migrants, and then they are less strict regarding the formation of the in-group characteristics as they analyse the issue with a larger empathy from the out-group.

Table 6.3: Positive and negative ideal solutions. National identity scale

Attribute	PIS	Segment	NIS	Segment	% var
C1	80.78	Far right _2013	52.97	Citizen(N)_2003	53%
C2	87.50	US_2003	62.46	Citizen(N)_2003	40%
C3	78.85	Prim. school_2003	59.29	Jewish _ 2013	33%

Table 6.3 continued from previous page

C4	88.75	Far right _2013	49.96	Ireland _ 2013	78%
C5	70.80	Russia _ 2013	19.80	Jewish _ 2013	258%
C6	88.13	Norway _ 2013	67.94	Ireland _ 2013	30%
C7	85.86	Far right _2013	63.81	Citizen(N)_2003	35%
C8	76.39	Prim. school_2003	31.58	Jewish _ 2013	142%

Own elaboration; PIS: positive ideal solution; NIS: negative ideal solution

Regarding the PIS crisp values, we confirm that the larger indicator is related to be able to speak the language, and the lowest value is related to the religion from the majority. On the other hand, the analysis of the NIS values confirms the trend observed for the whole population regarding that the religion and to have previous ancestors are the least valued indicators to form the national identity concept. It is also interesting to highlight that the religion item presents the largest variation between both solutions, meanwhile the discrepancy is the least for the respect to the political institutions and laws.

The ideal solutions can be seen as the extreme cases of two separated worlds. PIS is related to the extreme national identity or nationalism that is rooted in past symbols, memories and values which are usually invented and linked to in-groups (Guibernau, 2001). Meanwhile, NIS would be the representative of cosmopolitanism that blurred boundaries and national identities (Beck, 2006). Brown and Held (2010) contended that cosmopolitanism is aligned with the view that human beings form the ultimate unit of moral concern, and that nationality, citizenship, or any other communal affiliation are irrelevant. Hobsbawm (1992) even argued that nationalism will be less and less important, and predicted that, in time, the world will become supranational.

Once the ideal solutions are obtained, the Euclidean distances between each segment of analysis and the ideal solutions were calculated. Based on that, RNISI is obtained for each population segment, and it can be used to rank what degree of national identity strictness each population segment has.

Table 6.4 shows the values of national identity indicators obtained from the application of both methodologies: RNISI obtained from FHA and MGCFA obtained

from the full and partial equivalent scalar models. The table also shows the ranking of each of the models. Thus, it is possible to conclude that regarding the national identity: (1) Ireland and Germany in the 2013 wave are the least strict countries under the FHA method, meanwhile under the MGCFA-FS, the positions are taken by France and Norway in 2003; (2) Russia in 2013 and United States in 2003 are the strictest countries under FHA, and United States in 2003 repeats again as the strictest country in the ranking provided by MGCFA-FS method, but the second strictest position remains in Russia but changes from year to 2003; (3) left political orientations are less restrictive than right political orientations under all the ranking methods that have been applied; and (4) it seems that the national identity dynamics shows that there is a less restrictive trend by country and political orientation as in 11 out of 15 cases the index in the year 2013 is lower than in the year 2003.
The analysis of the Spearman correlation index between all the indices obtained permits us to conclude that there is a significant positive association between all the indices under analysis, and, interestingly, the coefficient between MGCFA-FS and RNISI is higher than between MGCFA-FS (Full equivalent scalar model) and MGCFA-PS (Partial equivalent scalar model). Thus, in the debate of whether the partial equivalent latent variable means are a valid tool to obtain robust results, we conclude here that FHA seems to produce more comparable results to the full equivalent scalar model than partial scalar equivalent models. The Spearman correlation coefficient between MGCFA-FS and RNISI for the political orientation (0.94) is much higher than the same coefficient for the country (0.59), so it becomes evident that the results could depend on the number of groups under analysis. It is well known that a higher number of groups seem to complicate the analysis of MGCFA.

Table 6.4: Relative national identity synthetic indicators (RNISI), MGCFA-FS, MGCFA-PS

Population	RNISI	Rank	MGCFA-FS	Rank	MGCFA-PS	Rank
			Country (Year)			
Denmark (2003)	0.6854	5	0.00	8	0.00	12
Denmark (2013)	0.5513	15	-0.16	12	-0.18	15
France (2003)	0.5134	18	-0.63	20	-0.37	20
France (2013)	0.5380	16	0.16	5	-0.27	19

Table 6.4 continued from previous page

Germany (2003)	0.5190	17	0.06	7	0.06	8
Germany (2013)	0.5111	19	-0.32	18	-0.19	17
Ireland (2003)	0.6108	10	-0.25	17	0.28	5
Ireland (2013)	0.4997	20	-0.17	13	0.04	9
Norway (2003)	0.5853	12	-0.56	19	-0.19	16
Norway (2013)	0.5690	14	-0.07	10	-0.20	18
Portugal (2003)	0.7838	3	0.26	4	0.33	4
Portugal (2013)	0.6409	9	-0.17	14	-0.01	13
Russia (2003)	0.7815	4	0.29	2	0.33	3
Russia (2013)	0.8279	2	0.29	3	0.42	1
Spain (2003)	0.6477	7	-0.21	16	0.13	6
Spain (2013)	0.5768	13	-0.14	11	-0.03	14
Great Britain (2003)	0.6026	11	-0.21	15	0.02	10
Great Britain (2013)	0.6424	8	-0.03	9	0.02	11
United States (2003)	0.8491	1	0.61	1	0.34	2
United States (2013)	0.6641	6	0.07	6	0.09	7
Political Orientation (Year)						
Far left (2003)	0.5765	8	0.11	6	-0.03	8
Far left (2013)	0.4713	10	-0.20	10	-0.25	10
Left, c-left (2003)	0.6186	7	0.00	8	0.00	7
Left, c-left (2013)	0.5196	9	-0.11	9	-0.21	9
Center (2003)	0.6956	5	0.11	7	0.13	4
Center (2013)	0.6750	6	0.12	5	0.12	5
Right (2003)	0.7292	3	0.17	3	0.15	3
Right (2013)	0.7070	4	0.15	4	0.06	6
Far right (2003)	0.7829	2	0.39	2	0.31	1
Far right (2013)	0.7912	1	0.55	1	0.21	2

Own elabration. RNISI: Relative National Identity Synthetic Indicators; MGCFA-FS: Full equivalent scalar model; MGCFA-PS: Partial equivalent scalar model

The section ends with the analysis of the elasticity of the index This analysis helps in the understanding of what indicators are the most and the least sensitive

regarding the national identity formation. Table 6.5 presents the results by country and political orientation respectively. For the whole sample, it can be seen that national identity is more elastic with respect to religion and less elastic with respect to the fact that citizens should have lived in the country most part of their life. The analysis by country and indicator can be used to conclude that national identity by country is more elastic with respect to language and ancestors, and less elastic with respect to living most of the time in the country. Regarding the countries, it seems that Russia in 2003 and 2013, jointly with United States in 2003 are the least elastic segments of all the countries under analysis. The analysis by political orientation and indicators is similar with respect to the fact that national identity is more elastic with respect to language and ancestors. Meanwhile, the analysis by political orientation group concludes that the far right wing citizens independently of the year of analysis are the least elastic segment, so it seems that they form a more cohesive group regarding the national identity than the rest of the groups.

Table 6.5: Elasticities of RNISI by country and political orientation

Group	C1	C2	C3	C4	C5	C6	C7	C8
				Country				
Total	0.34	0.34	0.24	0.44	0.47	0.30	0.29	0.45
Denmark (2003)	0.34	0.34	0.24	0.29	0.46	0.20	0.23	0.39
Denmark (2013)	0.35	0.35	0.26	0.52	0.41	0.28	0.30	0.47
France (2003)	0.31	0.34	0.24	0.55	0.29	0.29	0.31	0.44
France (2013)	0.31	0.31	0.22	0.48	0.29	0.25	0.27	0.41
Germany (2003)	0.35	0.36	0.26	0.60	0.42	0.30	0.31	0.50
Germany (2013)	0.35	0.37	0.27	0.62	0.41	0.32	0.31	0.47
Ireland (2003)	0.21	0.23	0.17	0.39	0.32	0.26	0.21	0.29

Table 6.5 continued from previous page

Ireland (2013)	0.35	0.33	0.24	0.33	0.37	0.23	0.28	0.51
Norway (2003)	0.32	0.30	0.23	0.41	0.36	0.23	0.28	0.42
Norway (2013)	0.32	0.31	0.23	0.44	0.36	0.22	0.27	0.42
Portugal (2003)	0.22	0.41	0.17	0.45	0.35	0.43	0.29	0.23
Portugal (2013)	0.33	0.34	0.23	0.43	0.45	0.33	0.27	0.40
Russia (2003)	0.19	0.36	0.08	0.46	0.37	0.48	0.20	0.25
Russia (2013)	0.16	0.38	0.06	0.46	0.09	0.51	0.26	0.10
Spain (2003)	0.28	0.36	0.21	0.49	0.44	0.34	0.32	0.38
Spain (2013)	0.34	0.35	0.23	0.48	0.42	0.32	0.31	0.46
GB (2003)	0.33	0.35	0.25	0.46	0.45	0.31	0.33	0.47
GB (2013)	0.29	0.31	0.19	0.34	0.43	0.27	0.30	0.42
US (2003)	0.29	0.05	0.05	0.12	0.19	0.21	0.18	0.61
US (2013)	0.35	0.24	0.24	0.35	0.43	0.25	0.27	0.47
				Political Orientation				
Far left (2003)	0.36	0.38	0.25	0.51	0.45	0.32	0.31	0.49
Far left (2013)	0.35	0.40	0.29	0.72	0.38	0.35	0.36	0.53

Table 6.5 continued from previous page

Left (2003)	0.36	0.35	0.25	0.45	0.46	0.29	0.31	0.46
Left (2013)	0.36	0.38	0.27	0.60	0.39	0.32	0.33	0.49
Center (2003)	0.34	0.33	0.23	0.42	0.47	0.29	0.28	0.44
Center (2013)	0.33	0.32	0.22	0.49	0.47	0.31	0.29	0.44
Right (2003)	0.31	0.30	0.23	0.41	0.49	0.27	0.26	0.39
Right (2013)	0.32	0.25	0.20	0.26	0.47	0.18	0.22	0.41
Far right (2003)	0.15	0.21	0.15	0.60	0.39	0.30	0.19	0.14
Far right (2013)	0.07	0.15	0.10	0.11	0.52	0.08	0.06	0.17

(C1) to have been born in (country); (C2) to have the (country) citizenship; (C3) to have lived in (country) for most of one's life; (C4) to be able to speak the (country) language; (C5) to be (religion); (C6) to respect the (country's) political institutions and laws; (C7) to eel (country nationality); (C8) to have (country nationality) ancestry.

6.6 Conclusions

The national identity measurement at cross-national level suffers from methodological and comparability issues that has caused a big controversy in the past. Issues about non-response bias and measurement errors (Heath et al., 2009), as well as equivalence invariance (Sarrasin et al., 2013) suppose an important threat that lead to biased and inconsistent results. We argue here that stratagems such as discarding

items from the scale that obscure the invariance equivalence, behind being helpful in some cases, might also bring some unwanted penalties such as, for example, that some item could be only important for some countries or particular minorities. We agree with Heath et al. (2009) regarding that there is not any miraculous rule, and that each method needs to be investigated by its own benefits and costs.

Social scientist on national identity have argued that it is difficult to take for granted the number of factors and the respective indicators that should be included in each of the factors. To our knowledge, the univariate factor obtained in the current study as a second order latent variable has not been analysed by previous studies. Thus, social science research on national identity has fallen victim to what can be named as a multi-dimensional methodological trap in which authors have felt comfort presenting the correlation degree between the ethnic, civic and cultural latent variables. Nevertheless, this approach has also created a number of controversial issues that have obscured potential trends in the field. In this sense, FHA can also be applied to analyse whether the results of factor latent variables with less indicators based on MGCFA are more or less similar to those obtained by FHA. The additive and difference scores of ethnic and civic national identity proposed by Kunovich (2009) can also be analysed using FHA to see whether the results are also robust.

In the past, researchers have paid too much attention to issues such as scale validity and reliability, so the ideas and rules applied to build the national identity construct have been constrained by this. Building on a well-grounded method (FHA) that has been applied successfully in different field to construct synthetic indicators that are based on multiple items, the study compares the national identity construct (RNISI) with the results obtained by a MGCFA. The results of both methods are compared to see to what extent the indicators are affected by two covariates: country-year and political orientation-year. ISSP 2003 and 2013 waves have been used to collate the information for ten different countries: Denmark, France, Germany, Ireland, Norway, Portugal, Russia, Spain, Great Britain, and the United States.

In seeking to explore whether FHA can complement or substitute MGCFA, we compared the results obtained by both methods to conclude that FHA is closer to the full scalar model than some partial scalar models, and that the results seem to be closer when the number of groups is lower. We are not sure whether these results are generalizable as the nature of both methods is evidently very different. What is

sure is that FHA can be an alternative method that could build constructs in social science and the discipline could be benefitted from this possibility.
In general, we think that FHA can be a very helpful tool to make research on national identity and other antecedents and determinants in social science such as attitudes towards immigrants and patriotism. Other interesting lines for future research might be based on the analysis of individual national identity models that show how to go beyond the existing traditional research on nationalism such as fuzzy clustering methods or latent class models. These methods could benefit the understanding of the complex interplay that exist between nationhood concept and attitudes towards immigrants.

7

PAPER 5: Two Approaches to Analyze Whether Citizens' National Identity Is Affected by Country, Age, and Political Orientation—A Fuzzy Eco-Apostle Model

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Abstract

The study analyzes national identity using the International Social Survey Program (ISSP) database for the waves 2003 and 2013. First, the Exploratory Factor Analysis (EFA) and the Multigroup Confirmatory Factor Analysis (MGCFA) are used to find the dimensions of the items included in the national identity module. Second, the civic and ethnic dimensions are analyzed through both a Fuzzy Clustering Analysis and an extended Apostle Model to classify citizens' national identity as: (1) post nationalists; (2) ethnic oriented; (3) civic-oriented; and (4) credentialists. Third, the fuzzy eco-extended Apostle model is applied to analyze 16 different national identity categories for which the four pure mentioned categories are further studied. And fourth, the effects of some social characteristics, such as country-year, political orientation-year, and age-year, on the respective pure national identity categories are studied using two distinct approaches namely contingency tables and conditional probability ratios. Results show that citizens tend to be more pure-credentialist than any other category and that social characteristics play a determinant role in explaining each cate-gory on citizens' national identity.

Keywords: National Identity · International Social Survey Program (ISSP) · Ethnic Identity · Civic Identity; Credentialists · Post-Nationalists · Fuzzy-Hybrid Clustering Analysis · Extended Eco Apostle Model.

7.1 Introduction

Tamir (2020) affirms that "Nationalism is one of those words that evokes a knee-jerk, invariably negative response in polite company. Associated with military aggression, genocide, and ethnic cleansing, it is tainted by the worst horrors of the twentieth century. Our present-day demagogues and populists in the United States and Europe— Donald Trump, Marine Le Pen, Viktor Orban, and others— are further reinforcing this image by fanning the flames of nativism, xenophobia, and religious bigotry in its name" (Tamir, 2020)(p.33). Various theories have defined national identity as linguistic, religious, and ethnic traits (Bonikowski and DiMaggio, 2016; Kunovich, 2009; Smith et al., 1994; Theiss-Morse, 2009; Wright et al., 2012). Furthermore, literature is divided between those who define national identity as a personal characteristic based on civic and ethnic criteria (Kunovich, 2009)and those who identify the most inclusive nationalism that shapes a moral community (Custodi, 2021).
Following the studies by (Kunovich, 2009; Larsen, 2017; Sarrasin et al., 2013), data from the International Social Survey Program (ISSP) were extracted for two different waves, 2003 and 2013, and ten countries: Denmark, France, Germany, Ireland, Nor-way, Portugal, Russia, Spain, Great Britain, and the United States. This study analyze the different dimensions of national identity and how these are influenced by different social characteristics. First, the Exploratory Factor Analysis (EFA) was used to analyze whether the previous ethnic and civic dimensions obtained in other studies were pre-sent in the dataset. First, the Exploratory Factor Analysis (EFA) was used to analyze whether the previous ethnic and civic dimensions obtained in other studies were pre-sent in the dataset. Second, the Multigroup Confirmatory Factor Analysis (MGCFA) was used to confirm the adequacy of the two dimensions. Third, two fuzzy logic methods, such as the Fuzzy Hybrid TOPSIS (The Technique for Order of Preference by Similarity to Ideal Solution) and the Fuzzy Clustering Analysis, the national identity, ethnic and civic dimensions are studied for each citizen. Fourth, the eco-Apostle Model is extended with the help of the membership functions of the fuzzy cluster analysis to divide the individuals according to the national identity categories as: (1) post nationalists; (2) ethnic oriented; (3) civic-oriented; and (4) credentialists. And finally, using two different

approaches, contingency tables and frequency ratios based on condition-al conditions and unconditional probability of events, the effects of three social co-variates, namely country-year, political orientation-year and age-year, are analysed.
Thus, the study aims to provide a new methodology for social science research in the context of national identity, complementing other previous prestigious studies (Kunovich, 2009; Larsen, 2017; Medrano, 2005; Reeskens et al., 2007). The main ad-vantages of these new approaches are based on considering uncertainty in a situation where the indicators are mainly based on subjective and vague responses. The following section presents the literature review that contextualizes the study.

7.2 National Identity as a construct

National identity has been studied and analyzed over time by various researchers. Conover and Feldman (1987) defined national identity as an emotional link between members of a society who shared something in (Anderson. B., 2006; Bonikowski & DiMaggio, 2016; Greenfeld & Eastwood, 2007). Similarly, Miller (Miller, 1995) described national identity as an essential component of personal identity. Moreover, Huddy and Khatib (Huddy º Khatib, 2011)assigned to national identity the connotation of belonging to a nation not represented by an ideological form of national attachment (Huddy, 2001).
Jaspal et al. (2021) argued that national identity could be complicated, taking the British as an example, and it cannot be based on any simple geographic territory, ethnicity, or religion. In this context, in recent UK politics, the institution intends to impose a Britishness sense several times, especially as a result of significant events, such as the July 7 attacks in London in 2005 (Asari et al., 2008).
One of the central issues of national identity theories is the ethnic and civic dichotomy (Jaspal, 2021). Researchers associate ethnic orientation as the harmful national identity version, which is the source of unjust and illiberal actions. On the other hand, civic orientation is compatible with liberal values (Azada-palacios, 2021; Bonikowski & DiMaggio, 2016; Kunovich, 2009; Theiss-Morse, 2009; Wright et al., 2012). Ethnic orientation is used to distinguish inner and outer nations. On the other hand, civic orientation is associated with social capital and cultural diversity.

Nevertheless, national identity has an emotional component that is mutable in the short term. Citizens usually see national identity as a factor that provides structure and political stability in a nation (Bonikowski & DiMaggio, 2016; F. L. Jones & Smith, 2001; Wagner et al., 2012).

Kohn (1961) was one of the first scholars who mentioned two national identity dimensions: ethnic and civic. The author linked the civic dimension to compliance with the laws and institutions in Western countries. The indicators included in each dimension have been controversial because the dimensions are not easily identified. For example, Kymlicka (2000) affirmed that perceptions of a nation are often modelled around broader cultural symbols such as shared norms, values, and customs rather than a common origin that is considered essential to people. Larsen (2017) also argued that the conceptual difference is ambiguous because some current methods of interpreting data are inappropriate, and new approaches are needed to revive a bidirectional national identity.

In addition to the strength of personal identity and its importance in daily life, the content of national identity makes it possible to distinguish between sub-concepts such as ethnic or civic national identity (Blank & Schmidt, 2003; Davidoff & Zaring, 2009; Kunovich, 2009; Schatz et al., 1999). However, as the meaning and understanding of these terms vary widely in different contexts (Latcheva, 2011; Reeskens et al., 2007), the personal concept of becoming an actual member of one's country has emerged. For this reason, analyses of ethnic identity between countries and cultures were conducted (Bonikowski & DiMaggio, 2016; Brubaker, 2009; Kunovich, 2009; Lenard. P. T. et al., 2018; Reeskens et al., 2007; Shulman, 2002), and this topic cannot be underestimated (Helbling et al., 2016).

Recent studies underline a particular ethnic/civic dichotomy, as some definitions of national identity do not belong to either category. For example, Pehrson et al. (2009) argued that popular notions of national identity were more confusing than the theory suggested. Analyzing data from the International Social Survey Program (ISSP) modules on national identity conducted in 1995, 2003, and 2013, Pehrson et al. (2009) pointed out that citizens can accept various criteria, such as respect country's institutions and laws and the ability to speak the official language. Thus, the two attributes have a positive correlation, as those who support the first tend to support the second. Analyzing the differences in responses between countries, the

authors also found that, contrary to the theoretical practice of attributing national identity as civic or ethnic, citizens tended to define it as a combination of both. This observation will be relevant in the study for the category of pure credentialists.
The current literature has neglected in part other variants of national identity that could broaden the existing national identity duality between ethnic and civic orientations. Thus, according to Medrano (2005), the extension of this analysis would allow highlighting better the complex interaction between the representations of the elites and the prevalent attitudes of the national identity, each noting the impact on political institutions and public policies in various fields, as well as on immigration and integration. In this context, Medrano (2005) escaped from the classic ethnic/-civic dichotomy of national identity and proposed an alternative nuance for citizens who consider both criteria as necessary, the credentialists, and those who do not consider any criteria as central, the post nationalists.

7.3 Data

The International Social Survey Program (ISSP) dataset is used with two different waves, 2003 and 2013, and ten countries: Denmark, France, Germany, Ireland, Norway, Portugal, Russia, Spain, Great Britain, and the United States. We have chosen eight indicators of the national identity module. These are: (1) born in (country); (2) have the citizenship (of the country); (3) have lived in (country) for most of their life; (4) speak the (country) language; (5) to be (religion); (6) respect political institutions and laws (of the country); (7) feel (nationality of the country); (8) have (nationality of the country) ancestors. The terms "country" and "religion" indicate the respective country and religion of the majority of the interviewers.
The sample is made up of 27,873 respondents, divided as follows: Denmark in 2003: 1,322; Denmark in 2013: 1,325; France in 2003: 1,669; France in 2013: 2,017; Germany in 2003: 1,287; Germany in 2013: 1,717; Ireland in 2003: 1,065; Ireland in 2013: 1,215; Norway in 2003: 1,469; Norway: 2013: 1,585; Portugal in 2003: 1600; Portugal in 2013: 1,001; Russia, 2003: 2,383; Russia in 2013: 1,514; Spain, 2003: 1,212; Spain, 2013: 1,225; Great Britain, 2003: 873; 2013 Great Britain: 904; United States, 2003: 1,216; United States in 2013: 1,274. Our primary intention was to include more countries in the study, but the inclusion of some countries

was not possible as the measurement of national identity varied between countries. This is an important issue when researchers apply MGCFA because the equivalent measurements become more difficult to achieve when the number of countries and waves increases.

Table 7.1 shows that the sample is well balanced between the two consecutive waves, with about 50% of respondents in each wave. The data shows that most respondents are women, about 5%, compared to men, about 45%. The citizens identify more with a moderate political orientation, as the most represented categories are respectively Right (20.98%), Left-Center (20.63), and Center-Liberal (15.92%). Interestingly, the far-left respondents' group is more representative than the far-right group. Most of the interviewees are over 45 years old (65.41%), while citizens under 25 represent the least represented category, with just over 4%. Regarding the religion, catholic (35%) and protestant (27%) are the most representative religions for the sample. The sample is mainly made up of educated individuals because over 63% of people have a higher than or equal to upper secondary education.

Table 7.1: Survey socio-demographic characteristics (N and %).

Variable	N	%*	Variable	N	%*
Year			*Gender*		
2003,00	1410	50.57	Male	1265	45.37
2013,00	1378	49.43	Female	1522	54.60
Political Orientation			*Age*		
Far Left	153	5.49	24 years or under	115	4.13
Left-Center	575	20.63	25-34 years	366	13.11
Center-Liberal	444	15.92	35-44 years	477	17.12
Right	585	20.98	45-54 years	520	18.67
Far Right	691	2.48	55-64 years	492	17.65
			65-74 years	427	15.30
			75 years or over	384	13.79
Religion			*Education*		
No Religion	583	20.90	No Formal education	848	3.04
Catholic	970	34.80	Primary school	183	6.55
Protestant	748	26.85	Lower secondary	731	26.24

Table 7.1 continued from previous page

Other Christians	354	12.70	Upper secondary	610	21.89
Jewish	96	0.34	Post-secondary	432	15.48
Islamic	464	1.66	Lower level tertiary	721	25.88
Other Religions	308	1.10			

N: Number of individual. %: percentage of the sample

7.4 Ethnic/Civic dichotomy

7.4.1 Exploratory Factor Analysis

Similarly to (2013), the dimensionality of the eight ISSP indicators of the national identity module was studied. First, an exploratory factor analysis (EFA) (rotational Promax) was performed to evaluate the factorial structure between countries. EFA provides the number and content of factors in each group. So, with EFA, the initial structure was obtained with two factors: (a) the ethnic dimension; and (b) the civic dimension.

Table 7.2 shows the results, and it can be seen that the ethnic dimension contains the following indicators: (1) being born in (country), (2) having citizenship (country), (3) having lived in (country) for most of their life, (5) being (religion), and (8) having (nationality of the country) ancestors. On the other hand, the civic dimension includes: (4) speaking the language (of the country), (6) respect for the institutions and political laws (of the country), and (7) Feeling (nationality of the country). Measurement of the internal consistency of the dimensions is carried out with Cronbach's alpha, and in both cases, the ethnic and civic dimensions, the results are greater than 0.6 (0.80 and 0.60, respectively). Therefore, the EFA results for both the ethnic and civic factors can be considered acceptable (van Griethuijsen et al., 2015).

Table 7.2: Factor loadings for EFA. ISSP 2003 and 2013 criteria for being a truly national

Criteria	Ethnic	Civic
To have been born in (country)	0.85	-0.11
To have the (country) citizenship	0.45	0.30
To have lived in (country) for most of one's life	0.62	0.14
To be able to speak the (country) language	0.01	0.60
To be (religion)	0.58	-0.05
To respect the (country's) political institutions and laws	-0.18	0.68
To feel (country nationality)	0.28	0.43
To have (country nationality) ancestry	0.84	-0.13
Cronbach's alfa	0.80	0.60
promax rotation		

7.4.2 Multigroup Confirmatory Factor Analysis

The MGCFA is used to test for measurement equivalence between groups. Based on the literature on the topic and considering the results of EFA, the MGCFA model is used to verify various measurement equivalences, such as pool, multi-group, metric, and scalar for two different models: (1) a model with only one latent variable that represents the national identity; and (2) a model with three latent variables that added the expected structure obtained by EFA with two latent variables representing the ethnic and civic dimensions and a second-order latent variable named as the national identity that depends on the two mentioned latent variables. Although there is no absolute rule (Hu Bentler, 1999; Marsh et al., 2004) to compare the fit index (CFI) and the Tucker-Lewis index (TLI), these should be greater than 0.95. The standardized mean square root (SRMR) and mean square error (RMSEA) must be less than 0.05, although some scholars believe that values between .05 and .08 are acceptable (Schermelleh-Engel et al., 2003). These indicators analyze whether a model fits well with the data. However, they have less information about the changes between the two stages of the equivalence measurement test. In this sense, the fit index tests (Chen, 2007; Cheung & Rensvold, 2002) show that small changes (between steps) in CFI and RMSEA reliably indicate that the additional

step has achieved equivalence in analysis. Thus, according to Chen (2007), when there is a decrease of .010 or less in the CFI and an increase of .015 or less in RMSEA, a stricter equivalent level is reached (Byrne & Stewart, 2006). We test configural pools, configural groups, metric, and scalar equivalence in different factor structures through confirmatory factor analysis. We compare a first model with a latent construct to test the equivalent configural (pool), configural (group), metric and scalar models. The second model includes three latent constructs that represent ethnic and civic dimensions and national identity (Table 7.3). The structure of the model uses the national identity module of 2003 and 2013 (Kunovich, 2009). Results show that the model with single-factor solutions does not fit well with the data. When we include the second structure, the chi-square model is reduced, so it seems that a second order with a two-factor model is more suitable due to this statistically significant reduction. Furthermore, RMSEA and SRMR seem to confirm that the two-factor model is more suitable for the data as they turn out to be lower than for the unidimensional model.

Table 7.3: Fit indices that test the configural (pool and multi-group), metric and scalar equivalence

Model	Df	χ^2	CFI	TLI	RMSEA	SRMR
Unidimensional model. Group by country-year						
Configural (pool)	20	7,342.2	0.976	0.967	0.115	0.071
Configural (MGCFA)	400	6,977.6	0.903	0.865	0.109	0.049
Metric	533	10,934.6	0.847	0.839	0.118	0.098
Scalar	666	25,765.1	0.632	0.690	0.164	0.152
Second order latent model (2 factors (Ethnic:Ind1-Ind3,Ind5,Ind8; Civic:Ind4,Ind6,Ind7;Nat.Id (Ethnic, Civic)Group by country-year						
Configural (pool)	18	4,420.7	0.985	0.978	0.093	0.054
Configural (MGCFA)	360	5,482.5	0.925	0.884	0.101	0.042
Metric	387	7,716.4	0.894	0.880	0.102	0.076
Scalar	292	16,799.3	0.762	0.773	0.140	0.111

Table 7.3 continued from previous page

In the analysis of the fits of the subsuquent steps, fit indices are usually worsening, that is CFI and TLI are lower and RMSEA and SRMR are higher. However, changes in the other direction (i.e., higher CFI and TLI and lower RMSEA and SRMR) are also possible because most fit indices depend also on the number of degrees of freedom. CFI=comparative fit index; TLI=Tucker–Lewis index; RMSEA=root mean square error of approximation; SRMR=standardized root mean square residual

Note: In the analysis of the fits of the subsequent steps, fit indices are usually worsening, that is CFI and TLI are lower and RMSEA and SRMR are higher. However, changes in the other direction (i.e., higher CFI and TLI and lower RMSEA and SRMR) are also possible because most fit indices depend also on the number of degrees of freedom. CFI = comparative fit index; TLI = Tucker–Lewis index; RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual.

Different measurement equivalences were obtained using the second model, which concurs with the results obtained in (Kunovich, 2009; Larsen, 2017; Medrano, 2005; Reeskens et al., 2007). Thus, results showed that the items or attributes to be included in the ethnic dimension are: have ancestry; to be (religion), to be born (in the country), to be citizenship (of the country); having lived in the country. Meanwhile, the civic national identity dimension is based on: respect for laws and institutions (of the country); feeling (of the country); and speaking the language of the country.

7.5 The extended Eco-Apostle Model applied to National Identity

7.5.1 Fuzzy TOPSIS and Fuzzy Clustering

The problem of expressing some form of vagueness arose in various disciplines in the mid-1900s, such as logic, linguistics, physics, and mathematics. Importantly, for the subsequent development of fuzzy set theory, the first attempts to propose

logic with three truth values (rather than the classic true/false dichotomy) were made in the 1930s (Zadeh, 1965). The study of fuzzy sets got an excellent impetus for the mathematical development of the so-called multi-value logic. Similarly, multi-value logics does not only consider true or false as truth values but introduce others. From the simplest case, the "I don't know" is added up to infinite values between 0 and 1 (Zadeh, 1965). Fuzzy set theory (FST) has been successfully applied to various analyses and disciplines, such as education (Di Nardo & Simone, 2019), supplier selection (Rashidi & Cullinane, 2019), or green energy (Mohsin et al., 2019). The essence of the application of FST in multi-criterion decision-making techniques (MCDM) provides a non-unique multivariate perspective for measuring common hidden concepts in the social sciences (Martín et al., 2020).

The study uses FST to adequately handle the vagueness of the information provided by the ISSP national identity module. All the steps described below will be implemented in self-programmed code on MATLAB, a numerical computing and programming platform used to analyze data, develop algorithms and create models. First, we convert semantic ordinal scales to triangular fuzzy numbers (TFNs). The transformation of the semantic ordinal scales provided by the interviewees, from 1 to 4, into TFN is characterized by the interval [0, 100] without loss of generalization. It can be summarized as follows: (1) not at all important (0,0,50); (2) not very important (30,50,70); (3) quite important (50,70,90); and (4) very important (70,100,100). Given the vagueness of the information, we represent the semantic scale with 3-tuples (a_1, a_2, a_3) for which the intersection of all the consecutive ordinal semantic points is an interval.

The Fuzzy Hybrid Analysis (FHA) is an extension of TOPSIS that can process the information at an individual level using the fundaments of FST. The first step is to calculate the ideal solution. For that, the positive and negative ideal solutions are obtained as follows:

$$A^{+} = \{(maxV_{ij}|j\epsilon J), (minV_{ij}|j\epsilon J'), i = 1, 2, ..., m\}$$

$$A^{-} = \{(minV_{ij}|j\epsilon J), (maxV_{ij}|j\epsilon J'), i = 1, 2, ..., m\}$$

Where V_{ij} stands for the crisp information matrix given by (a_1, a_2, a_3), where $i = 1to27873$ (total sample of respondents) and j stand for the items included in each

of the national identity dimensions (5 and 3 for ethnic and civic national identity, respectively). J´ is an empty set as all the items included in the national identity module can be considered as a benefit (Behzadian et al., 2012).
The positive ideal solution is represented by the largest number observed in the data set, and the opposite logic prevails for the negative ideal solution (Behzadian et al., 2012). Afterward, each individual observation can be compared with these ideal solutions by using the Euclidean distance and comparing the relative distances between them as follows (Cantillo et al., 2021):

$$D_i^+ = dist\left(V_i, A^+\right) = \sqrt{\sum_{j=1}^{n}\left(V_{ij} - A_j^+\right)^2}$$
$$D_i^- = dist\left(V_i, A^+\right) = \sqrt{\sum_{j=1}^{n}\left(V_{ij} - A_j^-\right)^2}$$

Therefore, the TOPSIS indicator is calculated as:

$$TOPSIS_i = \frac{D_i^-}{D_i^+ + D_i^-}$$

The analysis of the national identity at the individual level will be based on Fuzzy Clustering (Cantillo et al., 2021). Thus, the membership function can determine the degree of similarity that each citizen has for a representative group (Kruse et al., 2007). Fuzzy cluster analysis segmentation extends of the Bagged Cluster algorithm introduced by Leisch (1999). Hence, the C-means fuzzy algorithm for fuzzy data can be expressed as follows:

$$\begin{cases} min: \sum_{i=1}^{n}\sum_{c=1}^{C} u_{ic}^m d_F^2\left(\tilde{x_i}, \tilde{p_c}\right) = \sum_{i=1}^{n}\sum_{c=1}^{C} u_{ic}^m \left[w_2^2 \left\|a_2^i - p_2^c\right\|\right] + \\ +w_1^2\left(\left\|a_1^i - p_1^c\right\|^2 + \left\|a_3^i - p_3^c\right\|^2\right]\right) \\ m > 1, u_{ic} \geq 0, \sum_{c=1}^{C} u_{ic} = 1 \\ st \\ w_1 \geq w_2 \geq 0, w_1 + w_2 = 1 \end{cases}$$

Where $d_F^2\left(\tilde{x_i}, \tilde{pc}\right)$ is the squared fuzzy distance between the ith citizen and the profile of a set of representative citizens $x_i \equiv (a_{1ik}, a_{2ik}, a_{3ik}) : k = 1...K$ where the vector represents the TFN assigned to the information provided by the i-th citizen (Martín et al., 2020). $\tilde{p_c} \equiv \left\{p_{ck} = (p_{1ck}\tilde{}, p_{2ck}, p_{3ck}) : k = 1...K\right\}$ represents the TFN provided by the representative citizen of the cth cluster, while the expression $\left\|a_2^i - p_2^c\right\|^2$ is the squared Euclidian distances between the centers of the TFN vectors

of the ith citizen and the representative citizen of the cth cluster. The squared Euclidian distances between the left and right extreme components of the TFN vectors of the ith citizen and the representative citizen of the cth cluster are represented by $\|a_1^i - p_1^c\|^2$ and $\|a_3^i - p_3^c\|^2$. In addition, $w_1 \geq w_1 \geq 0$ are suitable weights respectively for the center, and extreme components for the fuzzy distance considered, and the weighted exponent that controls the fuzziness of the obtained partition m is larger than one. Thus, the membership degree of the ith resident in the cth cluster is given by and it is obtained by the Lagrangian minimization problem. For more information on cluster validation and cluster profiles, consult (D'Urso et al., 2013, 2015, 2016).

7.5.2 Fuzzy-Cluster Profiles

Table 7.4 shows the profiles of the 3-solution cluster according to selecting the most exigent citizen, the least exigent citizen, and the intermediate citizen regarding the TOPSIS index obtained for both national identity dimensions (Kruse et al., 2007). The three cluster solutions for each dimension are obtained to adequately characterize each citizen regarding the exigency in both dimensions. The prototype names reflect the degree of stiffness concerning each indicator as follows: (1) most, (2) least, and (3) intermediate.

Table 7.4: Fuzzy Cluster Profiles

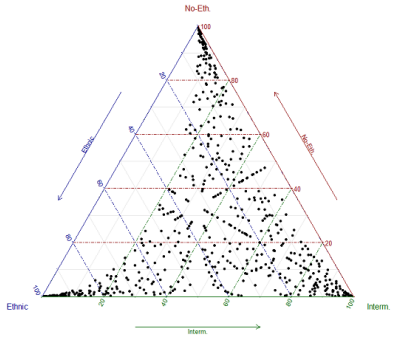
Ethnic Identity	Most	Least	Interm.	Civic Identity	Most	Least	Interm
Nativity	4	1	3				
Citizenship	4	1	4	Language	4	1	3
Living	4	1	4	Respect	4	1	4
Religion	4	1	1	Feeling	4	1	4
Ancestry	4	1	3				

Following the ethnic and civic dichotomy (Kunovich, 2009; Larsen, 2017; Reeskens et al., 2007), Figure 5.1 shows the ternary diagram of the ethnic (a) and civic (b) dimensions and represents the distribution of the citizens graphically according to the weights that represent their membership function. The analysis of the ethnic dimension graph shows a considerable majority of respondents who are close to the

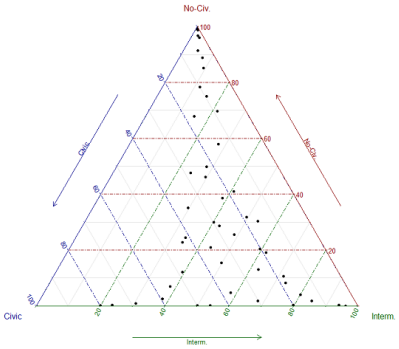
pure intermediate profile. 47.5 percent are similar to intermediate ethnic nationalists, 36.8 percent are similar to pure ethnic nationalists, and 15.8 percent are similar to non-ethnic nationalists. The graph representing the civic dimension appears less dispersed than for the ethnic dimension, and this is partly explained because the number of items included in the dimension is only 3 in comparison with the 5 items included in the ethnic dimension. The average aggregated membership function shows that pure civic nationalists account for 60.2%, while non-civic and intermediates account for only 6.3% and 33.5%, respectively. Thus, it is evident that there is more consensus between citizens for the civic dimension than for the ethnic dimension. Additionally, citizens define respect for the national laws and the country's institutions as the most important criteria of national identity, the right chart shows that results are not uniform (Reeskens et al., 2007).

7.5.3 Beyond the classical duality

"Apostle model" is a widely used approach to understanding invasive species' ecology (Schaefer, 2013). This approach was developed in the mid-1990s by Harvard Business School as a tool for achieving the best product performance for customers (Jones & Sasser, 1998). This approach was born to understand ecology (Schaefer, 2013), but it also compares customer loyalty with customer satisfaction. In this regard, Schaefer (2013) extended the "apostles" very satisfied and loyal customers who would also have convinced more customers of a product to a natural ecosystem. On the contrary, the "deserters" are not very satisfied and not very loyal so that they switch to other products. "Hostages" are customers with no alternatives, while "mercenaries" choose the product based on the price (Jones & Sasser, 1998).
Similar to the Schaefer (2013) study, apostles, hostages, mercenaries, and deserters in the apostle model can be associated with national ethnic-civic identity. So, we proxy satisfaction-fidelity axes with axes based on ethnic and civic national identity. Thus, the model can distinguish between credentialists and post-nationalists as in Medrano (2005). Thus, the parallel model determines that the apostles are the credentialists, the deserters or defectors are post nationalists, the hostages are the civic-oriented, and the mercenaries are the ethnic-oriented.
Through the TOPSIS indicator at an individual level, the four quadrants presented



(a) Ethnic National Identity



(b) Civic National Identity

Figure 7.1: Fuzzy clustering ternary graphs

in Figure 7.2 can be obtained. Thus, credentialists are those citizens who base the national identity by giving the highest importance to all the items. On the contrary, post nationalists are the citizens who do not give any importance to any attribute, and they are those who are more similar to both the non-ethnic and non-civic profiles of Figure 7.1. The classical apostle model finds that ethnic and civic-oriented citizens are 20.3 and 16.2 percent, respectively. Meanwhile, credentialists are 33.4% and post nationalists are 30%. A limitation of this method is that the attributed citizens' taxonomy for those near the average values of the TOPSIS indicators for both dimensions is unclear. For example, a citizen in the lower left of the credentialist quadrant should have different characteristics than those in the upper right

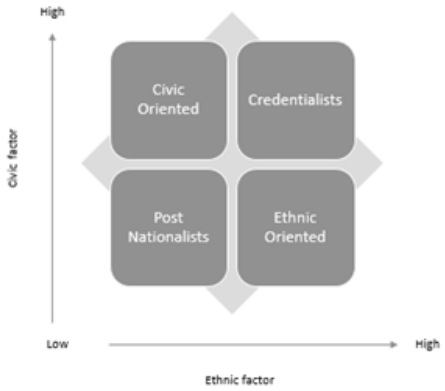


Figure 7.2: Apostle Model applied to National Identity

credentialist quadrant. Hence, the pure apostle model is blurred in the area mentioned, and for that, a new proposal based on the ternary graphs is developed and named the extended alpha 0.5 national identity extended eco-apostle model. The model reduces the potential blurred area when researchers determine credentialists, post nationalists, and civic and ethnic oriented citizens.

The extended model moves from four categories to a model that defines sixteen different classes. Among these, it is worth mentioning the 4 pure categories as pure credentialists, citizens in the upper right quadrant of the credentialist quadrant, pure post nationalists, citizens for whose location is located in the lower left quadrant of the post nationalist quadrant. Similarly, the pure ethnic and civic-oriented citizens' quadrants can be obtained.
Let us assume that (e_1, e_2, e_3) and (c_1, c_2, c_3) are 2 vectors that contain the membership functions for the national ethnic and civic identity obtained with the fuzzy clustering method explained in the previous section. We define the following function for each vector e:

$$f(e) = \begin{cases} 1 if e_2 \geq 0.5 \\ 3 if e_3 \geq 0.5 \\ 4 if e_1 \geq 0.5 \\ 2 otherwise \end{cases}$$

Without loss of generality, the same function can be applied to any vector c. Thus, the classical apostle model is extended to a model with 16 different classes

in which the pure post nationalists are now characterized because the pair f*=(f(e), f(v)) is equal to (1,1). Similarly, pure credentialists are those citizens for which f* is equal to (4,4), f* is equal to (4,1) for pure ethnic-oriented citizens, and f* is equal to (1,4) for pure civic oriented citizens. The extended apostle model finds that the pure post nationalist group is represented by only 1.7% of the sample. Most of the citizens, almost 76%, are classified as credentialists, although pure credentialists account only for 23.6%. It is also worth remarking that pure civic and ethnic oriented citizens are represented by 3.7% and 0.3%, respectively. In a nutshell, the results conclude that only the pure credentialists group is significant and that the pure ethnic oriented citizens are a minority.

7.6 Two approaches to analyze the effects of country, age, and political orientation on citizens' national identity

7.6.1 Contingency Tables

This section presents the contingency table method used to understand whether the citizens' national identity is affected by country, age, or political orientation. In this context, contingency tables are used to determine whether the national identity categories are independent of the covariates determined by country, age, and political orientation. The analysis is carried out for each analyzed wave, 2003 and 2013.
Pearson (1903) was the first author formulating contingency tables. He stated that a contingency table is a matrix format table that displays the (multivariate) frequency distribution of variables. They are widely used in survey research, business intelligence, engineering, and scientific research Greenacre (1988). It is a method that provides a primary picture of the interrelationship between two variables, and with its help, researchers can analyze the interactions between variables. Thus, the study analyses the degree of independence between the national identity type and the 3 mentioned covariates: country-year, age-year and political orientation-year. For ease of exposition, the analysis is mainly focused on the four pure categories, so a fifth category, named hybrid, was obtained for all the citizens who do not belong

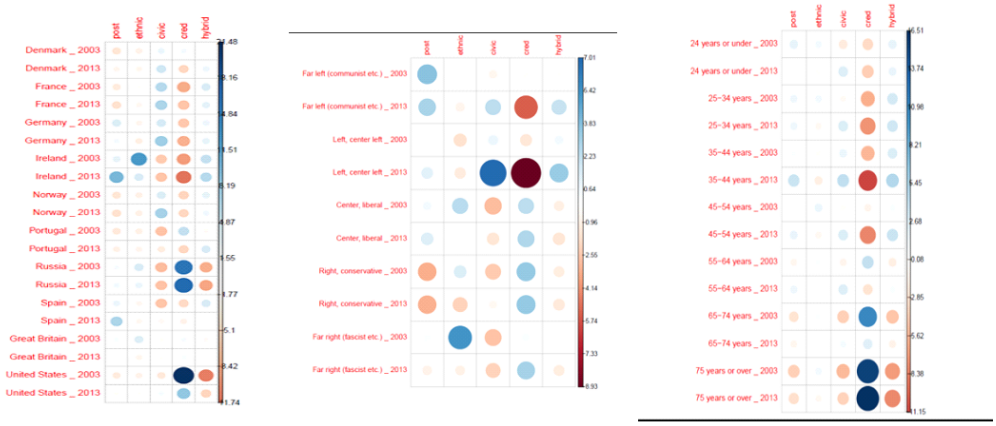
to one of the pure categories.

The chi-square independence test is used to analyze the contingency table of two categorical variables. The chi-squared test evaluates whether there is a significant association between the categories of the two variables. To determine which cells contribute most to the total Chi-squared score, we compute the Chi-squared statistic for each cell, as shown in Figure 7.3. Positive residuals are in blue. The cells' positive values specify an attraction (positive association) between the corresponding row and column variables. Negative residuals are in red, implying a repulsion (negative association) between the corresponding row and column variables.

Figure 7.3a shows that Ireland and Spain, in both waves but especially in 2013, were the two countries most positively associated with post nationalists. Germany also presented a similar trend. On the other hand, Central and Northern European countries, such as Denmark, France, and Norway, presented a negative association with post-nationalism. Regarding credentialism, it can be concluded that most of the countries for both waves are negatively associated with the exception of Denmark and Portugal in 2003, and Russia and the US for both waves. It is particularly interesting to remark that the observed results for these two latter countries presented the highest positive relationship with being credentialist. The analysis for pure ethnic and civic-oriented categories showed that Ireland and Russia are positively associated with ethnic and negatively associated with civic. The opposite trend is observed for Denmark, Germany, and Norway

Figure 7.3b shows the relationship between national identity categories and political orientation-year. It was seen that for post-nationalism, there was a positive and negative association with far-left citizens and right conservative, respectively, for both waves 2003 and 2013. Regarding credentialism, it was seen that leftist political orientation is negatively associated, and rightist political orientation is positively associated in contrast. The civic and ethnic-oriented national identity did not show a clear relationship pattern for the political orientation. There were only two issues to highlight: (1) the positive association of center-left with the pure civic-oriented category in the wave 2013; and (2) the positive association of far-right voters with the pure ethnic-oriented category in the wave 2003.

The section ends with analyzing the contingency table between the national identity and the age-year categories (Figure 7.3c). It can be seen that the older generations



(a) Country-year (b) Political orientation-year (c) Age-year

Figure 7.3: Contingency Tables

tend to be positively associated with credentialism, and negatively associated post nationalists and civic-oriented nationalists. On the other hand, the younger generations were negatively associated with credentialism, and positively associated with post-nationalism and civic-oriented nationalism.

7.6.2 Conditional probability ratios

The section presents a second approach that analyzes the relationship between the national identity categories and the three covariates of interest: country-year, political orientation-year and age-year. The second approach is based on whether two events are independent, that is, whether being a pure credentialist is independent of being a respondent for a country j in the wave 2003 or 2013.
Theoretically, it is known that two events A and B are independent if and only if:

$$P(A \cap B) = P(A)P(B) \Leftrightarrow P(A/B) = P(A) \Leftrightarrow P(B/A) = P(B)$$

Thus, the conditional probability ratios can be calculated for each of the four pure categories of the national identity, namely credentialists, post nationalist, pure civic-oriented nationalist, and pure ethnic-oriented nationalists on each of the categories for the three covariates mentioned above. If these ratios are significantly greater than one, it can be concluded that A and B are positively associated, and they are not independent. Similarly, A and B are negatively associated when the ratios are lower than one.

Thus, the method is based on the calculus of the following ratios:

$$R_{AB} = \frac{P(A \cap B)}{P(A)P(B)}$$

that will be used to analyze the relationship between the national identity categories and other sociodemographic categories of citizens.

The ratios are obtained for 1000 bootstrap subsamples obtained with replacement. Bootstrap is a well-known tool in statistics that is used for statistical inference. The idea behind the method is that if a sample approximates the population that generated it, then we can sample the sample to calculate a statistic of interest and measure its accuracy Efron (1993). Bootstrapping is useful when there is doubt that the usual distributive assumptions and asymptotic results are valid and accurate. Bootstrap is a non-parametric method that calculates estimated standard errors, confidence intervals, and hypothesis tests (Davison, 1998).

Table 7.5 shows the ratios for each type of national identity interacting with each country-year, political orientation-year, and age-year. We find that results are robust and that the same conclusions can be obtained with both methods. One notable result to remark is that there were only nine AB observations for which the ratios were zero, and interestingly, eight out of nine were referred to the pure ethnic oriented nationalist at country level: Denmark and the US in 2003, Germany and Great Britain in 2013, and Norway and Portugal for both waves. These observations correspond to those with the most existing negative association. On the other hand, at the country level, results showed that the most positive association existed for the following observations: (1) post nationalism (Ireland and Spain in 2013); (2) ethnic oriented (Ireland and Russia in both waves and Great Britain in 2003); (3) civic oriented (Germany and Norway in 2013); and (4) credentialists (the US in 2003).

At the political orientation level, the most positive associations were found in: (1)

post nationalism (Far-leftist in both waves); (2) ethnic-oriented (Centrist, rightist and far-rightist in 2003); (3) civic-oriented (leftist in both waves and far-leftist in 2013); and (4) credentialists (Rightist and far-rightist in 2013). Meanwhile, the most negative associations were found in: (1) post nationalism (rightist for both waves and far-rightist in 2013); (2) ethnic-oriented (leftist in both waves, and far-leftist and far-rightist in 2013); (3) civic-oriented (far-rightist in both waves); and (4) credentialists (far-leftist in 2013). And finally, at age level, results showed that the most positive associations were found in: (1) post nationalism (youngest generation -24 years or under in 2003 and 35-44 years old group in 2013); (2) ethnic oriented (youngest generation, 25-34, 45-54 and eldest generation- 75 years or older in 2003); (3) civic-oriented (youngest generation in 2013); and (4) credentialists (eldest generation in both waves). In the meantime, the most negative associations were found in: (1) post nationalism (eldest generation in both waves and 65-74 years old group in 2013); (2) ethnic oriented (25-44 years old in 2013); (3) civic oriented (youngest generation and 65-74 age group in 2003 and eldest generation in both waves); and (4) credentialists (35-44 age group).

Table 7.5: Ratios between national identity and country-year, political-orientation-year, and age-year

Country-year	Postnationalists	Ethnic	Civic	Credentialists
Denmark 2003	0.261371	0	1.307533	1.076628
Denmark 2013	0.651949	0.231167	1.651099	0.732112
France 2003	0.448565	0.734084	1.812449	0.578677
France 2013	0.314069	0.455573	1.807723	0.705653
Germany 2003	1.789863	0.237993	1.594921	0.651695
Germany 2013	1.240994	0	1.982003	0.611842
Ireland 2003	1.622221	7.765269	0.050721	0.413658
Ireland 2013	3.175681	3.025153	0.066688	0.306806
Norway 2003	0.313622	0	1.507635	0.726669
Norway 2013	0.254336	0	1.976663	0.750991
Portugal 2003	0.395923	0	0.151924	1.286691
Portugal 2013	0.46025	0	0.566617	0.685549
Russia 2003	1.18416	2.442147	0.249346	1.667388

Table 7.5 continued from previous page

Russia 2013	1.331314	2.023096	0.124875	1.896975
Spain 2003	1.472982	0.25272	0.044569	0.726973
Spain 2013	2.491599	0.250038	0.815774	0.885241
UK 2003	1.253365	3.157698	0.866259	1.077201
UK 2013	1.082976	0	0.896307	1.073062
US 2003	0.378874	0	0.533067	2.267803
US 2013	0.85886	0.721264	1.165997	1.496239
	Political orientation-year			
Far left 2003	1.63478	0.790443	0.940949	1.000247
Far left 2013	1.449256	0.405691	1.538245	0.611558
Left 2003	0.765906	0.387963	1.154584	0.96578
Left 2013	0.910583	0.472498	1.80197	0.653454
Center 2003	0.836642	1.779932	0.719361	1.130289
Center 2013	0.947265	0.904292	0.899911	1.136275
Right 2003	0.347502	1.33485	0.823933	1.150243
Right 2013	0.341595	0.213745	1.008351	1.152859
Far right 2003	0.848976	5.268002	0.331802	1.061607
Far right 2013	0.405555	0	0.380405	1.402062
	Age-year			
$\leq$ 24 2003	1.59969	1.791209	0.55281	0.724582
$\leq$ 24 2013	1.109849	0.655882	1.677201	0.589596
25-34 2003	1.247616	1.508108	0.90428	0.71956
25-34 2013	1.2766	0.565819	1.380372	0.612971
35-44 2003	1.072133	0.814619	1.180092	0.769307
35-44 2013	1.640784	0.286125	1.48857	0.504523
45-54 2003	0.995897	1.612088	0.94429	0.944345
45-54 2013	1.268177	0.602235	1.30636	0.664637
55-64 2003	0.803332	1.201687	0.847702	1.179955
55-64 2013	1.228562	0.933476	1.275841	0.885933
65-74 2003	0.516492	1.220914	0.511376	1.496431
65-74 2013	0.790635	0.949547	1.112405	1.114347
$\geq$ 75 2003	0.226219	1.546953	0.318285	1.756688

Table 7.5 continued from previous page

$\geq$ 75 2013	0.447075	0.594462	0.537291	1.749079

Own elaboration

7.7 Discussion

7.7.1 National Identity Apostle Model

The study presents an alternative method to those used by the literature to analyze whether different types of national identity are affected by country, political orientation, and age using two waves of the ISSP national identity module. Indeed, many researchers have found various dimensions that structure individuals' national identity. The ethnic and civic dimensions were obtained following (Kunovich, 2009; Larsen, 2017; Medrano, 2005) using EFA and MGCFA to identify the dimensions of national identity. The EFA and MGCFA identified which items need to be included in each dimension.

Ethno national identity is based on ethnic heritage, such as being born in the country, having national ancestors, professing the country's predominant religion, having lived most of the time in the country, and possessing the country's citizenship. This type of nationalism has been much claimed in history and the present day. It is typical to resort to national identity based on ethnic criteria when people go through moments of both economic and social crisis Wang (2021). Clear examples are the exploits of Fascism and Nazism during the post-World War I crisis. Hitler and Mussolini took advantage of the moment of identity crisis and the consequences of the Great War to emphasize the importance of fighting the enemy who undermined national integrity (Smith et al., 1994). We can also see these attitudes from European extremists, such as Marine Le Pen, Matteo Salvini, Santiago Abascal, and Viktor Orban in France, Italy, Spain, and Hungary. Now, the national enemy is the immigrant, as he is "the different" who threatens the identity and economic stability of the country (Tamir, 2020). Civic national identity is represented by liberal principles, independent of wealth, race, ethnicity (language and culture), gender, religion, or place of birth. The civic dimension of nationalism is based on speaking the country's language, being a citizen of the country, and, above all, respecting the

laws and institutions of the country. Civic national identity is typical in those multicultural societies such as the United States and the countries of Northern Europe (Xenos, 1945; Kaufmann, 2000).

The civic and ethnic national identity are studied at the individual level through the Fuzzy Hybrid Approach and the Fuzzy Clustering. The ethnic dimension analysis showed that a large majority (84.2%) is between giving a lot or intermediate importance to the five items included in the factor. There were only 15.8% of citizens who could be considered no-ethnic nationals. Therefore, for over a third of the sample citizens, the national identity coincides with the speeches of European leaders like Marine Le Pen, Matteo Salvini, Santiago Abascal, and Viktor Orban (Larsen, 2017). In addition, less than a fifth [1] of citizens do not share these extreme or intermediate ethnic opinions and can be associated with other leftist positions like the sympathizers of Podemos in Spain (Custodi, 2021). On the other hand, citizens that support civic criteria give more importance to items, such as speaking the language, respect for laws and institutions, and feel (nationality), are a vast majority, over 60%.

Medrano (2005) believed that citizens cannot be only divided into two categories supporters of civic dimension and supporters of ethnic dimension, and mentioned two additional categories for those citizens who do not give importance to any item (post nationalists) and those who give importance to all the items (credentialists). The four categories can be individually extracted through the apostle model. Other authors have defined credentialists as those who are mobilized for all the items (Larsen, 2017). In this sense, the mentioned authors contended that this national identity category considers that all the ethnic and civic items are important. On the other hand, the post nationalists do consider that all the items independently of the dimension are not important. Larsen (2017) named this category as the non-mobilized citizens.

Finally, through the extension of the apostle model, the number of categories is enlarged to sixteen. The analysis can filter four additional important categories: pure post nationalists, pure ethnic-oriented nationalists, pure civic-oriented nationalists, and credentialists. The extended apostle model showed that only a minority of 3.7% and 0.3% can be considered as pure civic nationalists and pure ethnic nationalists, respectively. It was worth noting that a large majority of the society (75%) can be

considered credentialists, and that 23.6% of the society are pure credentialists. The extended apostle model refined to a large extent the total number of post nationalists, and it was seen that only 1.7% of the sample could be considered pure post nationalists. They do not associate the national identity with linguistic, cultural, and institutional attributes. Custodi (2021) mentioned that it is probably that some citizens could give greater importance to being part of a moral community.

7.7.2 Effects of country, political orientation and age in both waves on the national identity categories

As stated, we do not detect any significant difference between the results obtained by the analysis carried out by contingency tables or conditional probability ratios. One of the most interesting results was the positive association found for post nationalism in Ireland and Spain in 2013. Nevertheless, both countries showed a very different pattern regarding the ethnic-oriented nationalism, for which Ireland also showed a positive association in comparison with Spain, which showed a negative association. The results can be partly explained by the fact that Spain is constitutionally a multi-national country, with strong independence movements in Catalonia and the Basque Country, so the negative relationship with ethnic nationalism can be explained by the influence of these movements, as there are other ethnic realities in their respective territories (Muro, 2005; Conversi, 2017) . On the other hand, the results for Ireland are explained because Irish nationalism was created against British institutions due to historical religious and ethnic differences (Mccaffrey, 1973).
The case of Ireland is a paradigmatic example of the two disjoint types of societies: one a self-governing island fortress of Christian and conservative values in a pagan, radical sea; the other bearing the burdens and sharing the glories of the mighty British empire (Mccaffrey, 1973). The two national identities are rooted in religion and social class: Protestant and Catholic, conqueror and conquered, master and serf. It can be said that the observed trend is "that religion served as the demarcation line separating those with power from the powerless, those with property from the disposed of" (p. 527). The Protestant community was seen as Unionist with a British cultural identity.
Meanwhile, Kymlicka (2000) found that some countries like Belgium, Spain and the

United Kingdom moved toward giving regional autonomy to their national ethnic minorities. In all of these countries, the elimination of minority national identities was abandoned, and policies towards facilitating that minority groups could see themselves as separate and self-governing nations within the larger state. The policy trend is seen as soft or hard federalism that "ensures peace, democracy, freedom, and prosperity for multination states like Spain, Canada, Belgium, Britain and Switzerland" (p. 201).

Central-northern European countries, such as Denmark, France, Germany, and Norway are among the countries in which there are positive associations for civic-oriented nationalism. The results can be explained because these countries have selectively implemented political multiculturalism, trying to redefine the prevailing conceptions of national identity (Citrin, 2014) . The discussion of country effects ends with the interesting result observed for credentialists that are mainly characterized by the positive association found in Russia and the US in both waves. Both countries were the main primary actors in the cold war, so citizens could consider that all the items are important to form the national identity. Nevertheless, an essential difference between the countries existed regarding the ethnic-oriented nationalism, which is positively associated with Russia and negatively associated with the US. Ethnic preference in Russia may result from of Putin's ethnic policies, such as the annexation of Crimea due to his ethnic identity (Kolstø, 2016).

Credentialism in Russia can be partly explained by the recent occupation of Ukraine that continues the annexation of the Crimean Peninsula that took place in 2014. The justification is based on the vintage Putin rhetoric that declares the Russian people as an ethnic entity, claiming that, after the collapse of the Soviet Union 'the Russian people have become one of the largest divided nations in the world (Kolstø & Blakkisrud, 2016).

The analysis of the political orientations showed differences regarding the affinity to one type of nationalism. The new waves of migration flows have intensified the resurgence of nationalist movements across Europe. The populist speeches of far-right leaders have awakened the fear that the immigrants could undermine the national identity of a country, and the economic situation (Tamir, 2020). Indeed, far-rightist citizens appear, from our analyses, to support ethnic-oriented nationalism over civic-oriented nationalism in 2003 and credentialism in 2013. Ding and

Hlavac (2017) found that voting for right-wing populist parties is more rooted in firmed beliefs about national identity preservation and cultural pureness than negative sentiments against political elites and establishment.

In addition, far-leftist, leftist, and centrist citizens do also have a particular conception of national identity. Custodi (2021) contended that leftist citizens preferred to associate a national identity with more moral criteria than ethnic or civic, so it seems reasonable to assume that these citizens are more similar to post nationalists. Liberals and centrist citizens, on the other hand, showed unexpected results as they were positively associated with ethnic-oriented nationalism in the year 2003. It can be concluded that citizens might have different definitions of liberalism for each of the countries analyzed in the study.

Finally, the age results showed an apparent dichotomy between the youngest and eldest generations regarding the national identity formation. The eldest generation tended to be more credentialists, less post nationalist, and less civic-oriented nationals than other age groups. On the other hand, the youngest generation tended to be more post nationalist, ethnic-oriented, and less civic-oriented than other age groups. The distinction can be explained in different political views regarding globalization and climate change (Tyson et al., 2021). These results were also confirmed by Azada-palacios (2021), where the authors found that the younger and well-educated American generations showed low levels of nationalism. Meanwhile, a larger group of citizens, characterized by being older and less well educated, embraces every form of nationalist sentiment.

7.8 Conclusions

The study aimed to analyze the concept of national identity studied by various scholars (Bonikowski & DiMaggio, 2016; Kunovich, 2009; Smith et al., 1994; Theiss-Morse, 2009; Wright et al., 2012). The classic distinction between ethnic and civic national identity was further addressed, allowing the possibility of giving more or less importance to each of the considered dimensions, following previous studies (Kunovich, 2009; Larsen, 2017; Medrano, 2005). Thus, it was possible to distinguish between 4 or 16 national identity categories. Pure post nationalists, pure civic-oriented nationalists, pure ethnic-oriented nationalists, and pure credentialists

were further studied according to three covariates, country, political orientation, and age, in each of the waves.

The study confirms and complements some previous results found in the literature, contributing to innovation by applying a novel approach based on fuzzy set theory. In this sense, the study can identify the different national identity types of an ample sample of citizens at the individual level. Previous published cross-national studies used MGCFA analyzing metric and scalar measurement equivalence through the respective global fit tests, such as CFI differences, RMSEA differences, and SRMR differences, and most of them failed even to find partial scalar equivalence. For this reason, most of the studies frequently reduced the number of countries. Davidov et al. (Davidov et al., 2015) contended that researchers needed to omit 30 percent of the countries, on average, in order to get equivalent scales. The novel approach presented in the study, based on FST and the extended eco-apostle model, is more flexible than MGCFA and deals adequately with the vague information provided by the Likert scales used by the ISSP national identity module. The novel approach analyzes the national identity at the individual level, and this is also a novel characteristic that produces insightful results. Therefore, we conclude that methods based on FST can also be a suitable tool to analyze social science topics, as in the case of national identity.

The results showed that most citizens are credentialists -neither civic nor ethnic nationalists. Thus, most citizens consider that national identity should be based on both ethnic and civic items, concurring with results obtained by [10]. The existence of these two extreme classes of citizens, post nationalists and credentialists, was already found by Bonikowski (2016). The intermediate classes resemble the ethnic and civic-oriented national identity types named in their study as ethno cultural and creedal nationalism.

The results showed that national identity differences were observed at the country, political orientation, and age level. As with any other study, future research is needed to overcome some limitations. First, the analysis could be broaden to other waves beyond 2003 and 2013. It would be interesting analyze if the citizen national identity has been changed in the last decade, as a consequence of the last refugees crisis and the recent Russia-Ukraine conflict. Second, the four pure categories are

based on an alpha coefficient which is equal to 0.5 in the study, and other alpha parameters can be studied to analyze the robustness of the results. Finally, the study included only three covariates, namely country, political orientation, and age, to analyze their effects on national identity. It could be tested how other socioeconomics characteristics, such as gender, income, religion, multiculturalism or traditionalism, affect national identity.

8

Conclusions

8.1 General discussion

This work aimed to introduce new quantitative approaches to the study of the social sciences. The literature in the field of study of attitudes towards immigrants and national identity has made substantial theoretical progress in the last two decades. Despite this, the field does not appear to be making methodological progress. Many researchers have been implementing OLS regression models, Structural Equation Model (SEM) and Confirmatory Factor Analysis (CFA). Therefore, the main aim of the study was to introduce deterministic mathematical approaches in the study of the reference field.

In this sense, two multi-criteria analysis approaches, DEA and Fuzzy TOPSIS, were implemented to verify whether the results could replicate previous studies or even improve the results of them. The DEA has proven to be a good tool for creating synthetic indicators that measure citizens' openness to immigrants. Using round 8 of the ESS, indices of openness towards immigrants were calculated according to each reference group under analysis, such as country and political orientation.

The Fuzzy methodology used here is a hybrid approach based on a transformation of vague information provided by the crisp answer values of the questionnaires into TFNs for which it is possible to apply the fundamentals of the algebra of the fuzzy set theory. Thus, synthetic indicators were created to measure the ATI through the TOPSIS technique. It has been shown that this methodology is applicable to the social sciences providing consistent results similar to those obtained by other methodologies, but handling the information vagueness more properly than the mentioned methods. At the same time, it is also possible to obtain results at individual level as well as in aggregates.

Furthermore, through the Apostle Model, the study analysed the ethnic/civic dichotomy of national identity widening the previous existing citizens' categorization. By adopting the analogy of the loyalty/customer satisfaction method to the ethnic/civic criteria of national identity, and extending the Classical Apostle Model, the results provide sixteen different categories of national identity, four of them associated to interest types of citizens: pure ethnic oriented, pure civic oriented, pure credentialists, and pure post-nationalists.

Another important result of the project obtains the main determinants of ATI and

the national identity. To offer a broader overview, the indicator that measures ATI and national identity have been calculated at the country level, for each age group, for the perception of income, employment status, gender, religion, citizenship and political orientation. In this context, the aim was to detect differences within the variables. Furthermore, to provide a more specific view, the ATI has been calculated at regional level.
The most important results obtained in the study will be listed below following the order of the research questions introduced in the first part of the project. Thus, the research questions of the study are answered as follows:

- The application of new approaches, such as DEA and FST, have produced consistent results, overcoming some of the limitations that exist in the methodologies commonly used in the field. The introduction of these methodologies allows a valid treatment of vague information and are able to provide results at an individual level (Martín, 2021; 2022).

- The socio-economic characteristics of individuals are determinants of national identity and attitudes towards immigrants. Thus, being an Iberian or Northern European citizen positively influences the attitude towards immigrants. Similarly, age, political orientation, citizenship, income and religion influence the ATI, as elderly groups, right-wing voters, natives, low income earners and Catholics are more hostile to immigrants. On the other hand, young people, citizens who vote left wing political parties, foreigners, wealthy citizens and religions other than Christian ones show more positive ATI.

- There are differences in openness towards immigrants across the territories. Capital regions are the regions with the highest ATI values. Substantial difference between island regions has been identified. Islands with a tourist-driven economy are the regions which are more open to immigrants.

- Following Medrano (2005), the Apostle Model has identified new theoretical frontiers of national identity beyond the ethnic/civic dichotomy. Two new types were found to be relevant, such as citizens who considered both criteria to be important (credentialists), and those who prefered to associate a national identity with other criteria (postnationalists).

8.2 Future research

The results of the study are solid, so the implementation of the DEA and the FST methodologies in other topics in the social sciences could be a fruitful area for future research. Despite this, the aim is now to analyse attitudes towards immigrants or national identity using other covariates that have not been used in the study. It will also be worth to use other econometric methods, such as ordinal multivariate probit methods or latent class models. Furthermore, another scope is to broaden the concept of national identity to other latent variables, such as patriotism and nationalism. Finally, it might be interesting to study the relationship between the ATI and the various categories of national identity.

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Resumen en Español

Marco Teórico

Las fronteras europeas atraviesan un largo e intenso período de estrés, debido a los flujos migratorios masivos. La crisis afgana, la primavera árabe, la guerra en Siria y la invasión rusa en Ucrania están alimentando de manera incesante el éxodo migratorio (Yıldız, 2016).
Según Ravenstein (1889), las fuerzas motrices de la inmigración son la situación económica, por temas de reunificación familiar y la atracción de los grandes centros urbanos. Desde el siglo pasado, muchos inmigrantes han huido de crisis políticas y guerras. La Primera y Segunda Guerra Mundial impulsaron a muchos europeos a emigrar a América. Incluso Europa, desde principios de los noventa, ha tenido que hacer frente a una intensa inmigración internacional, con varios episodios de entrada masiva de inmigrantes y refugiados, como el éxodo albanés hacia la costa adriática del sur de Italia. Además, a principios de la década de los 2000, los conflictos en Oriente Medio llevaron a miles de afganos y sirios a huir a destinos europeos. La reciente invasión rusa en Ucrania ha provocado más de siete millones de refugiados. En consecuencia, los últimos años se caracterizan por el intenso debate social y político sobre la acogida de inmigrantes y refugiados. La opinión de los ciudadanos sobre los inmigrantes siempre ha sido favorable, pero estudios revelan que esta condición está mutando. La invasión anunciada por la extrema derecha y la sucesión de atentados terroristas islámicos, como los de Madrid 2004, Londres 2005, Charlie Hebdo 2015 y París 2018, han remodelado la percepción ciudadana sobre los inmigrantes (Bar- Tal y Sharvit, 2004; Ben-Ezra, Leshem and Goodwin, 2015; Huddy et al., 2005; Miguel-Tobal et al., 2006; Skitka, Bauman y Mullen, 2004; Vasilopoulos, Marcus and Foucault, 2018).
Según varios investigadores, las actitudes hacia los inmigrantes suelen estar determinadas por las características socioeconómicas de los ciudadanos (Bail, 2008; Czymara, 2021; de Vreese, 2017; Martín e Indelicato, 2022). De hecho, estudios a nivel europeo muestran que los países del centro-norte de Europa están más abiertos a los inmigrantes que los países de Europa del Este. A pesar de ello, Martín e Indelicato (2021) identifican a la Península Ibérica como la región europea más acogedora para los recién llegados.
El aumento de los flujos migratorios también está cambiando el escenario político europeo. Los gobiernos tuvieron que hacer frente a la lucha política de las fuerzas extremistas en defensa de las fronteras. De hecho, en los últimos años, los líderes extremistas europeos, Marine Le Pen, Viktor Orban, Santiago Abascal y Giorgia Meloni, han aumentado exponencialmente su base electoral. Lograron reunir el consenso de aquella población que manifiesta descontento por la percepción de la amenaza socioeconómica y cultural de la inmigración (Alonso y Fonseca, 2012). En este contexto, la defensa de la identidad nacional amenazada por la inmigración se ha convertido en el punto principal en la agenda política de los movimientos de

extrema derecha en muchos países. (Tamir, 2020).
A pesar de esto, la identidad nacional ha sido objeto de disputas teóricas por parte de diversos investigadores. Kunovich (2009) señala que la identidad nacional se caracteriza principalmente por dos criterios: étnico y cívico. Custodi (2021), por su parte, afirma que la identidad nacional puede referirse a criterios morales y al sentimiento de pertenencia a una comunidad. Medrano (2005) ofrece una primera visión general más amplia de la identidad nacional que no solo incluye el clásico dualismo étnico/cívico de la identidad nacional, sino que proporciona una definición para quienes consideran importantes ambos criterios, los credencialistas, y quienes no consideran importante ni lo étnico, ni lo cívico, los posnacionalistas.
Este trabajo trata dos temas relacionados entre sí, las actitudes hacia los inmigrantes y la identidad nacional. Luego, como elección de trabajo por compendio, se proponen cinco artículos, tres de los cuales ya han sido publicados y los otros dos en revisión por importantes revistas internacionales. Por tanto, el primer trabajo propone la introducción de la metodología DEA en el campo estudiado. Posteriormente, el segundo artículo introduce la FST en el estudio de las actitudes hacia los inmigrantes. El tercer artículo aún no ha sido publicado, pero está siendo revisado por la revista Matemáticas. Este trabajo ofrece una visión territorial de la ATI y ofrece una comparación entre regiones continentales e insulares. El cuarto artículo se centra en la comparación metodológica entre CFA y FST en el estudio de la identidad nacional. El quinto artículo ofrece un panorama más amplio de la definición de identidad nacional, superando así la dicotomía étnico/cívico.

Objetivos

La metodología utilizada en las ciencias sociales a menudo implica modelos de regresión, Structural Equation Model (SEM) o Confirmatory Factor Analysis (CFA). A pesar de los grandes éxitos académicos en las ciencias sociales, y en particular en el estudio de las actitudes hacia los inmigrantes (ATI) y la identidad nacional, la literatura no muestra avances en las metodologías utilizadas.
Aunque SEM y CFA han demostrado ser enfoques útiles en las ciencias sociales, abrirse a nuevas fronteras metodológicas puede ser interesante. El objetivo de este trabajo es introducir nuevos enfoques matemáticos en el estudio de las actitudes hacia los inmigrantes y la identidad nacional. Este trabajo presenta tres enfoques diferentes, el DEA, la FST y la teoría del modelo del apóstol, para explicar el comportamiento de los ciudadanos hacia la inmigración y la identidad nacional.
Este estudio pretende responder otras preguntas importantes en el estudio de la ATI y la identidad nacional. En primer lugar, se analizan las relaciones entre las actitudes hacia los inmigrantes y las características socioeconómicas individuales. También se investiga si la orientación política puede ser un factor influyente en el

sentimiento antiinmigrante. Además, se intenta identificar una influencia territorial a nivel regional en el comportamiento de los ciudadanos hacia los inmigrantes. Finalmente, cabe preguntarse si existen otros tipos de identidad nacional además de las étnicas y cívicas.

Datos y metodologías

Los datos de este trabajo fueron proporcionados principalmente por dos bases de datos importantes a nivel de estudios sociales, la European Social Survey (ESS) y el International Social Survey Programme (ISSP).
Además, algunos artículos incluidos en este proyecto utilizaron datos de otras fuentes externas, como Economist Intelligence Unit, Universal Declaration of Human Rights, Eurostat y datos electorales proporcionados por los ministerios del interior de cada país analizado. Estas fuentes ha sido utilizadas para comparar los resultados entre ATI, identidad nacional e índices que miden la democracia, los derechos civiles, la libertad en el país, la tasa neta de migración, el porcentaje de presencia de extranjeros en el país y el porcentaje de votos obtenidos de la extrema derecha en cada país.
Data Envelopment Analyis (DEA) es una técnica no paramétrica desarrollada para medir la eficiencia productiva. Es un método basado en la programación lineal matemática lineal que se resuelve iterativamente para obtener el indicador de eficiencia para una muestra de unidades de decisión (DMU), en el que se comparan los factores de producción y las unidades producidas de cada unidad con una combinación lineal de las mismas que se observan en la muestra total (Charnes, 1978).
La FST se aplica para gestionar la vaguedad de la información proporcionada por las respuestas dadas al el cuestionario. En primer lugar, las escalas ordinales semánticas o de Likert se convierten en números fuzzy triangulares (TFN). Los números fuzzy triangulares se caracterizan por una terna de números reales. Por lo tanto, cada punto de la escala semántica o Likert estará asignado a un TFN.
Las escalas semánticas ordinales o tipo Likert proporcionadas por los entrevistados se transformarán en TFN caracterizadas por el hecho de que el universo del discurso se encuentra dentro del intervalo [0, 100]. El intervalo se elige por claridad sin pérdida de generalización.
Se obtiene así una matriz de números triangulares. Esta matriz se conoce como matriz de información TFN y contiene mucha información que es difícil de analizar. Por ello, se realiza una defuzzificación de la matriz para sintetizar la información (Kumar, 2017). Por lo tanto, la matriz de información fuzzy se convertirá en una matriz de información convencional de números reales ya que la incertidumbre y la vaguedad de la información se han manejado adecuadamente.

Finalmente, a partir de esta matriz de información clarificada, se calculan las soluciones ideales positivas y negativas para cada variable latente. Así, encontramos las distancias euclidianas entre los diversos grupos y las soluciones ideales. Estas distancias se utilizan para calcular el indicador sintético, comparando la distancia entre el grupo y la solución ideal negativa y la suma entre la distancia entre el grupo y las soluciones ideal positiva y negativa.

Resultados

La principal pregunta de investigación de este estudio se basa en analizar la posibilidad de introducir nuevos enfoques matemáticos determinísticos en el estudio de las ciencias sociales.
En este sentido, se implementaron dos enfoques de análisis multicriterio, DEA y Fuzzy TOPSIS, para comprobar si los resultados podían replicar estudios previos o incluso mejorar los resultados de estos. El DEA ha demostrado ser una herramienta válida para la creación de indicadores sintéticos que miden la apertura de los ciudadanos hacia los inmigrantes. Utilizando la ronda 8 de la ESS, se calcularon los índices de apertura hacia los inmigrantes en función de cada grupo objetivo bajo análisis, como el país y la orientación política.
La metodología Fuzzy utilizada aquí es un enfoque híbrido basado en una transformación de información vaga proporcionada por las respuestas de los cuestionarios. A partir de estos nuevos valores se obtuvieron indicadores sintéticos que miden el ATI a través de la técnica TOPSIS. Se ha demostrado que esta metodología es aplicable a las ciencias sociales y brinda mejor calidad de resultados que otras metodologías, ya que maneja la vaguedad de la información de las encuestas y proporciona resultados a nivel individual, así como a nivel agregado.
Además, con el Modelo del Apóstol, se ha analizado la dicotomía étnico/cívico de la identidad nacional y se ha aportado una visión más amplia de la variable latente. Al adoptar el método de lealtad/satisfacción del cliente a los criterios cívico y étnico de identidad nacional, se extiende el modelo clásico cuyos resultados proporcionan dieciséis categorías diferentes de identidad nacional. Cuatro de estas categorias son especialmente relevantes: orientación étnica pura, puramente cívica, credencialistas puros (aquellos que consideran importantes los criterios cívicos y étnicos) y posnacionalistas puros (aquellos que consideran irrelevantes las consideraciones analizadas). El estudio también encontró una relación entre ATI e identidad nacional con variables socioeconómicas individuales. Para ofrecer una visión más amplia, el indicador que mide las actitudes hacia los inmigrantes se calculó a nivel de país, para cada grupo de edad, para la percepción de ingresos economicos, situación laboral, género, religión, ciudadanía y orientación política. En este contexto, el objetivo era detectar diferencias dentro de las variables. Además, para dar una visión más

específica, el ATI se calculó a nivel regional.
Los resultados indican una separación entre el norte y el este de Europa. Los primeros, junto con la Península Ibérica, son los países más tolerantes a la inmigración. Entre los más abiertos a la inmigración, el estudio también destaca a los jóvenes, personas con altos ingresos, que profesan religiones distintas a la católica y ciudadanos extranjeros.
También se observaron diferencias en la apertura a los inmigrantes entre territorios. Las regiones capitales son las regiones con los valores ATI más altos. Se identificó una diferencia sustancial entre las regiones insulares. Las islas con una economía más basada en el turismo resultan las regiones más abiertas a los inmigrantes.
De igual forma, la identidad nacional brindó resultados en función de las covariables consideradas, que son: país, orientación política y grupo de edad. Las dos grandes potencias mundiales, EEUU y Rusia, son los países más exigentes, ya que piden criterios tanto cívicos como étnicos. Los ciudadanos de orientación política de izquierda, por el contrario, son aquellos que asocian la identidad nacional con algo diferente que la etnia y el respeto a la ley.

Riassunto in Italiano

Background Teorico

I confini europei stanno attraversando un lungo e intenso periodo di stress, dovuto a massivi flussi migratori. La crisi afgana, la primavera araba, la guerra in Siria e l'invasione russa dell'Ucraina stanno alimentando fortemente l'immigrazione (Yıldız, 2016).
Secondo Ravenstein (1889), le forze trainanti dell'immigrazione sono l'economia, il ricongiungimento familiare e l'attrazione dai grandi centri urbani. Nonostante ciò, dal secolo scorso, molti immigrati hanno deciso di spostarsi per motivi bellici. La prima e la seconda guerra mondiale hanno spinto molti europei ad emigrare in America. Anche l'Europa, dai primi anni novanta ha dovuto affrontare una intensa immigrazione internazionale, con vari episodi di entrata massiva di immigrati e rifugiati, come l'esodo albanese verso le coste pugliesi. Inoltre, all'inizio degli anni 2000, i conflitti in Medio Oriente hanno spinto migliaia di afgani e siriani a fuggire verso destinazioni europee. Così come l'invasione russa dell'Ucraina che ha causato più di sette milioni di profughi.
Di conseguenza, negli ultimi anni il dibattito sociale e politico sull'accoglienza di immigrati e rifugiati è diventato sempre piú acceso. Le opinioni dei cittadini sugli immigrati sono sempre state favorevoli, ma negli ultimi anni stanno subendo dei cambiamenti. L'invasione annunciata da estremisti di destra e il susseguirsi di attacchi terroristici islamici, come quelli di Madrid, Londra 2005, Charlie Hebdo 2015 e Parigi 2018 hanno rimodellato la percezione degli immigrati da parte dei cittadini (Miguel-Tobal et al., 2006; Bar-Tal e Sharvit, 2004; Huddy et al., 2005; Skitka, Bauman e Mullen, 2004; Ben-Ezra, Leshem e Goodwin, 2015; Vasilopoulos, Marcus e Foucault, 2018).
Secondo vari ricercatori, gli atteggiamenti nei confronti degli immigrati sono spesso modellati dalle caratteristiche socio-economiche dei cittadini (Martín e Indelicato, 2022; Bail, 2008; Czymara, 2021; de Vreese, 2017). Infatti, studi a livello europeo mostrano che i paesi centro-settentrionali dell'Europa sono più aperti agli immigrati rispetto ai paesi dell'Europa orientale. Nonostante ció, Martín e Indelicato (2021) identificano la penisola iberica come la regione europea piú accogliente per i nuovi arrivati.
L'aumento dei flussi migratori ha coinvolto anche la scena politica europea. I governi hanno dovuto far fronte all'exploit delle forze estremiste a difesa dei confini. Infatti, negli ultimi anni, i leader estremisti europei, Marine Le Pen, Viktor Orban, Santiago Abascal e Giorgia Meloni, hanno aumentato esponenziamente il loro bacino elettorale. Sono riusciti a raccogliere il consenso di quella popolazione che manifesta un malcontento dovuta alla percezione della minaccia socio-economica e culturale dell'immigrazione (Alonso e Fonseca, 2012) In questo contesto, la difesa dell'identità nazionale minacciata dall'immigrazione è diventata il punto principale dell'agenda politica dei movimenti di estrema destra di molti paesi. (Tamir, 2020).

Nonostante ciò, l'identità nazionale è stata oggetto di contrasti teorici da parte di vari studiosi. Kunovich (2009) sottolinea che l'identità nazionale è principalmente caratterizzata da due criteri: etnico e civico. Custodi (2021) afferma invece che l'identità nazionale può riferirsi a criteri morali e al sentimento di appartenenza a una comunità. Medrano (2005) fornisce una prima panoramica più ampia dell'identità nazionale che non solo include il classico dualismo etnico/civico dell'identità nazionale, ma fornisce una definizione per coloro che considerano importanti entrambi i criteri, i credentialisti, e coloro che non considerano importanti i criteri etnici e civici per far parte di una comunità nazionale, i postnazionalisti.
Questo lavoro tratta due temi strettamente legati tra loro, gli Atteggiamenti verso gli immigrati e l'Idenitá Nazionale. Quindi, come elezione di lavoro per compendio, sono stati proposti cinque papers, di cui tre giá pubblicati e gli altri due in fase di revisione da parte di riviste internazionali importanti. Quindi, il primo paper propone l'introduzione della metodologia DEA nel campo studiate. Successivamente, il secondo articolo introduce la Teoria degli Insiemi Fuzzy nello studio degli atteggiamenti verso gli immigrati. Il terzo articolo non é stato ancora pubblicato, ma é sotto revisione dalla revista Mathematics. Questo lavoro offre una panoramica territoriale dell'ATI e offre un confronto tra regioni continentali e regioni isolane. Il quarto articolo infoca il confronto metodologico tra CFA e FST nello studio dell'identità nazionale. Il quinto articolo, fornisce una panoramica piú amplia della definizione di identità nazionale, superando così la dicotomia etnico/civica.

Obiettivi

La metodologia utilizzata nel campo delle scienze sociali coinvolge spesso modelli di regressione, Structural Equation Model (SEM) o Confirmatory Factor Analysis (CFA). Nonostante i grandi successi accademici nelle scienze sociali, ed in particolare nello studio degli atteggiamenti nei confronti degli immigrati (ATI) e dell'identità nazionale, la letteratura non presenta progressi nelle metodologie utilizzate.
Sebbene SEM e CFA sono tools utili nelle scienze sociali, l'apertura a nuove frontiere metodologiche può essere interessante. Pertanto, l'obiettivo di questo lavoro è quello di introdurre nuovi approcci matematici nello studio degli atteggiamenti nei confronti degli immigrati e dell'identità nazionale. Questo lavoro introduce tre approcci differenti, la Data Envelopment Analysis (DEA), la Fuzzy Set Theory (FST) e la teoria del Modello Apostolo, per spiegare il comportamento dei cittadini nei confronti dell'immigrazione e dell'identità nazionale.
Questo studio ha l'obiettivo di rispondere ad altri quesiti importanti nello studio dell'ATI e dell'idenitiá nazionale. In primo luogo, si analizzano le relazioni tra gli atteggiamenti nei confronti degli immigrati e caratteristiche socioeconomiche

individuali. Si studia anche, se l'orientamento politico può essere una determinante influenzante del sentimento anti-immigrati. Inoltre, si cerca di individuare un'influenza territoriale a livello regionale nel comportamento dei cittadini nei confronti degli immigrati. Infine, ci si chiede se esistono altre tipologie di identità nazionale oltre a quella etnica e civica?

Dati e metodologie

I dati per questo lavoro sono stati forniti principalmente da due database importanti a livello di studi sociali. European Social Survey (ESS) e il International Social Survey Programme (ISSP).
Inoltre, alcuni paper inclusi in questo progetto hanno utlizzato dati provenienti da altre fonti esterne, come Economist Intelligence Unit, Universal Declaration of Human Rights, Eurostat e dati elettorali forniti dai ministeri degli interni di ciascun paese analizzato. Queste fonti sono stati utili per confrontare i risultati tra ATI, idenitá nazionale e indici che misurano la democrazia, i diritti civili, la libertá nel paese, il tasso di migrazione netta, la percentali di presenza di stranieri nel paese e le percentuali di voto ottenuti dai partiti di estrema destra per ogni paese.
La Data Envelopment Analyis (DEA) è una tecnica non parametrica sviluppata per misurare l'efficienza della produzione. È un programma matematico lineare che viene risolto in modo iterativo per ottenere l'indicatore di efficienza per un campione di unità decisionali (DMU), in cui gli input e gli output di ciascuna unità vengono confrontati con una combinazione lineare di input e output osservati nel campione. (Charnes, 1978).
LA FST viene applicata per gestire la vaghezza delle informazioni fornite dalle risposte date dal questionario. Innanzitutto, le scale ordinali semantiche o Likert vengono convertite in Triangular Fuzzy Numbers (TFN). I numeri fuzzy triangolari sono caratterizzati da una tripletta di numeri reali. Pertanto, ogni punto della scala semantica sarà assegnato a un TFN.
Le scale ordinali semantiche o Likert fornite dagli intervistati saranno trasformate in TFN caratterizzati dal fatto che l'universo del discorso è dentro l'intervallo [0, 100]. L'intervallo del discorso è scelto per chiarezza senza perdita di generalizzazione.
Si ottiene così una matrice di TFN. Questa matrice è nota come matrice di informazioni TFN e contiene molte informazioni difficili da analizzare. Per questo motivo viene effettuata una defuzzificazione della matrice per sintetizzare le informazioni (Kumar, 2017). Pertanto, la matrice di informazioni fuzzy verrà convertita in un numero reale plausibile o in una matrice di informazioni di valore nitido poiché l'incertezza e la vaghezza delle informazioni sono state adeguatamente gestite.
Infine, da questa matrice di informazioni nitida, si calcolano le soluzioni ideali positive negative per ogni costrutto. Quindi, si trovano le distanze euclidee tra i

vari gruppi e le soluzioni ideli. Queste distanze vengono utilizzate per calcolare l'indicatore sintentico , rapportando la distanza tra il gruppo e la soluzione ideale negative e la somma tra la distanza tra il gruppo e la soluzione ideale positiva e negativa.

Risultati

La principale domanda di ricerca di questo studio chiedeva di analizzare la possibilitá di introdurre nuovi approcci matematici deterministici nello studio del campo di riferimento.
In questo senso, sono stati implementati due approcci di analisi multi-criterio, DEA e Fuzzy TOPSIS, per verificare se i risultati potessero replicare studi precedenti o addirittura migliorare i risultati di altri studi. La DEA si è rivelata un valido strumento per creare indicatori sintetici che misurino l'apertura dei cittadini agli immigrati. Utilizzando il round 8 dell'ESS, sono stati calcolati gli indici di apertura verso gli immigrati in base a ciascun gruppo di riferimento in analisi, come il paese e l'orientamento politico.
La metodologia Fuzzy qui utilizzata è un approccio ibrido basato su una trasformazione di informazioni vaghe fornite dalle risposte dei questionari in valori netti. Da questi valori chiari sono stati ricavati degli indicatori sintetici che misurano l'ATI attraverso la tecnica TOPSIS. È stato dimostrato che questa metodologia è applicabile alle scienze sociali e fornisce una migliore qualità dei risultati rispetto ad altre metodologie, poiché gestiona la vaghezza delle informazioni grezze e fornisce risultati a livello individuale, così come a livello aggregato.
Inoltre, con il Modello Apostolo, la dicotomia etnico/civica dell'identità nazionale é stata analizzata ed é stata fornita, inoltre, una visione più ampia del concetto. Adottando il metodo loyality/satisfaction del cliente ai criteri etnici civici dell'identità nazionale, e ad un'estensione del Modello Apostolo, i risultati deducono sedici diverse categorie di identità nazionale, quattro di queste sono: l'orientamento puramente etnico, l'orientamento puramente civico, puro credenzialista (quelli che considerano importanti sia i criteri civici che quelli etnici) ed i puri postnazionalisti (coloro che considerano irrilevanti le considerazioni analizzate). Questo studio ha inoltre trovato una relazione tra ATI e dell'identità nazionale con le singole variabili socioeconomiche. Per offrire una visione più ampia, l'indicatore che misura gli atteggiamenti nei confronti degli immigrati è stato calcolato a livello di Paese, per ciascuna fascia di età, per la percezione del reddito, della condizione lavorativa, del genere, della religione, della cittadinanza e dell'orientamento politico. In questo contesto, l'obiettivo era quello di rilevare le differenze all'interno delle variabili. Inoltre, per fornire una visione più specifica, l'ATI è stato calcolato su scala regionale e per ogni partito politico votato.

I risultati indicanouna separazione tra Nord ed Est Europa. I primi, insieme alla penisola iberica risultano essere i paesi piú tolleranti all'immigrazione. Tra i piú aperti all'immigrazione, lo studio rileva anche i giovani, i percettori di redditi alti, chiprofessa religioni diverse da quella cattolica e i cittadini stranieri.
Sono state rilevate, inoltre, delle differenze nell'apertura verso gli immigrati tra territori. Le regioni capitali sono le regioni con i valori ATI più elevati. È stata identificata una differenza sostanziale tra le regioni insulari. Le isole con un'economia trainata dal turismo sono le regioni più aperte agli immigrati.
Allo stesso modo, l'identità nazionale ha fornito risultati a seconda delle covariate prese in considerazione, che sono: paese, orientamento politico e classe di età. I due colossi mondiali, USA e Russia sono i paesi piú esigenti, in quanto chiedono sia criteri civici che etnici. I cittadini con un orietamento politico di sinistra, invece, sono quelli che associano l'idenitá nazionale a qualcosa di diverso dalla etnia e dal rispetto delle leggi.
Pertanto, l'applicazione di nuovi approcci, come DEA e FST, ha prodotto risultati coerenti, superando gli ostacoli delle metodologie comunemente utilizzate sul campo. L'introduzione di queste metodologie consente un trattamento valido di informazioni vaghe e sono in grado di fornire risultati a livello individuale (Martín, 2021; 2022). Le caratteristiche socio-economiche degli individui sono proxy dell'identità nazionale e del comportamento nei confronti degli immigrati. Essere cittadino iberico o nord europeo influenza positivamente l'atteggiamento nei confronti degli immigrati. Allo stesso modo, l'età, l'orientamento politico, la cittadinanza, il reddito e la religione influenzano l'ATI, poiché gli anziani, i cittadini di destra, i nativi, i redditi bassi e i cattolici sono più ostili agli immigrati. Più positivi invece i giovani, i cittadini che votano di sinistra, gli stranieri, gli economisti facoltosi e le religioni diverse da quelle cristiane.

Appendix: Other contributions in the doctoral learning process

Another paper that was written during the PhD is presented in this appendix. This paper is not submitted for discussion.

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Article

Are Citizens Credentialist or Post-Nationalists? A Fuzzy-Eco Apostle Model Applied to National Identity

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Abstract: The debate on national identity has been receiving more attention from academics, social planners, and the public in recent years. This study aims to analyse citizens' different national identity typologies using data from the International Social Survey Program (ISSP) in two waves: 2003 and 2013. The study is based on 10 countries for which the dimensions of the national identity construct are first examined through multi-group confirmatory factor analysis (MGCFA). Then, a fuzzy hybrid approach is used to obtain two synthetic indicators for each dimension of national identity, namely ethnic and civic orientations. Then, a fuzzy clustering analysis is used to extend the Classical Apostle Model, obtaining 16 different national identity categories that expand the four Apostle categories denominated as credentialists, post-nationalists, ethnic-oriented and civic-oriented. The study ends by applying the Binary Probit Model to analyse whether some socioeconomic characteristics can partly explain the four pure national identity categories. Our results show that people seem to be increasingly credentialists. Furthermore, the civic–ethnic dichotomy of France–Germany is no longer confirmed, as Germans appear to be included in the civic-oriented national identity group.

Keywords: national identity; International Social Survey Program (ISSP); ethnic identity; civic identity; credentialists; post-nationalists; fuzzy clustering analysis; extended eco apostle model

MSC: 03B52; 68T27; 68T37; 94D05

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1. Introduction

National identity is a topic that has been extensively studied in the historical course of each country, and various migratory waves and globalisation have strongly influenced its definition. Many theories have shown that national identity is often associated with linguistic, religious, and ethnic characteristics ([1–4]). Scholars have argued that some individuals can develop a national identity based on ethnic and civic criteria [3], while others, on the contrary, have identified citizens who are aligned with an inclusive social state that shapes a moral community [5].

This study is based on the International Social Survey Program (ISSP), in 2003 and 2013, and 10 countries: Denmark, France, Germany, Ireland, Norway, Portugal, Russia, Spain, Great Britain, and the United States. The different dimensions of national identity and how these are influenced by different social characteristics are analysed in this work. First, the Exploratory Factor Analysis analyses the structural dimensions of national identity. Second, Multigroup Confirmation Factor Analysis (MGCFA) is applied to confirm the adequacy of the structure, characterised by two dimensions: ethnic and civic [6,7]. Third, using two fuzzy logic methods, a fuzzy hybrid TOPSIS (The Technique for Order of Preference by Similarity to Ideal Solution) method and fuzzy clustering analysis, ethnic and civic national identity are studied for each citizen. Fourth, the eco-apostle model is extended according to the membership functions obtained by the fuzzy cluster